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Megan Kublins
Executive General Manager
Brickworks Land & Development
780 Wallgrove Road
Horsley Park, NSW 2175

Cumberland Ecology
PO Box 2474
Carlingford Court 2118
NSW Australia
Telephone (02) 9868 1933
Facsimile (02) 9868 1977
Web: www.cumberlandecology.com.au

PLANT 2 UPGRADE - HORSLEY PARK: RELEVANCE OF THE BIODIVERSITY OFFSETS SCHEME

Dear Megan,

The purpose of this letter is to assess the need for formal biodiversity assessments to support the proposed Development Application (DA) for upgrades to Plant 2 at the Horsley Park Brickworks site, owned by Austral Bricks Pty Ltd (hereafter referred to as the 'project'). This assessment considers the land within the Development Footprint of the proposed Plant 2 upgrade works (hereafter referred to as the 'Development Site'), with particular respect to the areas to be impacted by the project (see **Figure 1**). The Development Site occurs within Lot 7 DP1059698 at 780 Wallgrove Road, Horsley Park (hereafter referred to as 'the property'.

Our assessment is provided below, with figures provided in **Appendix A.** Flora species lists are provided in **Appendix B** and threatened species records and an assessment of the likelihood of occurrence of threatened species is summarised in **Appendix C**.

Based on our assessment of biodiversity at the Development Site, we recommend that a waiver for the preparation of a Biodiversity Development Assessment Report (BDAR) be sought from the NSW Department of Planning and Environment (DPE).

1. Background

1.1 Description of the Project

Project Name: Upgrade to Plant # 2

Description of Works:

The following works are proposed to be undertaken as part of the Plant 2 upgrades:

1. Retention of part of existing factory to accommodate existing dryers and new kiln.

2. Demolition of part of existing factory and construction of new production building to accommodate brick extrusion and dehacking areas plus offices. .

3. Construction of new footings for relocated clay bins and conveyor system. New footings to allow the relocation of the existing clay bins from the front of the factory into the pit area. New Footings for a conveyor system. This will reduce dust associated with using the haul roads at the front of the property.

4. Construction of new footings for scrubber to be attached to the existing kiln stack.

5. Construction of booster assembly, hydrant water storage tanks, and hydrant booster pump room adjacent to existing car park.

6. Construction of new water tanks to south of existing production building.

7. Construction of new hardstand areas for fire access and forklift access.

8. Replacement of sheet metal roofing of existing areas of production building to be retained.

1.2 Assessment Requirements for State Significant Development

The project is classified as Stage Significant Development under Clause 15 of Schedule 1 of State Environmental Planning Policy (State and Regional Development) 2011, as the Capital Investment Value (CIV) of the project exceeds $30 million.

Section 7.9 of the NSW *Biodiversity Conservation Act 2016* (BC Act), requires all development applications for State Significant Development to be accompanied by a Biodiversity Development Assessment Report (BDAR) unless both the Planning Agency Head and the Environment Agency Head determine that the proposed development is not likely to have any significant impact on biodiversity values.

The main steps in the biodiversity assessment process for State Significant Development are as follows:

1. The Planning Agency Head and the Environment Agency Head determines if the Biodiversity Offsets Scheme (BOS) applies to the State Significant Development and specifies the environmental assessment requirements;

2. The proponent engages an accredited person to assess the Development Site using the Biodiversity Assessment Method (BAM) and a BDAR is prepared;

3. The approval authority considers any serious and irreversible impacts and determines whether there are additional and appropriate measures to minimise impacts;

4. The approval authority sets an offset obligation as part of the Conditions of Approval; and

5. The proponent meets their offset obligation and begins their development.

The BAM sets out clear and repeatable methods to conduct an assessment of direct and indirect impacts. The BAM is supported by the BAM Tool, which is a web-based tool that quantifies direct impacts using 'biodiversity credits'. Two types of credits are generated by the BAM Tool, ecosystem credits and species credits. Ecosystem credits are calculated based on a number of variables including landscape features, native vegetation and ecosystem credit species (species that are reliably predicted by habitat surrogates). Species credits are calculated based on the number of individuals (flora) or the area of habitat (fauna) of species credit species (species that are not reliably predicted by habitat surrogates).

The BAM includes a requirement to prepare a BDAR for the Development Site. The BDAR must be prepared by an accredited assessor. A proponent is required to submit the BDAR as part of an Environmental Impact Statement for a State Significant Development.

1.3 Waiver of Requirement to Prepare a Biodiversity Development Assessment Report

Section 7.9 of the BC Act indicates that there are some circumstances in which the Planning Agency Head and the Environment Agency Head will determine that a proposed development is not likely to have a significant impact on biodiversity values and as such, a BDAR is not required to be prepared. Biodiversity values are defined under the BC Act and the *Biodiversity Conservation Regulation 2017* (BC Regulation), and include:

- Vegetation integrity—being the degree to which the composition, structure and function of vegetation at a particular site and the surrounding landscape has been altered from a near natural state;
- Habitat suitability—being the degree to which the habitat needs of threatened species are present at a particular site;
- Threatened species abundance—being the occurrence and abundance of threatened species or threatened ecological communities, or their habitat, at a particular site;
- Vegetation abundance—being the occurrence and abundance of vegetation at a particular site;
- Habitat connectivity—being the degree to which a particular site connects different areas of habitat of threatened species to facilitate the movement of those species across their range;
- Threatened species movement—being the degree to which a particular site contributes to the movement of threatened species to maintain their lifecycle;

- Flight path integrity—being the degree to which the flight paths of protected animals over a particular site are free from interference; and

- Water sustainability—being the degree to which water quality, water bodies and hydrological processes sustain threatened species and threatened ecological communities at a particular site.

For a waiver to be applied for future development at the Development Site, it needs to be demonstrated that the above listed biodiversity values will not be significantly impacted.

2. Methods

2.1 Database Analysis

Database searches were conducted to identify threatened species, populations, that occur within the locality (10 km) using the NSW Office of Environment and Heritage (OEH) BioNet Atlas database (OEH 2018a). The BioNet Atlas search facility was used to generate records of threatened flora and fauna species and populations listed under the BC Act within the search area. The number, age, and location of such records were considered to provide an indication of the species that could have the potential to occur on or around the Development Site.

2.2 Site Surveys

A Cumberland ecologist botanist and an ecologist surveyed areas of the Development Site on Tuesday, the 15th August 2018. The Development Site was inspected by traversing areas within the development footprint. A second inspection was undertaken on the 10th December 2018 by a botanist to inspect new areas of vegetation within the Development Site due to changes in the proposed development footprint. Survey locations are detailed in **Figure 2**.

i. Flora Survey

Vegetation within the Development Site was assessed in relation to Plant Community Types (PCTs) known to occur within the locality. The flora assessment undertaken within the Development Site included:

- Seven random meander surveys to detect flora species across the Development Site including targeted searches for threatened flora considered likely to occur within the Development Site, and to define vegetation community boundaries. Each flora species encountered within each random meander survey was recorded; and

- Two BAM plots (OEH 2017), one 20x50m and the other 10x100m, were undertaken to assess the condition of woodland and grassland areas.

The random meander transect surveys were focused on ground-truthing the flora of the Development Site in order to create a comprehensive flora species list. Identification and recording of vascular flora species present of the different vegetation communities was undertaken. The random meander included consideration of any threatened flora likely to occur

at the Development Site. During the site inspection, notes and photographs were taken documenting vegetation and fauna habitat features throughout the Development Site.

All vascular flora species observed were identified to species level where possible, and recorded. All vascular plants recorded or collected were identified using keys and nomenclature provided in Harden (1990-1993). Where known, taxonomic and nomenclatural changes have been incorporated into the results, these were derived from PlantNET (Botanic Gardens Trust 2018).

The Development Site has been highly cleared and modified. Vegetation types were described based on the dominant species and structure of community. Floristic data from the vegetation types mapped in the Development Site was compared with the floristic data within the Final Determination for 'Cumberland Plain Woodland in the Sydney Basin Bioregion' (hereafter referred to as 'the Final Determination') (NSW Scientific Committee 2011) and community description provided by the Commonwealth Department of the Environment and Energy (Threatened Species Scientific Committee 2008).

Due to the size and layout of the degraded vegetation present within the Development Site, sampling using flora quadrats was difficult for degraded patches of Cumberland Plain Woodland and the BAM plot within this community included areas of hard surfaces.

ii. Fauna Survey

Fauna surveys were limited to six targeted searches for the Cumberland Plain Land Snail (*Meridolum corneovirens*), listed as Endangered under the BC Act, and an assessment of fauna habitat values.

Fauna habitat assessment was undertaken in conjunction with the flora survey. Fauna habitat assessment included consideration of important indicators of habitat condition and complexity including the occurrence of microhabitats such as tree hollows, fallen logs, rock and water sources. Structural features considered included the nature and extent of the understorey and ground stratum, extent of canopy and flowering characteristics. Tree hollows are used as a general indication of habitat quality for arboreal fauna, and hollow dwelling birds and bats. Hollows observed during surveys were noted and details of the size and type were recorded. Searches for indirect indicators of fauna use of the site such as droppings, diggings, footprints, scratches, nests, burrows, paths and runways were undertaken.

Searches for the Cumberland Plain Land Snail were undertaken at the base of trees within areas previously mapped by OEH as Cumberland Plain Woodland. Searches consisted of checking within 1 m of the base of all trees surrounding the locations that had a diameter at breast height greater than 10 cm and had leaf litter present at the base (**Figure 2**).

2.3 GIS Mapping

A desktop analysis was completed to identify whether any vegetation communities were present on or nearby the Development Site. To do this, the Development Site was plotted against the broad scale mapping compiled by the OEH for Western Sydney (OEH 2013) (**Figure 3**). A

vegetation map of the Development Site was then produced based upon observations of vegetation during the site inspection (**Figure 4**).

The results from the OEH BioNet Atlas search were downloaded and plotted onto an aerial image (**Figure 5** and **6**) corresponding to the Development Site. This subsequently displayed any threatened species within the locality to determine the potential for the species to be present within the Development Site.

