

A photograph of a squirrel climbing a tree trunk. The squirrel is positioned vertically, facing upwards, with its front paws gripping the bark. The tree trunk has a rough, textured bark. The background is a solid blue color.

Travers

bushfire & ecology

flora & fauna assessment

Devondale Milk
Processing Facility,
111-113 Quarry Road,
Erskine Park

August 2013
(REF: A13068)



Flora & Fauna Assessment

Devondale Milk Processing Facility
111-113 Quarry Road,
Erskine Park

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Survey effort has been reduced to provide an indication of the insitu vegetation and fauna habitat present. The 7 part test of significance is based on this survey data and further survey may result in the observation of threatened species not considered in this assessment. Consequently further target threatened species survey may be required by the determining authority. The mapping is indicative of available space and location of features which may prove critical in assessing the viability of the proposed works. Mapping has been produced on a map base with an inherent level of inaccuracy. Consequently the location of all mapped features is to be confirmed by a registered surveyor.

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List of abbreviations

APZ	asset protection zone
BPA	bushfire protection assessment
CKH	core Koala habitat
CLUMP	conservation land use management plan
DCP	Development Control Plan
DEC	NSW Department of Environment and Conservation (superseded by DECC from 4/07)
DECC	NSW Department of Environment and Climate Change (superseded by DECCW from 10/09)
DECCW	NSW Department of Environment, Climate Change and Water (superseded by OEH from 4/11)
EEC	endangered ecological community
EPA	Environmental Protection Agency
<i>EP&A Act</i>	<i>Environmental Planning and Assessment Act 1979</i>
<i>EPBC Act</i>	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
ESMP	ecological site management plan
FF	flora and fauna assessment
<i>FM Act</i>	<i>Fisheries Management Act 1994</i>
FMP	fuel management plan
HTA	habitat tree assessment
IPA	inner protection area
LEP	Local Environment Plan
LGA	local government area
NES	national environmental significance
NPWS	NSW National Parks and Wildlife Service
NSW DPI	NSW Department of Industry and Investment
OEH	Office of Environment and Heritage (Part of the NSW Department of Premier and Cabinet)
OPA	outer protection area
<i>PBP</i>	<i>Planning for Bush Fire Protection 2006</i>
PKH	potential Koala habitat
POM	plan of management
<i>RF Act</i>	<i>Rural Fires Act 1997</i>
RFS	NSW Rural Fire Service
ROTAP	rare or threatened Australian plants
SEPP 44	<i>State Environmental Protection Policy No 44 – Koala Habitat Protection</i>

SEWPAC	Federal Department of Sustainability, Environment, Water, Population and Communities
SIS	species impact statement
SULE	safe useful life expectancy
TPO	tree preservation order
TPZ	tree preservation zone
TRRP	tree retention and removal plan
<i>TSC Act</i>	<i>Threatened Species Conservation Act 1995</i>
VMP	vegetation management plan
<i>WM Act</i>	<i>Water Management Act 2000</i>



Ecological Assessment

Travers bushfire & ecology has been engaged to undertake an ecological assessment at 111-113 Quarry Road, Erskine Park for indirect impacts on adjacent bushland to the south of the site and the proposed stormwater line within the bushland corridor.

1.0 Proposed development

The proposal is for a processing factory for Devondale on a 5ha lot (approximately) which shall include the factory, energy centre, truck loading and unloading area, car parking and a perimeter access road. The development also incorporates stormwater facilities that extend into the adjoining bushland. The proposed layout is shown on Figure 1.

2.0 Survey

Botanical survey was undertaken on 12 August 2013 over a time frame of approximately 1.33hrs.

Botanical survey included a random meander in accordance with Cropper (1993) to gain a full species list of the plants within the site and up to 50m into adjacent bushland to the south. Target threatened species survey was also undertaken with a focus on searches for *Grevillea juniperina* subsp. *juniperina* which are known to occur on properties in the local area. No quadrats were undertaken, however, one (1) transect was undertaken within the bushland corridor. A review of the *Atlas of NSW Wildlife* (OEH 2013) was undertaken prior to the site visit to determine threatened species previously recorded within 10km of the subject site.

3.0 Site description

Table 1 provides a summary of the planning, cadastral, topographical, and disturbance details of the subject site.

Table 1 – Site features

Location	111-113 Quarry Road, Erskine Park
Size	Approximately 5ha
Local government area	Penrith
Grid reference	295050E 6255450N
Elevation	Approximately 40-50m AMSL
Topography	The subject site has been flattened. The south edge has been filled meaning there is a wall and batter down to the remnant bushland which has a southerly aspect.
Geology and soils	Geology; Bringelly Shales. Soils; Blacktown Soil Landscape – shallow to moderately deep low fertility shale type soils.
Catchment and drainage	Unnamed tributary to the south of the site which flows west into South Creek.
Vegetation	Remnant woodland occurs to the south within the bushland corridor – Cumberland Plain Woodland, River-flat Eucalypt Forest and revegetation works.
Existing land use	Commercial – vacant

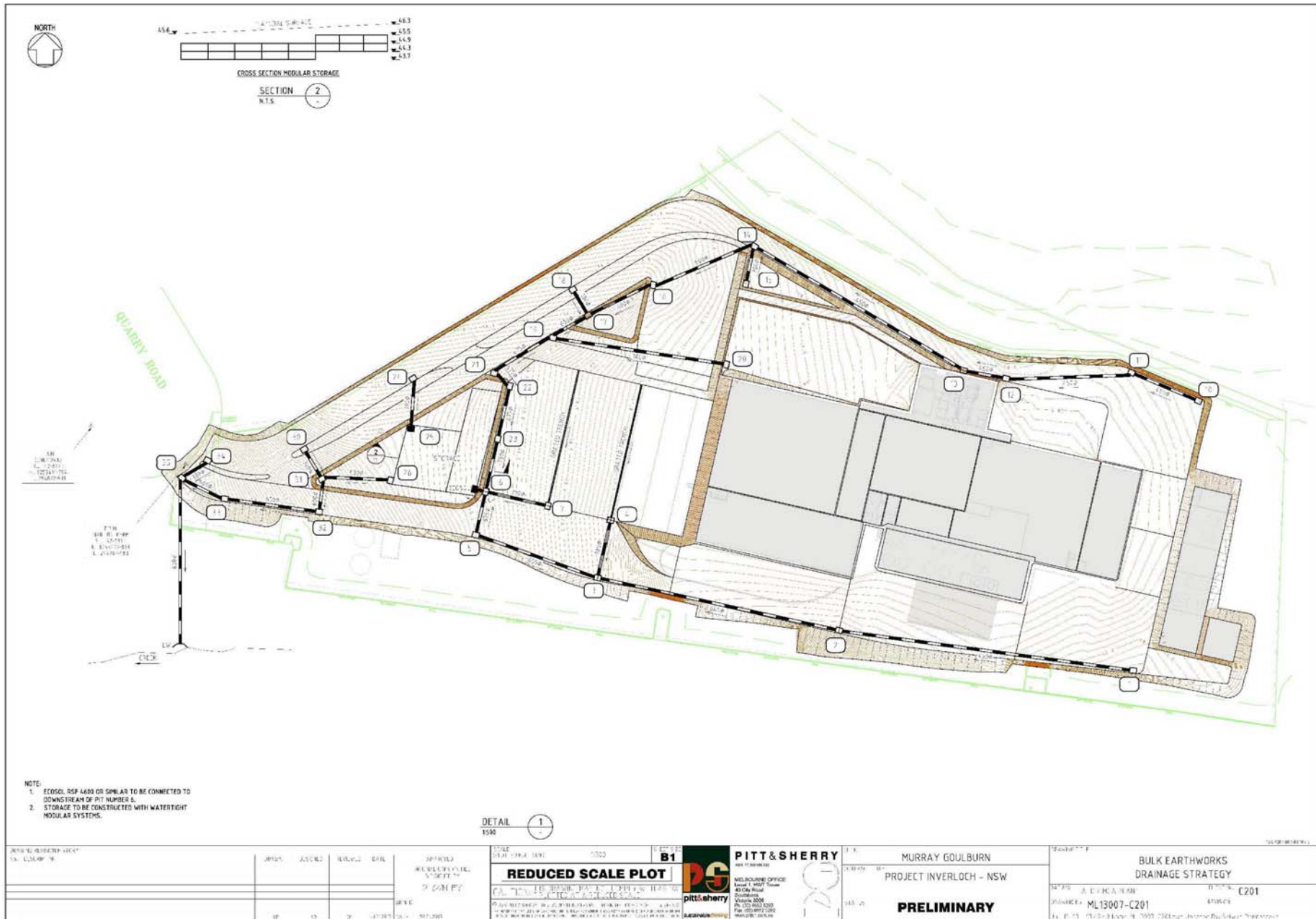


Figure 1 – Site proposal

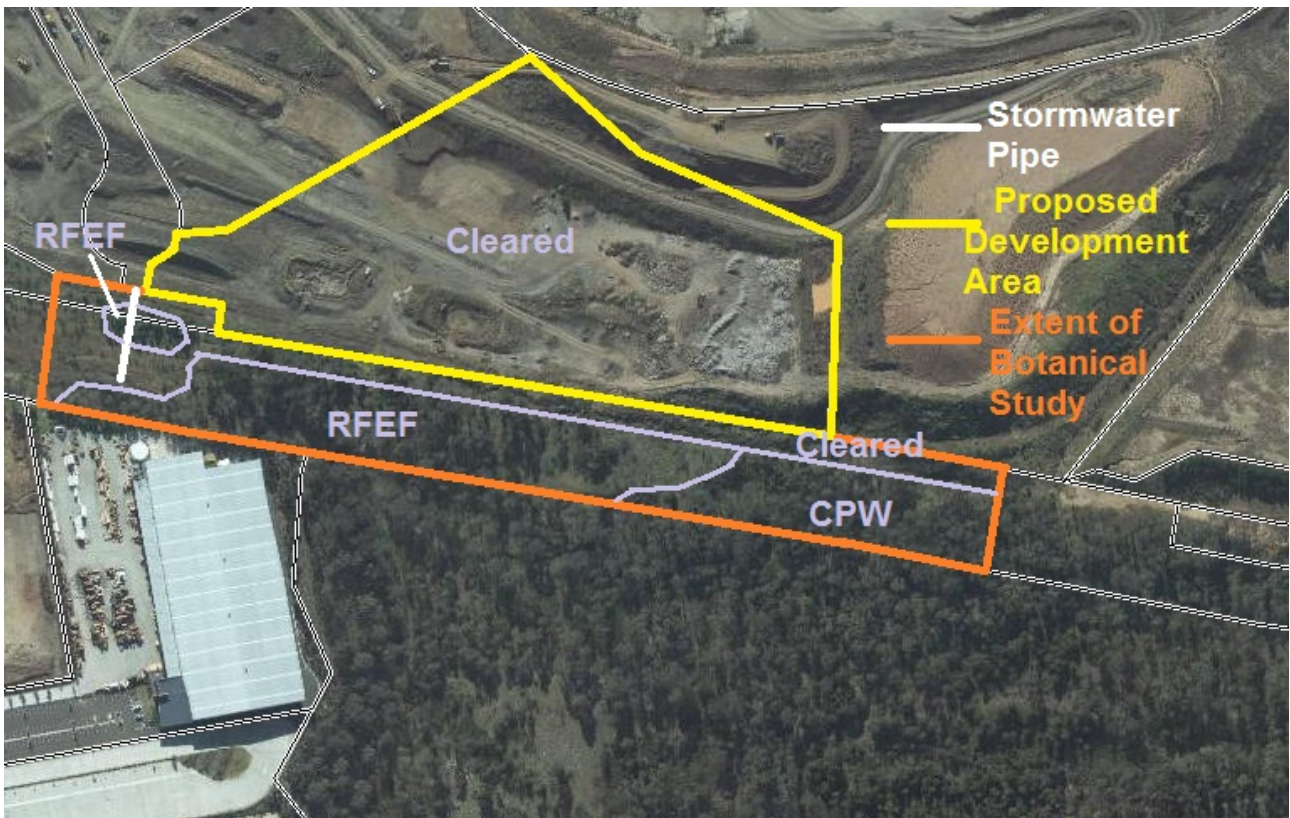


Figure 2 – Flora survey effort

Note: RFEF – River-flat Eucalypt Forest (EEC) and CPW – Cumberland Plain Woodland (EEC)

4.0 Flora

Botanical survey was undertaken within the development area and within the bushland corridor up to 50m outside of the development area.

No native vegetation is present within the development area and whilst disturbance may promote the growth of *Grevillea juniperina* subsp. *juniperina*, no specimens were present.

In the bushland corridor to the immediate south, there is a cleared batter of approximately 10m width which has been recently grassed, the remnant bushland is River-flat Eucalypt Forest up the western end, grading to Cumberland Plain Woodland at the eastern end. There are some plantings within the corridor and the batter on adjoining lots further east has been fully planted.

A list of all observed specimens within the study area are contained in Appendix 1.

4.1 Vegetation communities

River-flat Eucalypt Forest

The canopy comprises largely *Eucalyptus tereticornis* and *Angophora floribunda* with *Casuarina glauca* to a height of up to 25m and a projected foliage cover of 25-40%.

The mid-storey contains some *Melaleuca linariifolia* as a sub-canopy species as well as *Bursaria spinosa*. The projected foliage cover is highly variable because of past disturbances and presence / absence of the Melaleucas.



Photo 1 – Southern boundary of site with 5-10m wide clearing and grassed with River-flat Eucalypt Forest adjacent

The ground layer has a moderate diversity of small shrubs, herbs, grasses and occasionally ferns. Near the batter, which has caused some disturbance, there are some weeds present including some small to moderate patches of Blackberry.

Cumberland Plain Woodland

The canopy comprises a mixture of *Eucalyptus tereticornis* and *Eucalyptus moluccana* mostly 18-25m in height and with a projected foliage cover of 25%. There has been moderate dieback of many trees most likely due to Bell Miners. At least 85% of the Eucalypts have a diameter at breast height less than 30cm indicating juvenile or mostly semi-mature specimens. Consequently, there was a lack of hollow bearing trees present and fallen logs as ground refugia.



Photo 2 – Cumberland Plain Woodland to the south east of the subject site with a moderately dense layer of *Bursaria spinosa*

The mid-storey comprises *Bursaria spinosa* with some *Melaleuca* species along the creek line. The mid-storey has a projected foliage cover of between 30-65%.

The ground layer has a moderate diversity of small shrubs, herbs and grasses which are dense and comprise of approximately 85% native coverage versus 5-10% exotic coverage.

Cleared landscape

This describes the development area and the cleared portion in the first 10 m south of the constructed wall and batter.

Revegetation works

The batter on adjoining allotments further east has been revegetated with standard riparian plantings of Eucalypts, Melaleucas, Acacias, Dodonaeas and Hakeas, with groundcovers such as Lomandra and Dianella. The revegetation works are outside of the current study zone but were noted more towards Templar Road.



Photo 3 – The proposed building platform showing the site as a cleared landscape

4.2 Threatened flora species

Threatened Species Conservation Act (TSC Act) – A search of the *Atlas of NSW Wildlife* (OEH, 2013) indicated a list of species that have been recorded within a 10km radius of the subject site. These species are listed in Appendix 2 Table A2.1 and are considered for potential habitat within the subject site.