3. Key Findings

The Development Site is predominantly comprised of open grassland areas, and small occurrences of regrowth woodland and a small area of planted native, woody species.

3.1 Native Vegetation Desktop Study

Current aerial photography and recent vegetation mapping indicates that the Development Site has been maintained in a predominantly cleared state with additional plantings established and some regrowth occurrences of native vegetation (**Figure 3**).

The desktop study of the broad scale native vegetation mapping scheme 'Remnant Vegetation Mapping of the Cumberland Plain' (OEH 2013) revealed that three vegetation communities are common surrounding the property containing the Development Site. Two of these communities Shale Hills Woodland and Shale Plains Woodland are forms of the Critically Endangered Ecological Community (CEEC) listed under both the BC Act and the EPBC Act; Cumberland Plain Woodland. These communities are mapped as occurring within the Development Site and as small patches surrounding the property, and as large patches surrounding Prospect Reservoir to the east and north-east. The third vegetation community; Alluvial Woodland is mapped as occurring along the extent of Eastern Creek within the property containing the Development Site and to the north and south.

3.2 Vegetation of the Development Site

Three vegetation communities were recorded within the Development Site during flora surveys.

Generally, the composition, structure and function of vegetation within the Development Site and the surrounding landscape have been altered significantly from a near natural state and do not resemble any naturally occurring PCTs, with the exception of degraded occurrences of Cumberland Plain Woodland. Subsequently, the vegetation within the Development Site with the exception of Cumberland Plain Woodland has been mapped using the descriptive names "Planted Natives" and "Exotic Dominated Grassland".

i. Cumberland Plain Woodland (PCT 849) - Degraded

This community is present as two small areas within the Development Site, one in the east and one in the south. Both areas are degraded regrowth forms of the community without old trees, and a ground layer dominated by exotic grass species. The eastern occurrence consists of small isolated patches on a slope between two large concreted areas utilised by trucks and forklifts (**Photograph 1** and **2**). Canopy and sub-canopy species in this area include the

Cumberland Plain Woodland species *Eucalyptus moluccana* (Grey Box), *Eucalyptus tereticornis* (Forest Red Gum), *Eucalyptus fibrosa* (Red Ironbark) and *Eucalyptus crebra* (Narrow-leaved Ironbark). At the southern extent of the patch two small trees of the locally native species *Eucalyptus punctata* (Grey Gum) are present, which are likely planted, along with a larger planted individual of the non-endemic native species *Eucalyptus blakelyi* (Blakeley's Red Gum). Other plantings within this patch include individuals of an exotic *Cupressus* species.

The shrub layer is mostly absent with the exception of several individuals of the exotic *Lycium ferocissimum* (African Boxthorn) and young *Olea europaea* subsp. *cuspidata* (African Olive), and a planted *Nerium oleander* (Oleander). The ground layer is dominated by the exotic grass species *Eragrostis curvula* (African Lovegrass). Exotic grass species occurring less commonly include *Cenchrus clandestinus*(Kikuyu), and *Paspalum dilatatum* (Paspalum), and exotic forbs are present and include *Sida rhombifolia* (Paddys Lucerne), *Plantago lanceolata* (Lamb's Tongues), and *Bidens pilosa* (Cobbler's Pegs). The most common native species in the ground-layer is the native grass *Cynodon dactylon* (Couch), which is likely introduced to the site and accounts for about five percent of the layer, and *Bothriochloa decipiens* var. *decipiens* (Redleg Grass) is present in lesser abundances. A small number of native forbs are present with a scattered distribution in the layer and include *Dichondra repens* (Kidney Weed), *Atriplex semibaccata* (Berry Saltbush), and *Einadia nutans* subsp. *nutans* (Climbing Saltbush).

The southern occurrence of the community within the Development Site (**Photograph 3**) is at the periphery of a much larger patch. This is a small area of the community that contains one reasonably mature, though not old, *Eucalyptus tereticornis,* and a sub-canopy of a number of younger, small tree sized individuals of this species along with a single young *Eucalyptus moluccana* containing several *Amyema miquelii* (Box Mistletoe). *Eucalyptus tereticornis* also occurs as young regrowth individuals in the shrub layer, and several young *Acacia parramattensis* (Sydney Green Wattle) individuals are present in the layer.

The ground layer is dominated by the exotic grasses such as *Eragrostis curvula*, *Cenchrus clandestinus*, and *Chloris gayana* (Rhodes Grass), occurring along with a number of other less abundant species such as *Melinis repens* (Red Natal Grass), *Setaria parviflora* (Pigeon Grass), and *Briza subaristata*. Exotic forbs are common and include *Senecio madagascariensis* (Fireweed), *Bidens pilosa*, and *Lysimachia arvensis* (Scarlet Pimpernel). Native species are scattered in the ground layer, though none are abundant. Species present include the grasses, *Rytidosperma caespitosus*, which is the most commonly occurring, *Aristida vagans* (Threeawn Grass), and *Paspalidium distans*, the climber *Hardenbergia violacea* (False Sarsparilla), and the forb *Einadia nutans* subsp. *linifolia.*

The southern area of Cumberland Plain Woodland in the Development Site is contiguous with and part of a much larger patch in similar condition (**Photograph 4)**, with a canopy of young regrowth trees, and a ground layer predominately dominated by exotic grass species. Much of the occurrence at this location appears to be growing from an artificially created mound/mountain (likely created as a result of quarrying activities) and the regrowth trees therefore are likely to have germinated from seed from a shifted soil seed bank.

The community also occurs in similar condition to the east of the Development Site, along the boundary of the property, and as small areas to the east of the eastern patch.

A discussion of condition of Cumberland Plain Woodland patches within the Development Site in relation to the BC Act and EPBC Act listing criteria is provided below in Section **3.4.1**.

Photograph 1 *Degraded Cumberland Plain Woodland in the east of the Development Site*

Photograph 2 *Degraded Cumberland Plain Woodland in the east of the Development Site*

Photograph 3 *Degraded Cumberland Plain Woodland in the south of the Development Site*

Photograph 4 *Large patch of degraded Cumberland Plain Woodland to the south of the Development Site*

ii. Planted Natives

This community occurs as small areas in the Development Site in the north, east, and west. The northern occurrence consists of planted small tree sized Eucalypts including the non-endemic species *Eucalyptus scoparia* (Wallangarra White Gum). The eastern occurrence consists of planted *Casuarina glauca* (Swamp Oak) individuals on a slope between concrete surfaces (**Photograph 5**) with a ground layer dominated by exotic grasses similar to the composition of the degraded Cumberland Plain Woodland community described above, and the Exotic Dominated Grassland community described below. The western occurrence (**Photograph 6**) consists of a single individual of a cultivar of the non-endemic native species *Callistemon viminalis* (Weeping Bottlebrush) at the northern extent of a strip of planted cultivar *Callistemon viminalis* and *Callistemon citrinus* (Crimson Bottlebrush).

Photograph 5 Planted Casuarina glauca in the east of the Development Site

Photograph 6 Planted Callistemon viminalis in the West of the Development Site

iii. Exotic Dominated Grassland

This is the dominant vegetation community in the Development Site. The largest patch is present in the south of the Development Site, occurring on a steep, artificial slope with a northern aspect (**Photograph 7**), and the community occurs to the west of the existing Plant 2 buildings in unmaintained areas (**Photograph 8**), and surrounding administration buildings as mown areas generally outside of the Development Site with the exception of small areas in the far east where hydrant equipment and water tanks are proposed to be installed are proposed to be constructed (**Photograph 9**).

The community is dominated by exotic grass species, with the most common species including *Chloris gayana, Eragrostis curvula,* and *Cenchrus clandestinus*. Other species present in varying abundances include *Avena barbata* (Wild Oats), *Festuca pratensis* (Meadow Fescue), *Briza subaristata*, *Paspalum dilatatum, Melinis repens*, and *Setaria parviflora*. Exotic forbs are extremely common and species present include *Sonchus asper* (Prickly Sowthistle), *Sida rhombifolia*, *Ageratina adenophora*, and *Modiola caroliniana*. Native species are uncommon in the community, and generally occur as isolated individuals, with the exception of the likely introduced *Cynodon dactylon* which is common in some areas. Species present include the grasses *Eriochloa pseudoacrotricha* (Early Spring Grass) and *Rytidosperma caespitosus,* and forbs *Vittadinia cuneata* (Fuzzweed) and *Einadia nutans* subsp. *linifolia*.

The community is generally devoid of woody plants with the exception of some scattered shrub sized regrowth *Eucalyptus tereticornis* individuals in the south-west, several *Acacia fimbriata* individuals in the south, and scattered exotic species, predominately in the south such as *Lycium ferocissimum,* and *Chrysanthemoides monilifera* subsp. *monilifera* (Boneseed).

Photograph 7 *Exotic Dominated Grassland in the south of the Development Site*

Photograph 8 *Exotic Dominated Grassland in the east of the Development Site*

Photograph 9 *Exotic Dominated Grassland in the far east of the Development Site*

3.3 General Flora Species

A total of 107 flora species were recorded in and adjacent to the development site during site surveys. Of these 68 are exotic species, 35 are locally native species, and 3 are non-endemic native species.

3.4 Threatened Communities and Species

3.4.1 Threatened Ecological Communities

Degraded occurrences of one threatened ecological community (Cumberland Plain Woodland) are present within the Development Site. This community is listed as Critically Endangered under the NSW BC Act and the Commonwealth EPBC Act.

The listing advice for the Cumberland Plain Woodland community as listed under the EPBC Act (Threatened Species Scientific Committee 2008) states specific condition thresholds patches must meet to be considered the listed community under the EPBC Act. As the ground layers of the occurrences contain less than 30% coverage of perennial native understorey vegetation they do not meet the condition thresholds to be listed under the EPBC Act.