Environmental Protection and Biodiversity Conservation Act (EPBC Act) – A review of the schedules of the *EPBC Act* indicated the potential for a list of threatened flora species to occur within a 10km radius of the subject site. These species have also been listed in Appendix 2, Table A2.1 for consideration of potential to occur.

Based on the habitat assessment within Table A2.1 it is considered that the subject site provides potential habitat for the following threatened flora species. These species will be considered in the 7 part test of significance within Appendix 3:

Table 2 – Threatened flora species with suitable habitat present

SCIENTIFIC NAME
<i>Acacia pubescens</i>
<i>Dillwynia tenuifolia</i>
<i>Grevillea juniperina</i> subsp. <i>juniperina</i>
<i>Grevillea parviflora</i> subsp. <i>parviflora</i>
<i>Hypsela sessiliflora</i>
<i>Pimelea spicata</i>
<i>Pultenaea parviflora</i>

Grevillea juniperina subsp. *juniperina* was targeted in particular as there are known records within 250m of the study area. Despite the potential habitat, none of these species were observed during the flora survey.

4.3 Endangered populations

There are two (2) endangered populations within a 10km radius of the site, these include:

- *Marsdenia viridiflora* R. Br. subsp. *viridiflora* population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas (LGAs)
- *Dillwynia tenuifolia*, Kemps Creek

The vegetation within the remnant bushland area provides, at best, marginal habitat for the species, however, no specimens were observed within the study area.

The study area does not occur within Kemps Creek however *Dillwynia tenuifolia* is a listed vulnerable species under the *TSC Act* and is considered accordingly.

5.0 Fauna

5.1 Habitat assessment

The fauna assessment is based on desktop assessment, threatened species records (OEH 2013) and habitat attributes identified during the flora survey. Particular note was taken to search for the following potential threatened fauna species habitat:

- A count of tree species present to determine potential Koala habitat (PKH) according to the definitions of *State Environmental Planning Policy No.44 – Koala habitat protection* (SEPP 44).
- Hollow bearing trees present.
- Presence of drainages for frog species habitat

The following habitat was present:

- Low density of small hollows due to the limited number of mature tree specimens
- Nectar producing tree species, principally *Eucalyptus*
- Seed producing trees notably *Casuarina*
- Moderate to dense ground cover
- Loose soil suitable for foraging
- Exfoliated bark on trunks and piles at the base of smooth-barked *Eucalyptus* species
- Drainage / creek line
- Winter flowering trees

5.2 Threatened fauna species

TSC Act – A search of the *Atlas of NSW Wildlife* (OEH, 2013) provided a list of threatened fauna species previously recorded within a 10km radius of the subject site. These species are listed in Appendix Table A2.2 and are considered for potential habitat within the subject site. Strictly coastal and oceanic threatened species found within 10km have not been included.

Fisheries Management Act (FM Act) – No habitats suitable for threatened aquatic species were observed within the subject site and, as such, the provisions of this act do not require any further consideration.

EPBC Act – A review of the schedules of the *EPBC Act* identified a list of threatened fauna species or species habitat likely to occur within a 10km radius of the subject site. These species have been listed in Appendix Table A2.2.

SEPP 44 – Approximately 50% of the tree specimens were *Eucalyptus tereticornis* which are suitable feed species for the Koala. There are no local (within 7km) or recent records of the species utilising the area and there was no evidence of use. The site is not considered to be core Koala habitat (CKH) under SEPP 44 and, whilst relevant feed trees may occur, the lack of records and fragmented landscape mean that it is a PKH area although is not likely to support a population.

In accordance with Table A2.2, the following threatened fauna species are considered to have potential habitat within the subject site. These species will be considered in the 7 part test of significance (Appendix 3):

Table 3 – Threatened fauna species with suitable habitat present

COMMON NAME
Green and Golden Bell Frog
Australasian Bittern
Little Lorikeet
Swift Parrot
Speckled Warbler
Black-chinned Honeyeater
Regent Honeyeater
Varied Sittella
Scarlet Robin
Flame Robin
Diamond Firetail
Koala
Grey-headed Flying-fox
East-coast Freetail Bat
Eastern Falsistrelle
Little Bentwing-bat
Eastern Bentwing-bat
Large-footed Myotis
Greater Broad-nosed Bat
Cumberland Plain Land Snail

Additionally, protected migratory species listed under the *EPBC Act* are considered for habitat potential in Table 1.3.

It is concluded that there will be no likely significant impact on these species.

5.3 Endangered populations

The White-fronted Chat population in the Sydney Metropolitan Catchment Management Area may cover the study area however none have been observed within a 10km radius of the site previously and are not expected to occur.

5.4 Connectivity

The proposal itself does not interrupt connective values of the bushland as the remnant is over 100m in width and the stormwater outlet extends less than 50m into the bushland. As there will be minimal disturbance for this piece of infrastructure, it will not have a detrimental impact upon fauna movement. The only possible problem is that it may provide a short term barrier impact upon the Cumberland Plain Land Snail.

6.0 Conclusions and Recommendations

The following conclusions have been made:

- No significant impact to threatened flora is expected as no threatened species have been observed.
- The small removal or modification of vegetation and habitat is of such a small percentage of the local remnant that it will not cause a local extinction of any endangered ecological community (EEC) or potential threatened species.
- Given the limited habitat potential present, the 7 part test of significance (Appendix 3) has concluded a not significant conclusion with respect to the potential impact upon threatened species, communities and populations. Therefore, a species impact statement (SIS) should not be required for the proposed development.
- The proposed development was not considered to have a significant impact on threatened or migratory fauna species listed as matters of national environmental significance (NES) under the *EPBC Act*. As such, a referral to the Department of Sustainability, Environment, Water, Population and Communities (SEWPAC) is not required.

The following recommendations are relevant to the proposed works:

- Whilst the proposal may only provide a short term barrier impact upon the Cumberland Plain Land Snail, a project ecologist is to undertake a search of the area proposed for the stormwater pipe and outlet and relocate specimens into nearby bushland prior to construction works commencing.
- It is recommended that the proposal follow *Phytophthora* control protocols that minimise the risk of plant pathogens spreading.
- It is recommended that weed control be undertaken for Blackberry.
- It is recommended that all native vegetation areas disturbed as a result of the proposed stormwater works are to be stabilised and revegetated with native ground layer and shrub species post completion of works to minimise erosion and sedimentation.
- Temporary open weave jute mesh, not jute mat, is to be installed for stabilising disturbed grounds to promote natural regeneration.

Appendix 1

Flora Species List

Table A1.1 – Flora species observed within the subject site and immediately adjacent

Family	Scientific name	Common name
TREES		
Mimosaceae	<i>Acacia decurrens</i>	Black Wattle
Mimosaceae	<i>Acacia parramattensis</i>	Parramatta Wattle
Myrtaceae	<i>Angophora floribunda</i>	Rough-barked Apple
Casuarinaceae	<i>Casuarina glauca</i>	Swamp Oak
Myrtaceae	<i>Eucalyptus moluccana</i>	Grey Box
Myrtaceae	<i>Eucalyptus tereticornis</i>	Forest Red Gum
Myrtaceae	<i>Melaleuca decora</i>	-
Myrtaceae	<i>Melaleuca linariifolia</i>	Snow in Summer
SHRUBS		
Mimosaceae	<i>Acacia implexa</i>	Hickory
Pittosporaceae	<i>Bursaria spinosa</i> var. <i>spinosa</i>	Native Blackthorn
Solanaceae	<i>Cestrum parqui</i> *	Chilean Cestrum
Apocynaceae	<i>Gomphocarpus fruticosus</i> *	Narrow Leaf Cotton Bush
Verbenaceae	<i>Lantana camara</i> *	Lantana
Oleaceae	<i>Ligustrum sinense</i> *	Small-leaved Privet
Euphorbiaceae	<i>Ricinus communis</i> *	Castor Oil Plant
Rosaceae	<i>Rubus fruticosus</i> sp. agg.*	Blackberry Complex
Asteraceae	<i>Senecio pterophorus</i> *	African Daisy
Solanaceae	<i>Solanum linnaeanum</i> *	Devil's Apple
GROUNDCOVERS		
Asteraceae	<i>Ageratina adenophora</i> *	Crofton Weed
Alismataceae	<i>Alisma plantago-aquatica</i>	Water Plantain
Amaranthaceae	<i>Alternanthera denticulata</i>	Lesser Joyweed
Myrsinaceae	<i>Anagallis arvensis</i> *	Scarlet Pimpernel
Poaceae	<i>Axonopus fissifolius</i> *	Narrow-leaved Carpet Grass
Asteraceae	<i>Bidens pilosa</i> *	Cobbler's Pegs
Brassicaceae	<i>Brassica fruticulosa</i> *	Twiggy Turnip
Cyperaceae	<i>Carex appressa</i>	Tall Sedge
Gentianaceae	<i>Centaurium erythraea</i> *	Pink Stars
Apiaceae	<i>Centella asiatica</i>	Indian Pennywort
Poaceae	<i>Chloris gayana</i> *	Rhodes Grass
Poaceae	<i>Chloris ventricosa</i>	Tall Chloris
Asteraceae	<i>Cirsium vulgare</i> *	Spear Thistle
Poaceae	<i>Cortaderia selloana</i> *	Pampas Grass
Apiaceae	<i>Cyclospermum leptophyllum</i> *	Slender Celery
Poaceae	<i>Cynodon dactylon</i>	Common Couch
Cyperaceae	<i>Cyperus eragrostis</i> *	Umbrella Sedge
Convolvulaceae	<i>Dichondra repens</i>	Kidney Weed
Poaceae	<i>Digitaria sanguinalis</i> *	Crab Grass
Poaceae	<i>Echinopogon caespitosus</i> var. <i>caespitosus</i>	Tufted Hedgehog Grass
Poaceae	<i>Entolasia marginata</i>	Bordered Panic
Poaceae	<i>Eragrostis brownii</i>	Brown's Lovegrass
Poaceae	<i>Eragrostis curvula</i> *	African Lovegrass
Euphorbiaceae	<i>Euphorbia peplus</i> *	Spurge
Geraniaceae	<i>Geranium homeanum</i>	Northern Cranesbill
Clusiaceae	<i>Hypericum gramineum</i>	Small St Johns Wort
Asteraceae	<i>Hypochaeris radicata</i> *	Flatweed
Poaceae	<i>Imperata cylindrica</i> var. <i>major</i>	Blady Grass
Juncaceae	<i>Juncus cognatus</i> *	-
Juncaceae	<i>Juncus usitatus</i>	Common Rush

Table A1.1 – Flora species observed within the subject site and immediately adjacent

Family	Scientific name	Common name
Malvaceae	<i>Malva sylvestris</i> *	Tall Mallow
Fabaceae	<i>Medicago polymorpha</i> *	Burr Medic
Poaceae	<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Grass
Malvaceae	<i>Modiola caroliniana</i> *	Red-flowered Mallow
Haloragaceae	<i>Myriophyllum</i> sp.	-
Poaceae	<i>Pennisetum clandestinum</i> *	Kikuyu
Polygonaceae	<i>Persicaria decipiens</i>	Slender Knotweed
Poaceae	<i>Phragmites australis</i>	Common Reed
Plantaginaceae	<i>Plantago lanceolata</i> *	Ribwort
Poaceae	<i>Poa labillardieri</i> var. <i>labillardieri</i>	Tussock Grass
Lobeliaceae	<i>Pratia purpurascens</i>	Whiteroot
Polygonaceae	<i>Rumex crispus</i> *	Curled Dock
Asteraceae	<i>Senecio madagascariensis</i> *	Fireweed
Poaceae	<i>Setaria parviflora</i> *	-
Malvaceae	<i>Sida rhombifolia</i> *	Paddy's Lucerne
Solanaceae	<i>Solanum nigrum</i> *	Black Nightshade
Solanaceae	<i>Solanum pseudocapsicum</i> *	-
Asteraceae	<i>Sonchus oleraceus</i> *	Common Sow-thistle
Lamiaceae	<i>Stachys arvensis</i> *	Stagger Weed
Asteraceae	<i>Taraxacum officinale</i> *	Dandelion
Fabaceae	<i>Trifolium repens</i> *	White Clover
Juncaginaceae	<i>Triglochin microtuberosum</i>	Water Ribbons
Typhaceae	<i>Typha orientalis</i>	Cumbungi
Verbenaceae	<i>Verbena bonariensis</i> *	Purpletop
VINES		
Apocnyaceae	<i>Araujia sericifera</i> *	Mothvine
Asparagaceae	<i>Asparagus asparagoides</i> *	Bridal Creeper
Chenopodiaceae	<i>Einadia nutans</i> subsp. <i>linifolia</i>	Climbing Saltbush
Fabaceae	<i>Glycine tabacina</i>	Variable Glycine

* denotes exotic species

Appendix 2

Threatened Flora and Fauna Species Habitat Assessment

Table A2.1 – Threatened flora species habitat assessment

Scientific name DATABASE SOURCE	TSC Act	EPBC Act	Growth form and habitat requirements	Recorded on site (✓)	If not recorded onsite				Considered in 7 part test of significance (✓)
					Suitable habitat present (✓)	Nearby and / or high number of record(s) (✓) <i>Notes 1,2 & 3</i>	Record(s) from recent years (✓) <i>Notes 1,2 & 3</i>	Potential to occur	
<i>Acacia pubescens</i> OEH EPBC	V	V	Spreading shrub 1-4m high open sclerophyll growing in open forest and woodlands on clay soils. Distribution limits N-Bilpin S-Georges River.	x	marginal	not within 6km	✓	low	✓
<i>Allocasuarina glareicola</i> EPBC	E1	E	Small shrub 1-2m high growing in open sclerophyll forest on lateritic soils derived from tertiary alluviums. Distribution limits Castlereagh NR region.	x	x	-	-	x	x
<i>Cynanchum elegans</i> OEH EPBC	E1	E	Climber or twiner to 1m. Grows in rainforest gullies, scrub & scree slopes. Distribution limits N-Gloucester S-Wollongong.	x	x	-	-	x	x
<i>Dillwynia tenuifolia</i> OEH	V	-	Erect shrub 0.6-1m high. Grows in Woodlands and Open Forest on sandstone shale or laterite. Distribution limits N-Howes Valley S-Cumberland Plain.	x	✓	✓	✓	✓	✓
<i>Eucalyptus scoparia</i> OEH	E1	V	Smooth-barked tree only known from vicinity of Bald Rock.	x	x	-	-	x	x
<i>Grevillea juniperina</i> subsp. <i>juniperina</i> OEH	V	-	Erect to spreading shrub 0.5-1.5m tall. Grows on laterite and Tertiary alluvium. Distribution limits St Marys-Londonderry-Prospect.	x	✓	✓	✓	✓	✓
<i>Grevillea parviflora</i> subsp. <i>parviflora</i> OEH EPBC	V	V	Open to erect shrub to 1m. Grows in woodland on light clayey soils Distribution limits N-Cessnock S-Appin.	x	✓	✓	✓	✓	✓
<i>Hypsela sessiliflora</i> OEH	E1	Extinct	Prostrate herb, rooting at nodes, growing in damp places on the Cumberland Plain.	x	✓	✓	✓	✓	✓