The final determination for the BC Act listing of Cumberland Plain Woodland (NSW Scientific Committee 2009) states that "*Cumberland Plain Woodland is characterised by the assemblage of species listed in paragraph 3 and typically comprises an open tree canopy, a near-continuous groundcover dominated by grasses and herbs, sometimes with layers of shrubs and/or small trees*." The final determination also states that "*The community also includes 'derived' native*

grasslands which result from removal of the woody strata from the woodlands and forests" and that "*Either or both of the upper-storey and mid-storey may be absent from the community. Native grasslands derived from clearing of the woodland and forest are also part of this community if they contain characteristic non-woody species listed in paragraph 3*."

While the final determination states explicitly that derived native grasslands without tree species are included as the listed community, it does not state that remnant/regrowth trees without a native ground layer are the listed community. The species listed in paragraph 3 of the final determination are all native species, and as such it is considered unlikely that patches of several remnant/regrowth native trees, over a ground layer comprised almost exclusively of exotic weed species conform to the community as described in the final determination.

Paragraph 5 of the final determination states that the ground layer of the community is dominated "by a diverse range of grasses" and that it includes "includes a diversity of forbs". Of the over ninety species of native ground cover species listed as characteristic of Cumberland Plain Woodland in Paragraph 3 of the final determination, only six were recorded as present within a random meander in the southern occurrence, and five (with one additional locally native species *Atriplex semibaccata* present, which is not listed as characteristic) within a 10 x 40m quadrat sampled within the eastern occurrence.

It should be noted that although a tree layer is relatively easy to re-establish, it is extremely difficult to restore the ground layer of degraded occurrences of grassy woodlands. The listing advice for Cumberland Plain Woodland under the EPBC Act states that "*derived grasslands and shrublands can be quite easily recovered to meet the Description and Condition Thresholds for the listed ecological community through planting of key canopy tree species and ongoing management actions. Loss of ground layer diversity is much more difficult to replace*." Due to the nearly complete absence of a native ground layer within patches containing remnant/regrowth Eucalyptus moluccana trees, and dominance of exotic weed species, it is considered unlikely that these patches would naturally regenerate to a state matching the CEEC as described under the BC Act or the EPBC Act. If these patches are left unmanaged competition for resources by exotic weed species is likely to lead to further declines in the few remaining native species left in the ground layer over time.

For the above reasons the occurrences of the community within the Development Site are not considered to be comprised of areas of the CEEC Cumberland Plain Woodland as defined for the listings under the BC Act and/or the EPBC Act due to their extensive degradation.

3.4.2 Threatened Flora

No existing records of threatened flora species are present on the Development Site. Eight threatened flora species are known to occur within the locality (**Figure 5**). Due to the highly degraded nature of the vegetation within and adjacent to the Development Site, it is considered unlikely that any threatened flora species would occur within the Development Site. The likelihood of occurrence of threatened flora species is provided in **Table 2** in **Appendix C.** Additionally, the site surveys, which included targeted searches for threatened flora species in all areas of vegetation within the Development Site, did not locate any locally endemic threatened flora species within the Development Site.

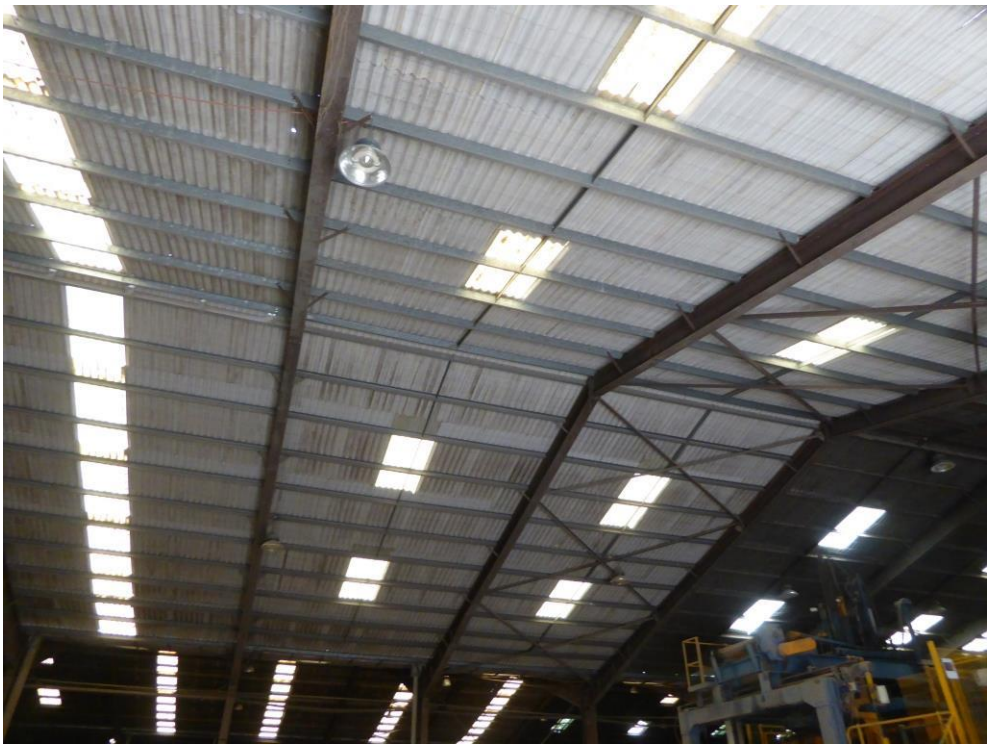
3.4.3 Fauna Habitat of the Development Site and Threatened Fauna Species

i. General Fauna Habitat

The primary habitats for native fauna within the Development Site are native trees and associated leaf litter. This vegetation may provide foraging habitat for a number of highly mobile or aerial groups of species including birds such as birds, microchiropteran bats and arboreal mammals. Litter may provide habitat for small, common reptile species such as the Garden Skink (*Lampropholis guichenoti*) and an array of invertebrate species.

Nectivorous and frugivorous species may utilise the native and exotic woody vegetation within the Development Site to feed on nectar and fruit whilst insectivorous species such as microchiropteran bats may forage for insects within the canopy of degraded woodland areas. Flowering native trees within the Development Site would be expected to provide foraging resources for common species such as the Rainbow Lorikeet *(Trichoglossus moluccanus*) and the Noisy Minor (*Manorina melanocephala*).

No hollow-bearing trees were observed within the Development Site for species requiring such features to roost or breed. As such, the Development Site does not contain roosting habitat/breeding habitat for arboreal mammals, birds, or microchiropteran bats species requiring hollows and trees are too young to have developed hollows. The production building within the Development Site which will have sheet metal roofing replaced, and is also unlikely to provide habitat for microchiropteran bat species as the walls and roof are open and constructed of beams and sheet metal, and does not provide dark, enclosed places suitable for roosting. Furthermore the noise and dust associated with an operational brick plant is likely to deter such species from roosting, even if such habitats were present.



Photograph 10 *Internal roof of the production building*

ii. Threatened Fauna Species

A number of threatened fauna species are known to occur within the locality of the Development Site (**Figure 6**). The likelihood of occurrence of these species is assessed in **Appendix C** in **Table 3**. Of these, seven species discussed below are likely to have some potential to utilise vegetation in the Development Site. There are no existing BioNet Atlas records of threatened fauna species present in the Development Site; however there is one record for a threatened species along the eastern boundary of the property (**Figure 7**). The Cumberland Plain Land Snail was recorded in the form of a single shell was by Travers Bushfire and Ecology who surveyed the property containing the Development Site in March 2015 (Cumberland Ecology assisted Travers Bushfire and Ecology with BioBanking flora surveys for a proposed development in another area of the property in 2015). This record was from outside of the current Development Site in Cumberland Plain Woodland along the eastern boundary of the property (Cumberland Ecology 2015, OEH 2018a).

This species was not located during targeted surveys within the Development Site in 2018 by Cumberland Ecology and is assumed unlikely be present within the Development Site due to a lack of habitat features such as deep leaf litter, fallen logs, or dumped rubbish to provide shelter (OEH 2018b).

The only threatened fauna that would be expected to occur within the Development Site and immediate surrounds are highly mobile, aerial species. The most likely species to access the site as it is known to utilise degraded areas of vegetation for foraging for nectar and fruit, including urban gardens, is the Grey-headed Flying-fox (*Pteropus poliocephalus*) which has 48 records in the locality. The Grey-headed Flying Fox is listed as Vulnerable under the BC Act and the EPBC Act.

There are a substantial number of records of Grey Headed Flying Fox near within the locality as there is a roosting camp of the species in Dr Charles Mckay Reserve in Rooty Hill, (located approximately 6km to the northwest), and . a camp located in Wetherill Park, (located approximately 5km to the southeast) (Department of the Environment and Energy 2015). The Grey Headed Flying Fox is known to forage within 20 km of a camp site and may fly over the Development Site in search of foraging resources such as nectar and pollen (OEH 2018c). Whilst Grey-headed Flying Foxes are likely to occur, the Development Site does not contain a roosting camp; however the Grey Headed Flying Fox may occasionally and opportunistically utilise the foraging resources within the Development Site.

There are records of two threatened small bird species in the locality which are known to utilise eucalypts for foraging for nectar. These are the Little Lorikeet (*Glossopsitta pusilla*), listed as vulnerable under the BC Act (OEH 2018d), and the Swift Parrot (*Lathamus discolor*), listed as endangered under the BC Act and EPBC Act (OEH 2018e). Nesting habitat is not present within the Development Footprint, due to the lack of hollows. The Swift Parrot breeds in Tasmania and is a migratory visitor to mainland Australia for foraging only during the warmer months of the year. As the site does not contain breeding habitat for either species the Development Site would only be as part of a much larger foraging range.

Four microchiropteran bats with records in the locality may access degraded woodland within the Development Site as all four forage for insects in woodland/forest areas with eucalypt canopies. These species are:

- Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*);
- Little Bentwing bat (*Miniopterus australis*);
- Eastern Freetail-bat (*Mormopterus norfolkensis*);
- Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*).