Table A2.1 – Threatened flora species habitat assessment

Scientific name DATABASE SOURCE	TSC Act	EPBC Act	Growth form and habitat requirements	Recorded on site (✓)	If not recorded onsite				Considered in 7 part test of significance (✓)
					Suitable habitat present (✓)	Nearby and / or high number of record(s) (✓) <i>Notes 1,2 & 3</i>	Record(s) from recent years (✓) <i>Notes 1,2 & 3</i>	Potential to occur	
<i>Micromyrtus minutiflora</i> OEH EPBC	E1	V	Spreading shrub to 2m high. Grows in dry sclerophyll forest dominated by Scribbly gums and Ironbarks on Tertiary Alluviums. Distribution limits Western part of Cumberland Plain.	x	x	-	-	x	x
<i>Persoonia nutans</i> OEH EPBC	E1	E	Erect to spreading shrub. Grows in dry sclerophyll forest and woodland on laterite and alluvial sands. Distribution limits Cumberland Plain.	x	x	-	-	x	x
<i>Pilularia novae-hollandiae</i> OEH	E1	-	Widespread but not common in seasonally dry depressions and margins of marshes; may grow submerged.	x	x	-	-	x	x
<i>Pimelea curviflora</i> var. <i>curviflora</i> OEH EPBC	V	V	Woody herb or sub-shrub to 0.2-1.2m high. Grows on Hawkesbury sandstone near shale outcrops. Distribution Sydney.	x	x	-	-	x	x
<i>Pimelea spicata</i> OEH EPBC	E1	E	Decumbent or erect shrub to 0.5m high. Occurs principally in woodland on soils derived from Wianamatta Shales. Distribution limits N-Lansdowne S-Shellharbour.	x	✓	✓	✓	✓	✓
<i>Pomaderris brunnea</i> EPBC	V	V	Shrub to 3m high. Confined to Upper Nepean and Colo Rivers where it grows in open forest.	x	x	-	-	x	x
<i>Pterostylis gibbosa</i> EPBC	E1	E	Terrestrial orchid which occurs near Wollongong and in Hunter Valley in sclerophyll forest, sometimes with paperbarks.	x	x	-	-	x	x

Table A2.1 – Threatened flora species habitat assessment

Scientific name DATABASE SOURCE	TSC Act	EPBC Act	Growth form and habitat requirements	Recorded on site (✓)	If not recorded onsite				Considered in 7 part test of significance (✓)
					Suitable habitat present (✓)	Nearby and / or high number of record(s) (✓) <i>Notes 1,2 & 3</i>	Record(s) from recent years (✓) <i>Notes 1,2 & 3</i>	Potential to occur	
<i>Pterostylis saxicola</i> OEH EPBC	E1	E	Terrestrial orchid. Grows in shallow sandy soil above rock shelves, usually near Wianamatta / Hawkesbury transition. Distribution limits N-Hawkesbury River S-Campbelltown.	x	x	-	-	x	x
<i>Pultenaea parviflora</i> OEH EPBC	E1	V	Erect shrub. Grows in dry sclerophyll forest at the intergrade between Tertiary Alluviums and Wianamatta Shales. Distribution limits Cumberland Plain.	x	marginal	✓	✓	low	✓
<i>Streblus pendulinus</i> EPBC	-	E	Tree or large shrub to 6m tall. Coastal species along watercourses in warmer rainforest area.	x	x	-	-	x	x
OEH	- Denotes species listed within 10km of the subject site on the <i>Atlas of NSW Wildlife</i>								
EPBC	- Denotes species listed within 10km of the subject site in the <i>EPBC Act</i> habitat search								
V	- Denotes vulnerable listed species under the relevant Act								
E or E1	- Denotes endangered listed species under the relevant Act								
NOTE:	1. This field is not considered if no suitable habitat is present within the subject site 2. 'records' refer to those provided by the <i>Atlas of NSW Wildlife</i> 3. 'nearby' or 'recent' records are species specific accounting for home range, dispersal ability and life cycle								

A detailed assessment in accordance with Section 5A of the *EPA Act* will be completed for these species in Appendix 3 of this report.

Table A2.2 – Threatened fauna species habitat assessment

Common name Scientific name DATABASE SOURCE	TSC Act	EPBC Act	Preferred habitat Distribution limit	Recorded on site (✓)	If not recorded onsite				Considered in 7 part test of significance (✓)
					Suitable habitat present (✓)	Nearby and / or high number of record(s) (✓) <i>Notes 1,2 & 3</i>	Record(s) from recent years (✓) <i>Notes 1,2 & 3</i>	Potential to occur	
Giant Burrowing Frog <i>Heleioporus australiacus</i> OEH EPBC	V	V	Inhabits open forests and riparian forests along non-perennial streams, digging burrows into sandy creek banks. <i>Distribution Limit: N-Near Singleton S-South of Eden.</i>	x	x	-	-	x	x
Giant Barred Frog <i>Mixophyes iteratus</i> EPBC	E	E	Terrestrial inhabitant of rainforest and open forests. <i>Distribution Limit: N-Border Ranges National Park. S-Narooma.</i>	x	x	-	-	x	x
Green and Golden Bell Frog <i>Litoria aurea</i> EPBC	E	V	Prefers the edges of permanent water, streams, swamps, creeks, lagoons, farm dams and ornamental ponds. Often found under debris. <i>Distribution Limit: N-Byron Bay S-South of Eden.</i>	x	Only if there are dams remaining on adjacent lots	x	✓	Unknown but assumed as possible	✓
Southern Bell Frog <i>Litoria raniformis</i> EPBC	E	V	Prefers the edges of permanent water, streams, swamps, creeks, lagoons, farm dams and ornamental ponds. Often found under debris. <i>Distribution Limit: N-ACT Bay. S-Albury.</i>	x	x	-	-	x	x
Broad-headed Snake <i>Hoplocephalus bungaroides</i> EPBC	E	V	Sandstone outcrops, exfoliated rock slabs and tree hollows in coastal and near coastal areas. <i>Distribution Limit: N-Mudgee Park. S-Nowra.</i>	x	x	-	-	x	x

Table A2.2 – Threatened fauna species habitat assessment

Common name <i>Scientific name</i> DATABASE SOURCE	TSC Act	EPBC Act	Preferred habitat <i>Distribution limit</i>	Recorded on site (✓)	If not recorded onsite				Considered in 7 part test of significance (✓)
					Suitable habitat present (✓)	Nearby and / or high number of record(s) (✓) <i>Notes 1,2 & 3</i>	Record(s) from recent years (✓) <i>Notes 1,2 & 3</i>	Potential to occur	
Freckled Duck <i>Stictonetta naevosa</i> OEH	V	-	Occurs mainly within the Murray-Darling basin and the channel country within large cool temperate to sub-tropical swamps, lakes and floodwaters with cumbungi, lignum or melaleucas. <i>Distribution Limit: N- Tenterfield. S-Albury.</i>	x	x	-	-	x	x
Black-necked Stork <i>Ephippiorhynchus asiaticus</i> OEH	E	-	Occurs in tropical to warm temperate terrestrial wetlands, estuarine and littoral habitats such as mangroves, tidal mudflats, floodplains, open woodlands, irrigated lands, bore drains, sub-artesian pools, farm dams and sewerage ponds. <i>Distribution Limit: N-Tweed Heads. S-Nowra.</i>	x	x	-	-	x	x
Australasian Bittern <i>Botaurus poiciloptilus</i> EPBC	E	E	Found in or over water of shallow freshwater or brackish wetlands with tall reedbeds, sedges, rushes, cumbungi, lignum and also in ricefields, drains in tussocky paddocks, occasionally saltmarsh, brackish wetlands. <i>Distribution Limit: N-North of Lismore. S- Eden.</i>	x	x	-	-	x	x
Little Eagle <i>Hieraaetus morphnoides</i> OEH	V	-	Utilises plains, foothills, open forests, woodlands and scrublands; river red gums on watercourses and lakes. <i>Distribution Limit - N-Tweed Heads. S-South of Eden.</i>	x	✓	✓	✓	✓	✓

Table A2.2 – Threatened fauna species habitat assessment

Common name <i>Scientific name</i> DATABASE SOURCE	TSC Act	EPBC Act	Preferred habitat <i>Distribution limit</i>	Recorded on site (✓)	If not recorded onsite				Considered in 7 part test of significance (✓)
					Suitable habitat present (✓)	Nearby and / or high number of record(s) (✓) <i>Notes 1,2 & 3</i>	Record(s) from recent years (✓) <i>Notes 1,2 & 3</i>	Potential to occur	
Square-tailed Kite <i>Lophoictinia isura</i> OEH	V	-	Utilises mostly coastal and sub-coastal open forest, woodland or lightly timbered habitats and inland habitats along watercourses and mallee that are rich in passerine birds. <i>Distribution Limit: N-Goondiwindi. S-South of Eden.</i>	x	✓	x	✓	low	✓
Red Goshawk <i>Erythrotriorchis radiatus</i> OEH EPBC	E	V	Inhabits tall open forests and woodlands. Breeds in tall trees adjacent to watercourses of wetlands. <i>Distribution Limit: N-Border Ranges National Park. S-Foster.</i>	x	x	-	-	x	x
Bush Stone-curlew <i>Burhinus grallarius</i> OEH	E	-	Utilises open forests and savannah woodlands, sometimes dune scrub, savannah and mangrove fringes. <i>Distribution Limit: N-Border Ranges National Park. S-Near Nowra.</i>	x	x	-	-	x	x
Australian Painted Snipe <i>Rostratula australis</i> EPBC	E	V	Most numerous within the Murray-Darling basin and inland Australia within marshes and freshwater wetlands with swampy vegetation. <i>Distribution Limit: N-Tweed Heads. S-South of Eden.</i>	x	x	-	-	x	x
Gang-gang Cockatoo <i>Callocephalon fimbriatum</i> OEH	V	-	Prefers wetter forests and woodlands from sea level to > 2,000m on the Great Dividing Range, timbered foothills and valleys, timbered watercourses, coastal scrubs, farmlands and suburban gardens. <i>Distribution Limit: mid north coast of NSW to western Victoria.</i>	x	x	-	-	x	x

Table A2.2 – Threatened fauna species habitat assessment

Common name <i>Scientific name</i> DATABASE SOURCE	TSC Act	EPBC Act	Preferred habitat <i>Distribution limit</i>	Recorded on site (✓)	If not recorded onsite				Considered in 7 part test of significance (✓)
					Suitable habitat present (✓)	Nearby and / or high number of record(s) (✓) <i>Notes 1,2 & 3</i>	Record(s) from recent years (✓) <i>Notes 1,2 & 3</i>	Potential to occur	
Glossy Black-Cockatoo <i>Calyptorhynchus lathamii</i> OEH	V	-	Open forests with <i>Allocasuarina</i> species and hollows for nesting. <i>Distribution Limit: N-Tweed Heads. S-South of Eden.</i>	x	x	-	-	x	x
Little Lorikeet <i>Glossopsitta pusilla</i> OEH	V	-	Inhabits forests, woodlands; large trees in open country; timbered watercourses, shelterbeds, and street trees. <i>Distribution Limit: N-Tweed Heads. S-South of Eden.</i>	x	✓	✓	✓	✓	✓
Swift Parrot <i>Lathamus discolor</i> OEH EPBC	E	E	Inhabits eucalypt forests and woodlands with winter flowering eucalypts. <i>Distribution Limit: N-Border Ranges National Park. S-South of Eden.</i>	x	✓	x	✓	low	✓
Powerful Owl <i>Ninox strenua</i> OEH	V	-	Forests containing mature trees for shelter or breeding and densely vegetated gullies for roosting. <i>Distribution Limits: N-Border Ranges National Park. S-Eden.</i>	x	x	-	-	x	x
Masked Owl <i>Tyto novaehollandiae</i> OEH	V	-	Open forest and woodlands with cleared areas for hunting and hollow trees or dense vegetation for roosting. <i>Distribution Limit: N-Border Ranges National Park. S-Eden.</i>	x	x	-	-	x	x
Eastern Bristlebird <i>Dasyornis brachypterus</i> EPBC	E	E	Coastal woodlands, dense scrubs and heathlands, especially where low heathland borders taller woodland or dense tall tea-tree. <i>Distribution Limit: N-Tweed Heads. S-South of Eden.</i>	x	x	-	-	x	x

Table A2.2 – Threatened fauna species habitat assessment

Common name Scientific name DATABASE SOURCE	TSC Act	EPBC Act	Preferred habitat Distribution limit	Recorded on site (✓)	If not recorded onsite				Considered in 7 part test of significance (✓)
					Suitable habitat present (✓)	Nearby and / or high number of record(s) (✓) <i>Notes 1,2 & 3</i>	Record(s) from recent years (✓) <i>Notes 1,2 & 3</i>	Potential to occur	
Speckled Warbler <i>Chthonicola sagittata</i> OEH	V	-	Found in temperate eucalypt woodland and open forest including forest edges, wooded farmland and urban areas with mature eucalypts. <i>Distribution Limit: N-Urbanville. S-Eden.</i>	x	✓	x	✓	low	✓
Black-chinned Honeyeater <i>Melithreptus gularis gularis</i> OEH	V	-	Found in woodlands containing box-ironbark associations and River Red Gums, also drier coastal woodlands of the Cumberland Plain and Hunter Richmond and Clarence. <i>Distribution Limit: N-Cape York Pen. Qld. S-Victor H. Mt Lofty Ra & Flinders Ra. SA.</i>	x	✓	✓	✓	✓	✓
Regent Honeyeater <i>Xanthomyza Phrygia</i> OEH EPBC	E4A	E	Found in temperate eucalypt woodland and open forest including forest edges, wooded farmland and urban areas with mature eucalypts. <i>Distribution Limit: N-Urbanville. S-Eden.</i>	x	✓	x	✓	low	✓
Varied Sittella <i>Daphoenositta chrysoptera</i> OEH	V	-	Open eucalypt woodlands / forests (except heavier rainforests); mallee, inland acacia, coastal tea-tree scrubs; golf courses, shelterbelts, orchards, parks, scrubby gardens. <i>Distribution Limit: N-Border Ranges National Park. S-South of Eden.</i>	x	✓	✓	✓	✓	✓
Scarlet Robin <i>Petroica boodang</i> OEH	V	-	Found in foothill forests, woodlands, watercourses; in autumn-winter, more open habitats: river red gum woodlands, golf courses, parks, orchards, gardens. <i>Distribution Limit: N-Tweed Heads. S-South of Eden.</i>	x	✓	x	✓	low	✓