No roosting habitat is present within the Development Footprint for these species due to a lack of tree hollows, caves/culverts, and enclosed building roof cavities (**Photograph 10**). These species may occasionally and opportunistically forage within the degraded woodland and Planted Native vegetation present within the Development Footprint, but due to the small, and degraded areas of vegetation no species or population of any of the four species would depend on the habitat.

3.5 Impacts to Biodiversity

The approximate areas of impact to vegetation communities within the Development Site of the Plant 2 upgrade works are provided below in **Table 1**.

Table 1 Impacts to Vegetation Communities within the Development Site

Vegetation Communities (Development Site)	Area (ha)
Cumberland Plain Woodland - Degraded	0.11
Planted Natives	0.03
Exotic Dominated Grassland	0.49
Total	0.62

Approximately 0.12 ha of combined of the Planted Natives and Cumberland Plain Woodland - Degraded vegetation will be removed which may provide some sub-optimal foraging habitat for the following insectivorous and nectivorous threatened fauna species:

- Grey-headed Flying-fox (*Pteropus poliocephalus*);
- Little Lorikeet (*Glossopsitta pusilla*);
- Swift Parrot (*Lathamus discolor*);
- Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*);
- Little Bentwing bat (*Miniopterus australis*);

- Eastern Freetail-bat (*Mormopterus norfolkensis*);
- Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*).

The removal of this vegetation is not expected to significantly affect and of these threatened faun species due to the degraded nature or the vegetation, small areas to be removed, and an abundance of better quality vegetation for foraging for these highly mobile species will remain within the locality (**Figure 3**).

4. Biodiversity Values Assessment

The BC Act and the BC Regulation list a suite of biodiversity values that are relevant to assessments that must take place under the BC Act. To demonstrate that the Plant 2 upgrade works will not significantly impact upon biodiversity, **Table 2** systematically comments upon the relevance of each value.

Table 2 Assessment of biodiversity values within the Development Site

Biodiversity Value	Assessment within Development Site
BC Act - Part 1 Section 1.5 (2)	
(a) vegetation integrity—being the degree to which the composition, structure and function of vegetation at a particular site and the surrounding landscape has been altered from a near natural state,	Based upon the results of floristic surveys, it has been concluded that the existing vegetation is comprised predominantly of exotic dominated grassland which is not consistent with any naturally occurring vegetation community, and small areas of planted native woody vegetation occur that are similarly not consistent with naturally occurring communities. Casuarina glauca occurs naturally in riparian communities in the area but these communities do not occur on slopes removed from depressions and creeklines, and the species naturally occurs over a ground layer of semi-aquatic species, not exotic grasses. Small, degraded areas of Cumberland Plain Woodland are present within the Development Area, but these are degraded to the extent that they do not resemble the description of the community under the BC Act and EPBC Act due to the lack of a native ground layer, and a lack of old trees or a native shrub layer further indicates a substantially reduced ecological function. The community is degraded to the extent it cannot regenerate to a natural state without substantial and costly assistance. The composition, structure and function of vegetation within the Development Site and the surrounding landscape are considered to have been altered significantly from a natural state and do not resemble any naturally occurring PCTs known from the locality with the exception of the canopy composition of degraded woodland regrowth.

Table 2 Assessment of biodiversity values within the Development Site

Biodiversity Value	Assessment within Development Site
(b) habitat suitability—being the degree to which the habitat needs of threatened species are present at a particular site,	As discussed above, the Development Site has little potential to provide habitat for threatened species other than highly mobile, aerial species. Threatened species with the highest likelihood to utilise the Development Site include the Grey Headed Flying Fox, small woodland birds, and microchiropteran bats. These highly mobile species may occasionally and opportunistically utilise the limited foraging resources of the Development Site as part of a larger foraging range.
(c) biodiversity values, or biodiversity-related values, prescribed by the regulations.	See below.
BC Regulation - Part 1 Clause 1.4	
(a) threatened species abundance—being the occurrence and abundance of threatened species or threatened ecological communities, or their habitat, at a particular site,	No threatened species were observed during the site surveys and as described above, only highly mobile, aerial species would be expected to utilise the Development Site occasionally and opportunistically.
(b) vegetation abundance—being the occurrence and abundance of vegetation at a particular site,	As described above, the Development Site is predominantly comprised of low biodiversity value exotic dominated grassland. Also present are two small occurrences of extremely degraded Cumberland Plain Woodland with reduced ecological function, and a minimal area of Planted Natives – both of these communities may comprise sub-optimal foraging habitat for some threatened and non-threatened fauna species.
(c) habitat connectivity—being the degree to which a particular site connects different areas of habitat of threatened species to facilitate the movement of those species across their range,	The property the Development Site occurs in is likely to provide habitat connectivity along the vegetated eastern boundary and central riparian corridor. These areas of vegetation are outside of the Development Site. Vegetation within the Development Site is unlikely to provide significant habitat connectivity as patches of vegetation are isolated by cleared areas and buildings.
(d) threatened species movement—being the degree to which a particular site contributes to the movement of threatened species to maintain their lifecycle,	As above, the Development Site does not contribute to the movement of threatened species other than highly mobile, aerial species. Impacts within the Development Site would not be expected to have any impact on the lifecycle of such species,
(e) flight path integrity—being the degree to which the flight paths of	The development proposed will expand the size of an existing building only, and no changes are to be made to the height of the building.

Table 2 Assessment of biodiversity values within the Development Site

Biodiversity Value	Assessment within Development Site
protected animals over a particular site are free from interference,	Subsequently the project is not expected to impact upon free-flying animals (threatened or otherwise) by interfering with flight paths.
(f) water sustainability—being the degree to which water quality, water bodies and hydrological processes sustain threatened species and threatened ecological communities at a particular site.	The Development Site is located approximately 400 m from Eastern Creek which runs through the property. The proposed upgrade is not expected to increase impacts to any hydrological processes. The site is already substantially developed and the proposed development is to upgrade the existing plant only, and should not impact on water quality if adequate erosion control measures are utilised during construction works. The proposed upgrade is expected to decrease dust produced by the plant which is likely to reduce impacts to water quality.

5. Mitigation Measures

Although the proposed upgrade works are unlikely to have a significant impact on biodiversity values, the following mitigation measures are recommended to protect biodiversity adjacent to impact areas during construction:

5.1.1 Vegetation Protection

To avoid unnecessary removal or damage to the adjacent vegetation, the clearing area will be clearly demarcated and signed, where appropriate, to ensure no vegetation beyond these boundaries is removed. Clearing works and equipment should be excluded from areas outside the clearing area. Site inductions are to be given by the civil contractor to ensure all site workers and visitors are aware of any no-access areas.

In any area in which construction machinery is to be used with the potential to damage surrounding vegetation to be retained, temporary construction fencing will be installed to protect vegetation to be retained. Temporary fencing should be of a metal construction fence at least 2 m high so it physically protects vegetation as well as visually delineates vegetation to be retained. This fencing is to remain in place until all works have been finished in adjoining areas. No vehicles or machinery will be permitted to enter areas of vegetation to be retained.

5.1.2 Erosion, Sedimentation and Pollution Control

Potential impacts to flora and fauna occurring in the construction phase that can be managed include: run-off, sedimentation, erosion and pollution. To reduce sedimentation on the construction site, erosion control measures should be implemented. This includes minimising the amount of exposed soils on the site at any given time. All soil stockpiles should be adequately covered when not in use to prevent erosion from heavy rainfall. Sediment fences

should be established around the perimeter of the Development Site to prevent the impacts of sedimentation on the adjoining vegetation. During development, precautions should be taken to ensure that no pollution, such as petrochemical substances or water containing suspended solids, escapes the construction site. Pollution traps where required and efficient removal of pollution to an off-site location would help to minimise pollution impacts.

6. Conclusion

The proposed upgrade works are unlikely to have a significant impact on any biodiversity values of the site, due to the small areas of woody vegetation to be removed, the majority of vegetation to be removed being low biodiversity value Exotic Dominated Grassland, and the substantially degraded nature of the small occurrences of Cumberland Plain Woodland within the Development Site, which is likely to further degrade over time without human intervention. The development will result in the removal of some sub-optimal habitat for seven threatened fauna species, none of which if utilising the habitat would be significantly impacted, as at most they would utilise vegetation as a very small, occasional resource as part of a much larger foraging range due to the highly mobile nature of these species, and abundance of better quality or similar habitat in the locality.

When assessing impacts likely as a result of the Plant 2 upgrade works there is limited justification for considering impacts to threatened species with the detail required under the BAM. As can be seen in **Figure 2** there is no areas of any native vegetation community within the Development Site large enough to fit a 20x50m or 10x100m BAM plot without including substantial areas of concrete or adjacent exotic dominated grassland as a large proportion of the plot. The project may result in marginal reduction in the foraging habitat of highly mobile, aerial threatened species. When assessing impacts likely from the project in its current form, there is very little likelihood of significant impacts to threatened species or ecological communities.

On the basis of our investigations, we believe that the preparation of a BDAR is not necessary due to the low likelihood of significant impacts to biodiversity. Therefore, we recommend that a waiver for the preparation of a BDAR be sought from the Department of Planning and Environment for the proposed Plant 2 upgrade works, constituting State Significant Development.