Table A2.2 – Threatened fauna species habitat assessment

Common name <i>Scientific name</i> DATABASE SOURCE	TSC Act	EPBC Act	Preferred habitat <i>Distribution limit</i>	Recorded on site (✓)	If not recorded onsite				Considered in 7 part test of significance (✓)
					Suitable habitat present (✓)	Nearby and / or high number of record(s) (✓) <i>Notes 1,2 & 3</i>	Record(s) from recent years (✓) <i>Notes 1,2 & 3</i>	Potential to occur	
Flame Robin <i>Petroica phoenicea</i> OEH	V	-	Summer: forests, woodlands, scrubs, from sea-level to c. 1800 m. Autumn-winter: open woodlands, plains, paddocks, golf courses, parks, orchards. <i>Distribution Limit: N northern NSW tablelands. S-South of Eden.</i>	x	✓	x	✓	low	✓
Diamond Firetail <i>Stagonopleura guttata</i> OEH	V	-	Found in Eucalypt woodlands, forests and mallee where there is grassy understorey west of the Great Div. also drier coastal woodlands of the Cumberland Plain and Hunter Richmond and Clarence River Valleys. <i>Distribution Limit: N-Rockhampton Q. S-Eyre Pen Kangaroo Is. SA.</i>	x	✓	✓	✓	✓	✓
Spotted-tailed Quoll <i>Dasyurus maculatus</i> OEH EPBC	V	E	Dry and moist open forests containing rock caves, hollow logs or trees. <i>Distribution Limit: N-Mt Warning National Park. S-South of Eden.</i>	x	x	-	-	x	x
Koala <i>Phascolarctos cinereus</i> OEH EPBC	V	V	Inhabits both wet and dry eucalypt forest on high nutrient soils containing preferred feed trees. <i>Distribution Limit: N-Tweed Heads. S-South of Eden.</i>	x	✓	x	✓	low / unlikely	✓
Long-nosed Potoroo <i>Potorous tridactylus</i> EPBC	V	V	Coastal heath and dry and wet sclerophyll forests with a dense understorey. <i>Distribution Limit: N-Mt Warning National Park. S-South of Eden.</i>	x	x	-	-	x	x

Table A2.2 – Threatened fauna species habitat assessment

Common name <i>Scientific name</i> DATABASE SOURCE	TSC Act	EPBC Act	Preferred habitat <i>Distribution limit</i>	Recorded on site (✓)	If not recorded onsite				Considered in 7 part test of significance (✓)
					Suitable habitat present (✓)	Nearby and / or high number of record(s) (✓) <small>Notes 1,2 & 3</small>	Record(s) from recent years (✓) <small>Notes 1,2 & 3</small>	Potential to occur	
Brush-tailed Rock-wallaby <i>Petrogale penicillata</i> EPBC	E	V	Found in rocky gorges with a vegetation of rainforest or open forests to isolated rocky outcrops in semi-arid woodland country. <i>Distribution Limit: N-North of Tenterfield. S-Bombala.</i>	x	x	-	-	x	x
Grey-headed Flying-fox <i>Pteropus poliocephalus</i> OEH EPBC	V	V	Found in a variety of habitats including rainforest, mangroves, paperbark swamp, wet and dry open forest and cultivated areas. Forms camps commonly found in gullies and in vegetation with a dense canopy. <i>Distribution Limit: N-Tweed Heads. S-Eden.</i>	x	✓	✓	✓	✓	✓
East-coast Freetail Bat <i>Micronomus norfolkensis</i> OEH	V	-	Inhabits open forests and woodlands foraging above the canopy and along the edge of forests. Roosts in tree hollows, under bark and buildings. <i>Distribution Limit: N-Woodenbong. S-Pambula.</i>	x	✓	✓	✓	✓	✓
Large-eared Pied Bat <i>Chalinolobus dwyeri</i> EPBC	V	V	Warm-temperate to subtropical dry sclerophyll forest and woodland. Roosts in caves, tunnels and tree hollows in colonies of up to 30 animals. <i>Distribution Limit: N-Border Ranges National Park. S-Wollongong.</i>	x	x	-	-	x	x
Eastern Falsistrelle <i>Falsistrellus tasmaniensis</i> OEH	V	-	Recorded roosting in caves, old buildings and tree hollows. <i>Distribution Limit: N-Border Ranges National Park. S-Pambula.</i>	x	✓	✓	✓	✓	✓

Table A2.2 – Threatened fauna species habitat assessment

Common name <i>Scientific name</i> DATABASE SOURCE	TSC Act	EPBC Act	Preferred habitat <i>Distribution limit</i>	Recorded on site (✓)	If not recorded onsite				Considered in 7 part test of significance (✓)
					Suitable habitat present (✓)	Nearby and / or high number of record(s) (✓) <i>Notes 1,2 & 3</i>	Record(s) from recent years (✓) <i>Notes 1,2 & 3</i>	Potential to occur	
Little Bentwing-bat <i>Miniopterus australis</i> OEH	V	-	Roosts in caves, old buildings and structures in the higher rainfall forests along the south coast of Australia. <i>Distribution Limit: N-Border Ranges National Park. S-Sydney.</i>	x	✓	✓	✓	✓	✓
Eastern Bentwing-bat <i>Miniopterus orianae oceansis</i> OEH	V	-	Prefers areas where there are caves, old mines, old buildings, stormwater drains and well-timbered areas. <i>Distribution Limit: N-Border Ranges National Park. S-South of Eden.</i>	x	✓	✓	✓	✓	✓
Large-footed Myotis <i>Myotis macropus</i> OEH	V	-	Roosts in caves, mines, tunnels, buildings, tree hollows and under bridges. Forages over open water. <i>Distribution limits: N-Border Ranges National Park. S-South of Eden.</i>	x	✓	✓	✓	✓	✓
Greater Broad-nosed Bat <i>Scoteanax rueppellii</i> OEH	V	-	Inhabits areas containing moist river and creek systems, especially tree lined creeks. <i>Distribution Limit: N-Border Ranges National Park. S-Pambula.</i>	x	✓	✓	✓	✓	✓

Table A2.2 – Threatened fauna species habitat assessment

Common name <i>Scientific name</i> DATABASE SOURCE	TSC Act	EPBC Act	Preferred habitat <i>Distribution limit</i>	Recorded on site (✓)	If not recorded onsite				Considered in 7 part test of significance (✓)
					Suitable habitat present (✓)	Nearby and / or high number of record(s) (✓) <i>Notes 1,2 & 3</i>	Record(s) from recent years (✓) <i>Notes 1,2 & 3</i>	Potential to occur	
New Holland Mouse <i>Pseudomys novaehollandiae</i> EPBC	-	V	Occurs in heathlands, woodlands, open forest and paperbark swamps and on sandy, loamy or rocky soils. Coastal populations have a marked preference for sandy substrates, a heathy understorey of leguminous shrubs less than 1m high and sparse ground litter. Recolonise of regenerating burnt areas. <i>Distribution Limit: N-Border Ranges National Park. S-South of Eden.</i>	x	x	-	-	x	x
Cumberland Plain Land Snail <i>Meridolum corneovirens</i> OEH	E	-	Inhabits remnant eucalypt woodland of the Cumberland Plan. Shelters under logs, debris, clumps of grass, around base of trees and burrowing into loose soil. <i>Distribution Limit: Cumberland Plain of Sydney Basin Region.</i>	x	✓	✓	✓	✓	✓
Macquarie Perch <i>Macquaria australasica</i> EPBC	V (FM Act 1994)	E	Occurs in south east Australia at moderate to high altitudes in rivers and reservoirs. Historical records show the species was widespread and abundant in the upper reaches of the Lachlan, Murrumbidgee and Murray Rivers and their tributaries. Allen (1989) states that introduced populations are present in Nepean River and water supply dams in the Sydney area. Occurs in lakes and flowing streams, usually in deep holes.	x	x	-	-	x	x