If any further information is required, or if you have any questions, please do not hesitate to call myself or Bryan Furchert on (02) 9868 1933.Yours sincerely,

David Robertson
Director
david.robertson@cumberlandecology.com.au

7. References

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Appendix A

Figures

Legend

Development Site

Coordinate System: MGA Zone 56 (GDA 94)

Image Source:
Image © NearMap 2018
Dated: 18/1/2018

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0 50 m

I:\...\18111\Figures\Letter 2\20190405\Figure 1. Location_Development Site

Figure 1. Location of the Development Site

Figure 2. Flora and Fauna Survey Locations

Legend

Development Site

Vegetation Community (OEH 2013)

9 - Shale Hills Woodland

10 - Shale Plains Woodland

11 - Alluvial Woodland

Coordinate System: MGA Zone 56 (GDA 94)

Image Source:
Image © NearMap 2018
Dated: 18/1/2018

Data Source:
OEH (2013). Remnant Vegetation of the western Cumberland subregion, 2013 Update. Office of Environment and Heritage, NSW

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0 100 200 300 400 m

I:\...\18111\Figures\Letter 2\20190405Figure 3. Broad scale mapping of the Development Site and Surrounds

Figure 3. Broad scale mapping of the Development Site and Surrounds

Legend

Development Site

Vegetation Community

Cumberland Plain Woodland - Degraded

Planted Natives

Exotic Dominated Grassland

Coordinate System: MGA Zone 56 (GDA 94)

Image Source:
Image © NearMap 2018
Dated: 18/1/2018

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0 40 m

I:\...\18111\Figures\Letter 2\20190405\Figure 4. Vegetation of the Development Site and Adjacent Areas

Figure 4. Vegetation of the Development Site and Adjacent Areas

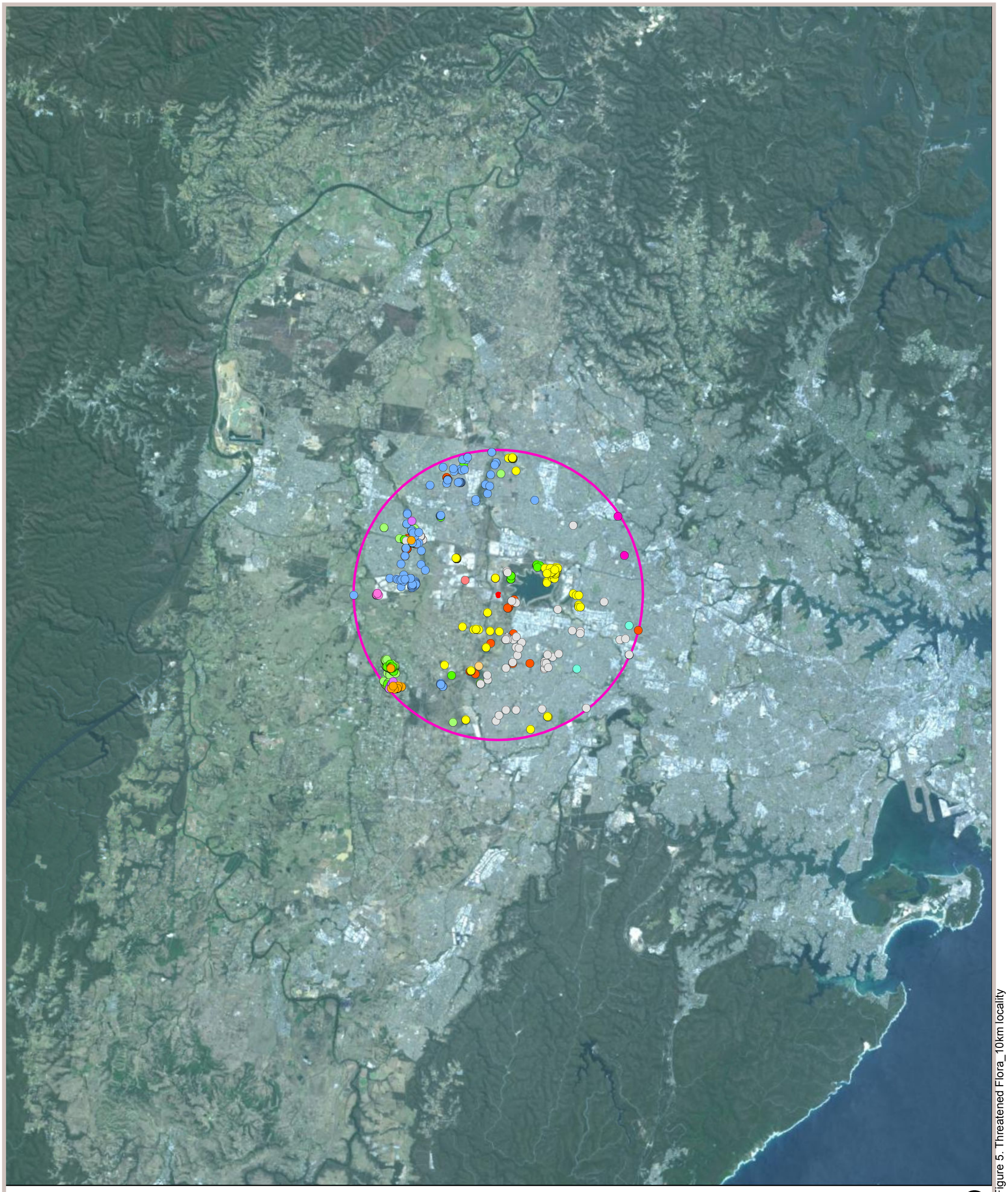

Figure 5. Threatened Flora Species within 10km locality of the Development Site (BioNET 2018)

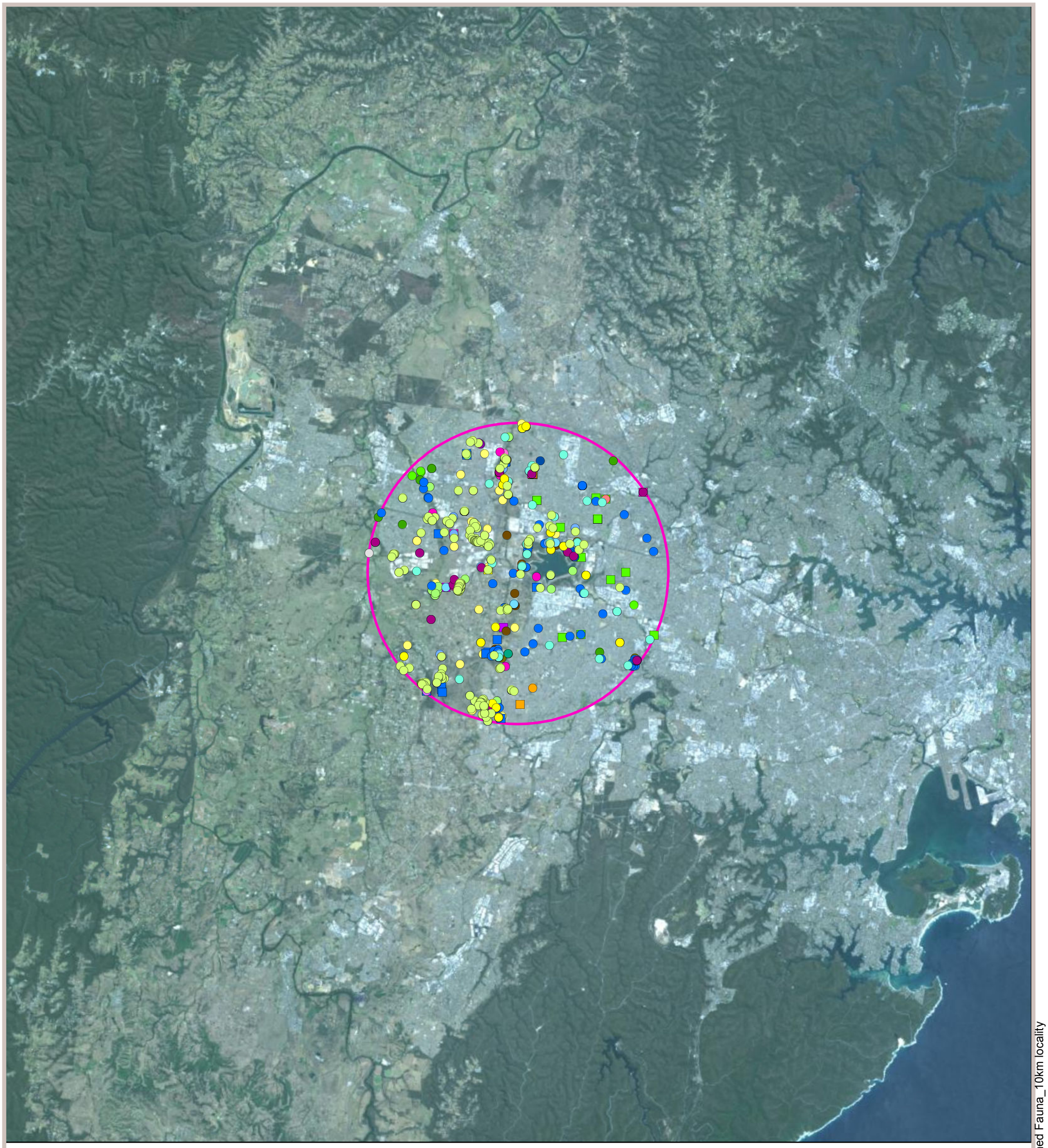

Figure 6. Threatened Fauna Species within 10km locality of the Development Site (BioNET 2018)

Figure 7. Cumberland Plain Land Snail records near the Development Site (BioNET 2018)

Appendix B

Flora Species Recorded

Table 3 Flora Species Recorded

Family	Exotic	Scientific Name	Common Name	High Threat Weed	BAM Growth Form Group	Q1		Q2		RMS 1	RMS 2	RMS 3	RMS 4	RMS 5	RMS 6	RMS 7
						C	A	C	A	P	P	P	P	P	P	P
Alliaceae	*	*Nothoscordum gracile*	Onion Weed	#N/A	#N/A										X	X
Amaranthaceae	*	*Gomphrena celosioides*	Gomphrena Weed	#N/A	#N/A											X
Apiaceae	*	*Cyclospermum leptophyllum*	Slender Celery	#N/A	#N/A			0.1	50		X			X		
Apocynaceae	*	*Araujia sericifera*	Moth Vine	YES	#N/A									X		
Apocynaceae	*	*Gomphocarpus fruticosus*	Narrow-leaved Cotton Bush	#N/A	#N/A							X	X			
Apocynaceae	*	*Nerium oleander*	Oleander	#N/A	#N/A	1	1									
Asteraceae	*	*Ageratina adenophora*	Crofton Weed	YES	#N/A							X	X		X	
Asteraceae	*	*Arctotheca calendula*	Capeweed	#N/A	#N/A											X
Asteraceae	*	*Bidens pilosa*	Cobbler's Pegs	#N/A	#N/A	0.1	10				X	X	X	X	X	
Asteraceae	*	*Bidens subalternans*	Greater Beggar's Ticks	#N/A	#N/A								X			
Asteraceae	*	*Chrysanthemoides monilifera* subsp. *monilifera*	Boneseed	#N/A	#N/A								X		X	
Asteraceae	*	*Cirsium vulgare*	Spear Thistle	#N/A	#N/A							X	X		X	

Table 3 Flora Species Recorded

Family	Exotic	Scientific Name	Common Name	High Threat Weed	BAM Growth Form Group	Q1		Q2		RMS 1	RMS 2	RMS 3	RMS 4	RMS 5	RMS 6	RMS 7
						C	A	C	A	P	P	P	P	P	P	P
Asteraceae	*	*Conyza sumatrensis*	Tall fleabane	#N/A	#N/A								X			
Asteraceae		*Cotula australis*	Common Cotula	#N/A	Forb (FG)						X					
Asteraceae	*	*Hypochaeris albiflora*	White Flatweed	#N/A	#N/A			0.1	2		X			X		X
Asteraceae	*	*Hypochaeris radicata*	Catsear	#N/A	#N/A			0.1	10							
Asteraceae	*	*Lactuca saligna*	Willow-leaved Lettuce	#N/A	#N/A						X				X	
Asteraceae	*	*Lactuca serriola*	Prickly Lettuce	#N/A	#N/A								X			
Asteraceae	*	*Senecio madagascariensis*	Fireweed	#N/A	#N/A			0.1	10		X		X	X		
Asteraceae	*	*Senecio pterophorus*		#N/A	#N/A			0.1	1							
Asteraceae		*Senecio quadridentatus*	Cotton Fireweed	#N/A	Forb (FG)								X			
Asteraceae	*	*Sonchus asper*	Prickly Sowthistle	#N/A	#N/A			0.2	100	X	X		X		X	X
Asteraceae	*	*Taraxacum officinale*	Dandelion	#N/A	#N/A										X	
Asteraceae	*	*Tragopogon porrifolius* subsp. *porrifolius*	Oyster Plant	#N/A	#N/A			0.1	3		X				X	
Asteraceae		*Vittadinia cuneata*	A Fuzzweed	#N/A	Forb (FG)								X			
Brassicaceae	*	*Brassica fruticulosa*	Twiggy Turnip	#N/A	#N/A								X	X		
Brassicaceae	*	*Lepidium africanum*	Common Peppercress	#N/A	#N/A						X					X

Table 3 Flora Species Recorded

Family	Exotic	Scientific Name	Common Name	High Threat Weed	BAM Growth Form Group	Q1		Q2		RMS 1	RMS 2	RMS 3	RMS 4	RMS 5	RMS 6	RMS 7
						C	A	C	A	P	P	P	P	P	P	P
Campanulaceae		*Wahlenbergia gracilis*	Annual Bluebell	#N/A	Forb (FG)											X
Caryophyllaceae	*	*Paronychia brasiliana*	Chilean Whitlow Wort, Brazilian Whitlow	#N/A	#N/A						X					X
Casuarinaceae		*Casuarina glauca*	Swamp Oak	#N/A	Tree (TG)					X						
Chenopodiaceae		*Atriplex semibaccata*	Creeping Saltbush	#N/A	Shrub (SG)	0.1	2				X		X			
Chenopodiaceae		*Einadia nutans* subsp. *linifolia*	Climbing Saltbush	#N/A	Forb (FG)	0.3	20	0.1	1				X	X		
Chenopodiaceae		*Salsola australis*		#N/A	#N/A						X					
Convolvulaceae	*	*Convolvulus arvensis*	Field Bindweed	#N/A	#N/A					X						
Convolvulaceae		*Convolvulus erubescens*	Pink Bindweed	#N/A	Other (OG)								X			
Convolvulaceae		*Dichondra repens*	Kidney Weed	#N/A	Forb (FG)	0.1	50						X			
Cupressaceae	*	*Cupressus* sp.		#N/A	#N/A	4	4									
Cyperaceae		*Cyperus gracilis*	Slender Flat-sedge	#N/A	Grass & grasslike (GG)	0.1	10									
Euphorbiaceae	*	*Euphorbia prostrata*	Red Caustic Weed	#N/A	#N/A						X		X	X	X	
Euphorbiaceae	*	*Ricinus communis*	Castor Oil Plant	YES	#N/A										X	

Table 3 Flora Species Recorded

Family	Exotic	Scientific Name	Common Name	High Threat Weed	BAM Growth Form Group	Q1		Q2		RMS 1	RMS 2	RMS 3	RMS 4	RMS 5	RMS 6	RMS 7
						C	A	C	A	P	P	P	P	P	P	P
Fabaceae (Faboideae)		*Glycine microphylla*	Small-leaf Glycine	#N/A	Other (OG)								X		X	
Fabaceae (Faboideae)		*Glycine tabacina*	Variable Glycine	#N/A	Other (OG)	0.1	50							X		X
Fabaceae (Faboideae)		*Hardenbergia violacea*	False Sarsaparilla	#N/A	Other (OG)									X		
Fabaceae (Faboideae)	*	*Lotus uliginosus*	Birds-foot Trefoil	#N/A	#N/A			0.1	50		X		X			
Fabaceae (Faboideae)	*	*Medicago polymorpha*	Burr Medic	#N/A	#N/A			0.2	200		X					X
Fabaceae (Faboideae)	*	*Melilotus indicus*	Hexham Scent	#N/A	#N/A								X			
Fabaceae (Faboideae)	*	*Trifolium repens*	White Clover	#N/A	#N/A							X	X			X
Fabaceae (Faboideae)	*	*Vicia sativa*	Common vetch	#N/A	#N/A			0.2	20		X	X	X			
Fabaceae		*Acacia fimbriata*	Fringed Wattle	#N/A	Shrub (SG)								X			

Table 3 Flora Species Recorded

Family	Exotic	Scientific Name	Common Name	High Threat Weed	BAM Growth Form Group	Q1		Q2		RMS 1	RMS 2	RMS 3	RMS 4	RMS 5	RMS 6	RMS 7
						C	A	C	A	P	P	P	P	P	P	P
(Mimosoideae)																
Fabaceae (Mimosoideae)		*Acacia parramattensis*	Parramatta Wattle	#N/A	Tree (TG)								X	X		
Gentianaceae	*	*Centaurium tenuiflorum*	Branched Centaury, Slender centaury	#N/A	#N/A								X			
Linaceae	*	*Linum trigynum*	French Flax	#N/A	#N/A			0.2	200			X	X			X
Loranthaceae		*Amyema miquelii*	Box Mistletoe	#N/A	Other (OG)									X		
Malvaceae	*	*Malva parviflora*	Small-flowered Mallow	#N/A	#N/A					X	X					
Malvaceae	*	*Modiola caroliniana*	Red-flowered Mallow	#N/A	#N/A			0.1	5	X			X		X	X
Malvaceae	*	*Sida rhombifolia*	Paddy's Lucerne	#N/A	#N/A	0.2	5						X		X	X
Myrsinaceae	*	*Lysimachia arvensis*	Scarlet Pimpernel	#N/A	#N/A			0.1	50				X	X		
Myrtaceae	NE	*Eucalyptus blakelyi*	Blakely's Red Gum	#N/A	Tree (TG)	4	1									
Myrtaceae		*Eucalyptus crebra*	Narrow-leaved Ironbark	#N/A	Tree (TG)	3	1									
Myrtaceae		*Eucalyptus fibrosa*	Red Ironbark	#N/A	Tree (TG)	5	2									
Myrtaceae		*Eucalyptus moluccana*	Grey Box	#N/A	Tree (TG)	15	5									
Myrtaceae		*Eucalyptus moluccana*	Grey Box	#N/A	Tree (TG)									X		

Table 3 Flora Species Recorded

Family	Exotic	Scientific Name	Common Name	High Threat Weed	BAM Growth Form Group	Q1		Q2		RMS 1	RMS 2	RMS 3	RMS 4	RMS 5	RMS 6	RMS 7
						C	A	C	A	P	P	P	P	P	P	P
Myrtaceae		*Eucalyptus punctata*	Grey Gum	#N/A	Tree (TG)	2	2									
Myrtaceae	NE	*Eucalyptus scoparia?*	Wallangarra White Gum?	#N/A	#N/A						X					
Myrtaceae		*Eucalyptus tereticornis*	Forest Red Gum	#N/A	Tree (TG)	10	3	0.25	1	X		X		X	X	
Oleaceae	*	*Olea europaea* subsp. *cuspidata*	African Olive	Yes	#N/A	0.2	2				X		X			
Oxalidaceae	*	*Oxalis corniculata*	Creeping Oxalis	#N/A	#N/A								X			
Pittosporaceae		*Bursaria spinosa*	Native Blackthorn	#N/A	Shrub (SG)									X		
Plantaginaceae	*	*Plantago lanceolata*	Lamb's Tongues	#N/A	#N/A	0.2	100	1	1000		X		X	X	X	X
Poaceae		*Aristida vagans*	Threeawn Speargrass	#N/A	Grass & grasslike (GG)									X		
Poaceae	*	*Avena barbata*	Bearded Oats	#N/A	#N/A								X	X	X	
Poaceae	*	*Axonopus fissifolius*	Narrow-leafed Carpet Grass	YES	#N/A											X
Poaceae		*Bothriochloa decipiens* var. *decipiens*	Redleg Grass	#N/A	Grass & grasslike (GG)	3	300									
Poaceae		*Bothriochloa macra*	Red Grass	#N/A	Grass & grasslike									X		X

Table 3 Flora Species Recorded

Family	Exotic	Scientific Name	Common Name	High Threat Weed	BAM Growth Form Group	Q1		Q2		RMS 1	RMS 2	RMS 3	RMS 4	RMS 5	RMS 6	RMS 7
						C	A	C	A	P	P	P	P	P	P	P
					(GG)											
Poaceae	*	*Briza subaristata*		YES	#N/A			1	100				X	X	X	
Poaceae	*	*Bromus catharticus*	Praire Grass	#N/A	#N/A						X					X
Poaceae	*	*Cenchrus clandestinus*	Kikuyu	#N/A	#N/A	1	50				X	X	X	X	X	X
Poaceae	*	*Chloris gayana*	Rhodes Grass	YES	#N/A			20	2000	X	X		X	X		X
Poaceae		*Chloris truncata*	Windmill Grass	#N/A	Grass & grasslike (GG)						X					
Poaceae		*Cynodon dactylon*	Common Couch	#N/A	Grass & grasslike (GG)	5	200	20	2000		X		X		X	X
Poaceae	*	*Ehrharta erecta*	Panic Veldtgrass	YES	#N/A											X
Poaceae	*	*Eleusine tristachya*	Goose Grass	#N/A	#N/A											X
Poaceae	*	*Eragrostis curvula*	African Lovegrass	YES	#N/A	70	5000	10	1000				X	X	X	X
Poaceae		*Eriochloa pseudoacrotricha*	Early Spring Grass	#N/A	Grass & grasslike (GG)								X			X
Poaceae	*	*Festuca pratensis*	Meadow Fescue	#N/A	#N/A								X		X	
Poaceae		*Lachnagrostis filiformis*		#N/A	Grass & grasslike								X			

Table 3 Flora Species Recorded

Family	Exotic	Scientific Name	Common Name	High Threat Weed	BAM Growth Form Group	Q1		Q2		RMS 1	RMS 2	RMS 3	RMS 4	RMS 5	RMS 6	RMS 7
						C	A	C	A	P	P	P	P	P	P	P
					(GG)											
Poaceae	*	*Lolium perenne*	Perennial Ryegrass	#N/A	#N/A			0.5	100			X				
Poaceae	*	*Melinis repens*	Red Natal Grass	#N/A	#N/A								X	X		
Poaceae		*Paspalidium distans*		#N/A	Grass & grasslike (GG)									X		
Poaceae	*	*Paspalum dilatatum*	Paspalum	YES	#N/A	1	100	1	100		X		X	X		X
Poaceae	*	*Poa annua*	Winter Grass	#N/A	#N/A						X					
Poaceae		*Rytidosperma caespitosum*	Ringed Wallaby Grass	#N/A	#N/A								X	X		
Poaceae	*	*Setaria parviflora*		#N/A	#N/A			0.1	20				X	X		X
Poaceae	*	*Setaria parviflora*		#N/A	#N/A							X				
Poaceae	*	*Sporobolus africanus*	Parramatta Grass	#N/A	#N/A						X					X
Poaceae		*Sporobolus creber*	Slender Rat's Tail Grass	#N/A	Grass & grasslike (GG)			0.5	20			X				
Polygonaceae	*	*Polygonum aviculare*	Wireweed	#N/A	#N/A						X		X			
Polygonaceae	*	*Rumex crispus*	Curled Dock	#N/A	#N/A										X	
Portulacaceae		*Portulaca oleracea*	Pigweed	#N/A	Forb (FG)											X

Table 3 Flora Species Recorded

Family	Exotic	Scientific Name	Common Name	High Threat Weed	BAM Growth Form Group	Q1		Q2		RMS 1	RMS 2	RMS 3	RMS 4	RMS 5	RMS 6	RMS 7
						C	A	C	A	P	P	P	P	P	P	P
Proteaceae		*Grevillea robusta*	Silky Oak	#N/A	Tree (TG)						X					
Ranunculaceae		*Clematis glycinoides*	Headache Vine	#N/A	Other (OG)								X			
Rubiaceae	*	*Richardia stellaris*		#N/A	#N/A											X
Solanaceae	*	*Lycium ferocissimum*	African Boxthorn	YES	#N/A	0.5	3						X			
Solanaceae	*	*Solanum nigrum*	Black-berry Nightshade	#N/A	#N/A						X					
Verbenaceae	*	*Lantana montevidensis*	Trailing Lantana	#N/A	#N/A					X						
Verbenaceae	*	*Verbena bonariensis*	Purpletop	#N/A	#N/A								X			
Verbenaceae	*	*Verbena officinalis*	Common Verbena	#N/A	#N/A			0.3	10						X	

*Table Key: Status: * = Exotic, blank = locally native species, NE = Non-endemic native species. C= Cover, A = Abundance, P – X denotes presence in meander survey*

Appendix C

Likelihood of Occurrence - Threatened Species

Table 4 Likelihood of Occurrence – Threatened Flora Species

Family	Scientific Name	Common Name	TSC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
Apocynaceae	*Cynanchum elegans*	White-flowered Wax Plant	E1	E	1	Usually associated with dry rainforest vegetation and in coastal communities. Can occur in clay influenced woodland associated with Eucalyptus tereticornis and Corymbia maculata.	Unlikely to occur. No dry rainforest or moist habitats present within the Development Site.
Apocynaceae	*Marsdenia viridiflora* subsp. *viridiflora*	*Marsdenia viridiflora* R. Br. subsp. *viridiflora* population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	E2	-	14	Grows in vine thickets and open shale woodlands.	Unlikely to occur. Ground layer of vegetation communities is extremely degraded and dominated by exotic species. Species was not located during targeted surveys.
Fabaceae (Faboideae)	*Pultenaea parviflora*		E1	V	26	Endemic to the Cumberland Plain. Core distribution is from Windsor to Penrith and east to Dean Park. Found in scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or laterised clays	Unlikely to occur. Species is a conspicuous shrub that was not located during targeted searches.

Table 4 Likelihood of Occurrence – Threatened Flora Species

Family	Scientific Name	Common Name	TSC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
						and in transitional areas where these communities adjoin Castlereagh Scribbly Gum Woodland.	
Fabaceae (Faboideae)	*Pultenaea pedunculata*	Matted Bush-pea	E1,P	-	2	In NSW is known only from the Sydney Basin Bioregion and within the Sydney area is only known to occur at Villawood and Prestons. The species is also known to occur on the South Coast and Southern Tableands. It has a preference for clay soils with a sandy and lateritic influence, and is associated with Grey Box Woodland with a canopy of Eucalyptus moluccana with Melaleuca decora, Bursaria spinosa, Dillwynia sieberi, Acacia falcata, Kunzea ambigua, Gahnia aspera, Aristida vagans and Themeda australis in the understorey.	Unlikely to occur. Species only known from small number of locations and not located during targeted surveys.
Fabaceae (Mimosoideae)	*Acacia pubescens*	Downy Wattle	V	V	60	Occurs on alluviums, shales and at the intergrade between shales and	Unlikely to occur. Species is a conspicuous shrub that was not

Table 4 Likelihood of Occurrence – Threatened Flora Species

Family	Scientific Name	Common Name	TSC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
						sandstones. Occur in open woodland and forest, including Cooks River/Castlereagh Ironbark Forest, Shale/Gravel Transition Forest and Cumberland Plain Woodland.	located during targeted searches.
Myrtaceae	*Callistemon linearifolius*	Netted Bottle Brush	V	-	2	In the Sydney area it has been recorded from Georges River to the Hawkesbury River, and occurs northwards to Nelson Bay. It grows in dry sclerophyll forest close to the coast and in adjacent ranges.	Unlikely to occur. Species is associated with sandstone substrates not present within the Development Site.
Orchidaceae	*Pterostylis saxicola*	Sydney Plains Greenhood	E1	E	1	The species occurs in small pockets of shallow soil in flat areas on top of sandstone rock shelves above cliff lines, or on mossy rocks in gullies. Sclerophyll forest/woodland often occurs growing above where the species occurs, on shale or shale/sandstone transition soils. Flowering occurs between October and December. It is currently only	Unlikely to occur. No sandstone shelves or cliffs within the Development Site.

Table 4 Likelihood of Occurrence – Threatened Flora Species

Family	Scientific Name	Common Name	TSC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
						known to occur at five locations within western Sydney: Georges River National Park, close to Yeramba Lagoon, Peter Meadows Creek, and St Marys Towers.	
Thymelaeaceae	*Pimelea spicata*	Spiked Rice-flower	E1	E	131	Found on well-structured clay soils in Cumberland Plain and Illawarra environments. In the inland Cumberland Plain sites it is associated with Grey Box and Ironbark. In the coastal Illawarra it occurs commonly in Coast Banksia open woodland with a better developed shrub and grass understorey.	Unlikely to occur. Species was not located during targeted searches and site is degraded to the extent that the ground layer is nearly entirely exotic.

Table 5 Likelihood of Occurrence – Threatened Fauna Species

Family	Scientific Name	Common Name	BC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence

Table 5 Likelihood of Occurrence – Threatened Fauna Species

Family	Scientific Name	Common Name	BC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
Amphibia							
Hylidae	*Litoria aurea*	Green and Golden Bell Frog	E1	V	7	Marshes, dams, stream sides, particularly those containing bulrushes or spikerushes; unshaded water bodies free of Gambusia form optimum habitat; vegetation and/or rocks are needed for sheltering. Species is known to inhabit artificial and degraded aquatic habitats such as flooded brick pits.	Unlikely. No waterbodies or associated aquatic vegetation within Development Site. Although Development Site is part of a brick works plant, there are no flooded brick pits or other artificial aquatic habitat within the Development Site.
Accipitridae	*Haliaeetus leucogaster*	White-bellied Sea-Eagle		M	1	Found in coastal habitats and around terrestrial wetlands, including rivers, swamps, lakes and the sea.	Unlikely. No waterbodies present for foraging and trees within Development Site not mature enough for nesting.
Accipitridae	*Hieraaetus morphnoides*	Little Eagle	V	-	14	Occupies open eucalypt forest, woodland or open woodland. Sheoak or acacia woodlands and riparian woodlands of interior NSW also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter. Preys on birds, reptiles and mammals, occasionally adding large insects and carrion.	Unlikely. Minimal amount of degraded foraging habitat present within the Development Site. No tall living trees within remnant woodland suitable for nesting.
Accipitridae	*Lophoictinia isura*	Square-tailed Kite	V	-	1	Found in a variety of timbered habitats including dry woodlands and open forests. It	Unlikely. No large trees near to riparian areas within Development Site suitable

Table 5 Likelihood of Occurrence – Threatened Fauna Species

Family	Scientific Name	Common Name	BC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
						is a specialist hunter preying on passerine birds, especially honeyeaters and targets predominately nestlings and insects occurring in the tree canopy. It nests in tree forks or on large horizontal tree limbs located mostly along or near watercourses.	for nesting, and foraging habitat present degraded and adjacent to noisy operational plant.
Artamidae	*Artamus cyanopterus cyanopterus*	Dusky Woodswallow	V	-	4	Occurs from Atherton Tableland in Queensland, down to Tasmania and west to the Eyre Peninsula in South Australia. In NSW it occurs from the coast to the western slopes of the Great Dividing Range and farther west. It breeds primarily on the western slopes of the Great Dividing Range in woodland and open dry forest. The species often occurs in eucalypt woodland and forest, though is also found in shrubland and heathland. It forages both above and below the canopy primarily for invertebrates, though will occasionally consume nectar, fruit and seed.	Unlikely. Some sub-optimal foraging habitat present but species more likely to utilise intact woodland/forest in the locality.
Cacatuidae	*Callocephalon fimbriatum*	Gang-gang Cockatoo	V	-	1	Occurs within a variety of forest and woodland types. Usually frequents forested	Unlikely to occur. No forested areas with old growth trees, and small patches

Table 5 Likelihood of Occurrence – Threatened Fauna Species

Family	Scientific Name	Common Name	BC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
						areas with old growth attributes required for nesting and roosting purposes. Also utilises less heavily timbered woodlands and urban fringe areas to forage, but appears to favour well-timbered country through which it habitually flies as it moves about.	of vegetation present within Development Site close to noisy operational brick plant.
Meliphagidae	*Anthochaera phrygia*	Regent Honeyeater	E4A	CE	1	Inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes. Every few years non-breeding flocks are seen foraging in flowering coastal Swamp Mahogany and Spotted Gum forests, particularly on the central coast and occasionally on the upper north coast. The Regent Honeyeater is a generalist forager, which mainly feeds on the nectar from a wide range of eucalypts and mistletoes. Key eucalypt species include Mugga Ironbark, Yellow Box, Blakely's Red Gum, White Box and Swamp Mahogany. Also utilises: *E. microcarpa, E.*	Unlikely, no large mature trees present within the Development Site and vegetation present as small patches only.

Table 5 Likelihood of Occurrence – Threatened Fauna Species

Family	Scientific Name	Common Name	BC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
						punctata, E. polyanthemos, E. moluccana, Corymbia robusta, E. crebra, E. caleyi, Corymbia maculata, E. mckieana, E. macrorhyncha, E. laevopinea, and *Angophora floribunda.* Nectar and fruit from the mistletoes *A. miquelii, A. pendula, A. cambagei* are also eaten during the breeding season.	
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella	V	-	7	Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland. As the species is sedentary cleared farmland is thought to be a barrier to movement of the species.	Unlikely. All vegetation within the Development Area is isolated by cleared areas.
Psittacidae	*Glossopsitta pusilla*	Little Lorikeet	V	-	3	Forages mostly in the canopy of open Eucalyptus forest and woodland, on Eucalypt species, and species of Angophora, Melaleuca, and other trees. Riparian habitats are ideal for the species due to higher productivity of flowering feed species. Isolated trees in paddocks and	Potential. Some foraging habitat. No nesting habitat.

Table 5 Likelihood of Occurrence – Threatened Fauna Species

Family	Scientific Name	Common Name	BC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
						roadside remnants, along with urban trees can help sustain populations of the species. The species roosts in tree tops, often some distance from food trees, though prefers to nest in close proximity to feed areas. The species nests in hollows with a small entrance (3 cm) and at a height of between two and fifteen metres. Often nest trees are in riparian areas, and include trees of species like Allocasuarina spp.	
Psittacidae	*Lathamus discolor*	Swift Parrot	E1	E	7	Migrates to the Australian south-east mainland between March and October. On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations.	Potential foraging habitat in the form of flowering Eucalypts. Species does not breed in mainland Australia.
Tytonidae	*Tyto novaehollandiae*	Masked Owl	V	-	2	Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting. Lives in dry eucalypt forests and woodlands from sea level to 1100 m. A forest owl, but often hunts along the edges of forests, including	Unlikely to occur. Intact native vegetation/forest suitable for roosting, nesting, and foraging not present.

Table 5 Likelihood of Occurrence – Threatened Fauna Species

Family	Scientific Name	Common Name	BC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
						roadsides. The typical diet consists of tree-dwelling and ground mammals, especially rats.	
Gastropoda							
Camaenidae	*Meridolum corneovirens*	Cumberland Plain Land Snail	E1	-	194	Primarily inhabits Cumberland Plain Woodland (an endangered ecological community). This community is a grassy, open woodland with occasional dense patches of shrubs. Lives under litter of bark, leaves and logs, or shelters in loose soil around grass clumps. Occasionally shelters under rubbish.	Unlikely. Cumberland Plain Woodland within impact area is in poor condition, regrowing from a former clearing event, with minimal little leaf litter and no logs. Potential sub-optimal habitat under minimal leaf litter, however species was not located during targeted searches.
Mammalia							
Emballonuridae	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail-bat	V	-	1	Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory.	Minimal vegetation / foraging habitat to be removed. Potential sub-optimal foraging habitat in over woodland patches. Development Site unlikely to contain roosting habitat as no hollow trees, and no dark enclosed spaces within production building, which is further unlikely to be utilised due to dusty noisy environment of operational

Table 5 Likelihood of Occurrence – Threatened Fauna Species

Family	Scientific Name	Common Name	BC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
							brick plant.
Molossidae	*Mormopterus norfolkensis*	Eastern Freetail-bat	V	-	18	Occur in dry sclerophyll forest and woodland east of the Great Dividing Range. Roosts in tree hollows but will also roost under bark or in man-made structures.	Minimal vegetation / foraging habitat to be removed. Potential sub-optimal foraging habitat in over woodland patches. Development Site unlikely to contain roosting habitat as no hollow trees, and no dark enclosed spaces within production building, which is further unlikely to be utilised due to dusty noisy environment of operational brick plant.
Pteropodidae	*Pteropus poliocephalus*	Grey-headed Flying-fox	V	V	48	Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Commonly found in gullies, close to water, in vegetation with a dense canopy.	Potential sub-optimal foraging habitat in form of small treed areas in Development Site. No breeding camp present within the Development Site and no vegetation present capable of supporting one.
Vespertilionidae	*Falsistrellus tasmaniensis*	Eastern False Pipistrelle	V	-	9	Occurs in moist habitat with trees over 20m in height, hunting insects above or just below the tree canopy. Roosts in eucalypt hollows, under bark and in buildings.	Unlikely to occur. Species has a preference for wet sclerophyll forests with tall trees, not dry woodland.
Vespertilionidae	*Miniopterus australis*	Little Bentwing-bat	V	-	2	Inhabits moist eucalypt forest, rainforest, wet	Minimal vegetation / foraging habitat to

Table 5 Likelihood of Occurrence – Threatened Fauna Species

Family	Scientific Name	Common Name	BC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
						and dry sclerophyll forest, melaleuca swamps, dense coastal forests and banksia scrub, preferring well-timbered areas. Species roosts in caves, tunnels, tree hollows, stormwater drains, culverts, bridges and sometimes in buildings.	be removed. Potential sub-optimal foraging habitat in over woodland patches. Development Site unlikely to contain roosting habitat as no hollow trees, and no dark enclosed spaces within production building, which is further unlikely to be utilised due to dusty noisy environment of operational brick plant.
Vespertilionidae	*Miniopterus schreibersii oceanensis*	Eastern Bentwing-bat	V	-	34	Roosts mainly in caves but also in tunnels, mines or buildings. Non-breeding populations disperse within a 300 km range of maternity caves. Hunting for moths and other insects takes place in forested areas above the canopy.	Minimal vegetation / foraging habitat to be removed. Potential sub-optimal foraging habitat over woodland patches. Development site unlikely to contain roosting habitat as no hollow trees, and no dark enclosed spaces within production building, which is further unlikely to be utilised due to dusty noisy environment of operational brick plant.
Vespertilionidae	*Myotis macropus*	Southern Myotis	V	-	11	Roosts close to water in caves, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. Forage over streams and pools	Unlikely. Buildings in Development are within 350m of Eastern Creek. However unlikely to be utilised as dusty, noisy environment of operational brick plant,

Table 5 Likelihood of Occurrence – Threatened Fauna Species

Family	Scientific Name	Common Name	BC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
						catching insects and small fish. Known from a range of habitats close to water from lakes, small creeks to large lakes and mangrove lined estuaries	and no enclosed dark spaces within roof which is constructed of open steel girders and sheet metal. No foraging habitat to be removed.
Vespertilionidae	*Scoteanax rueppellii*	Greater Broad-nosed Bat	V	-	9	Found mainly in the gullies and river systems that drain the Great Dividing Range. Usually roosts in tree hollows and buildings. Forages after sunset, flying slowly and directly along creek and river corridors at an altitude of 3 - 6 m. Open woodland habitat and dry open forest suits the direct flight of this species as it searches for beetles and other large, slow-flying insects. Species is not known to occur in areas of high urban density.	Unlikely to occur. Species is not known from areas of high urban density and is therefore unlikely to utilise noisy operational plant for roosting. No foraging habitat within the Development Site due to lack of riparian areas.