Table A2.2 – Threatened fauna species habitat assessment

Common name <i>Scientific name</i> DATABASE SOURCE	TSC Act	EPBC Act	Preferred habitat <i>Distribution limit</i>	Recorded on site (✓)	If not recorded onsite				Considered in 7 part test of significance (✓)
					Suitable habitat present (✓)	Nearby and / or high number of record(s) (✓) <i>Notes 1,2 & 3</i>	Record(s) from recent years (✓) <i>Notes 1,2 & 3</i>	Potential to occur	
Australian Greyling <i>Prototroctes maraena</i> EPBC	Part 2, Section 19 – Protected Fish (FM Act 1994)	V	Clear, moderate to fast flowing water in the upper reaches of rivers (sometimes to altitudes above 1,000m). Typically found in gravel bottom pools. Often forming aggregations below barriers to upstream movement (e.g. weirs, waterfalls).	x	x	-	-	x	x
OEH	- Denotes species listed within 10km of the subject site on the <i>Atlas of NSW Wildlife</i>								
EPBC	- Denotes species listed within 10km of the subject site in the <i>EPBC Act</i> habitat search								
V	- Denotes vulnerable listed species under the relevant Act								
E	- Denotes endangered listed species under the relevant Act								
NOTE:	1. This field is not considered if no suitable habitat is present within the subject site 2. 'records' refer to those provided by the <i>Atlas of NSW Wildlife</i> 3. 'nearby' or 'recent' records are species specific accounting for home range, dispersal ability and life cycle								

A detailed assessment in accordance with Section 5A of the *EPA Act* will be completed for these species in Appendix 3 of this report.

Table A2.3 below provides an assessment of potential habitat within the subject site for nationally protected migratory fauna species recorded within 10km on the *EPBC Protected Matters Tool*. Nationally threatened migratory species are considered in Table A2.2 above.

Table A2.3 – Migratory fauna habitat assessment

Common name Scientific name	Preferred habitat Migratory breeding	Suitable habitat present (✓)	Recorded on Site (✓)	Comments
White-bellied Sea Eagle (<i>Haliaeetus leucogaster</i>)	Coasts, islands, estuaries, inlets, large rivers, inland lakes, reservoirs. <i>Sedentary; dispersive.</i>	✓	x	Low likelihood of any site utilisation
White-throated Needletail (<i>Hirundapus caudacutus</i>)	Airspace over forests, woodlands, farmlands, plains, lakes, coasts, towns; companies forage often along favoured hilltops and timbered ranges. <i>Breeds Siberia, Himalayas, east to Japan. Summer migrant to eastern Australia.</i>	✓	x	Low likelihood of any site utilisation
Rainbow Bee-eater (<i>Merops ornatus</i>)	Open woodlands with sandy, loamy soil; sandridges, sandspits, riverbanks, road cuttings, beaches, dunes, cliffs, mangroves, rainforest, woodlands, golf courses. <i>Breeding resident in northern Australia. Summer breeding migrant to south east and south west Australia.</i>	✓	x	Low likelihood of any site utilisation
Black-faced Monarch (<i>Monarcha melanopsis</i>)	Rainforests, eucalypt woodlands; coastal scrubs; damp gullies in rainforest, eucalypt forest; more open woodland when migrating. <i>Summer breeding migrant to coastal south east Australia, otherwise uncommon.</i>	✓	x	Low likelihood of any site utilisation
Satin Flycatcher (<i>Myiagra cyanoleuca</i>)	Heavily vegetated gullies in forests, taller woodlands, usually above shrub-layer; during migration, coastal forests, woodlands, mangroves, trees in open country, gardens. <i>Breeds mostly south east Australia and Tasmania over warmer months, winters in north east Qld.</i>	✓	x	Low likelihood of any site utilisation
Rufous Fantail (<i>Rhipidura rufifrons</i>)	Undergrowth of rainforests / wetter eucalypt forests / gullies; monsoon forests, paperbarks, sub-inland and coastal scrubs; mangroves, watercourses; parks, gardens. On migration, farms, streets buildings. <i>Breeding migrant to south east Australia over warmer months. Altitudinal migrant in north east NSW in mountain forests during warmer months.</i>	✓	x	Low likelihood of any site utilisation
Great Egret (<i>Ardea alba</i>)	Shallows of rivers, estuaries; tidal mudflats, freshwater wetlands; sewerage ponds, irrigation areas, larger dams, etc. <i>Dispersive; cosmopolitan.</i>	✓	x	Low likelihood of any site utilisation
Cattle Egret (<i>Ardea ibis</i>)	Stock paddocks, pastures, croplands, garbage tips, wetlands, tidal mudflats, drains. <i>Breeds in summer in warmer parts of range including NSW.</i>	✓	x	Low likelihood of any site utilisation
Latham's Snipe (<i>Gallinago hardwickii</i>)	Soft wet ground or shallow water with tussocks and other green or dead growth; wet parts of paddocks; seepage below dams; irrigated areas; scrub or open woodland from sea-level to alpine bogs over 2,000m; samphire on saltmarshes; mangrove fringes. <i>Breeds Japan. Regular summer migrant to Australia. Some overwinter.</i>	✓	x	Low likelihood of any site utilisation

Table A2.3 – Migratory fauna habitat assessment

Common name Scientific name	Preferred habitat Migratory breeding	Suitable habitat present (✓)	Recorded on Site (✓)	Comments
Fork-tailed Swift <i>(Apus pacificus)</i>	Aerial: over open country, from semi-arid deserts to coasts, islands; sometimes over forests, cities. <i>Breeds Siberia, Himalayas, east to Japan south east Asia. Summer migrant to east Australia. Mass movements associated with late summer low pressure systems into east Australia. Otherwise uncommon.</i>	✓	x	Low likelihood of any site utilisation

Appendix 3

7 Part Test of Significance

7 Part Test of Significance

(Section 5A EPA Act 1979)

Council is required to consider the impact upon threatened species, populations and / or EECs from any development or activity via the process of a 7 part test of significance. The significance of the assessment is then used to determine the need for a more detailed species impact statement (SIS).

The following 7 part test of significance relies on the ecological assessment provided in Sections 4 and 5 of this report and should be read as such.

Detailed flora and fauna investigations of the subject site, together with habitat assessments, have resulted in the identification of potential habitat for a variety of threatened species. An assessment of these species is as follows:

Threatened flora

- *Acacia pubescens*
- *Dillwynia tenuifolia*
- *Grevillea juniperina* subsp. *juniperina*
- *Grevillea parviflora* subsp. *parviflora*
- *Hypsela sessiliflora*
- *Pimelea spicata*
- *Pultenaea parviflora*

Endangered ecological communities

- Cumberland Plain Woodland
- River-Flat Eucalypt Forest on Coastal Floodplains

Threatened fauna

- Green and Golden Bell Frog
- Australasian Bittern
- Little Lorikeet
- Swift Parrot
- Speckled Warbler
- Black-chinned Honeyeater
- Regent Honeyeater
- Varied Sittella
- Scarlet Robin
- Flame Robin
- Diamond Firetail
- Koala
- Grey-headed Flying-fox
- East-coast Freetail Bat
- Eastern Falsistrelle
- Little Bentwing-bat
- Eastern Bentwing-bat
- Large-footed Myotis
- Greater Broad-nosed Bat
- Cumberland Plain Land Snail

Endangered populations

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

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

No threatened species were recorded within the study area during surveys, however only a full botanical survey was undertaken. Fauna survey included the identification of habitats only.

The proposed stormwater outlet will remove or modify vegetation within the existing bushland corridor south of the proposed development area to the effect of approximately 40-50m by 5m. Whilst the stormwater outlet may pass through EEC vegetation, it will not have a significant impact on the threatened flora with potential habitat as sufficient survey has been undertaken to rule out the current presence of those known to occur locally.

Based upon the small area of impact within an area that has had previous impacts, this is unlikely to pose any great risk of loss to threatened fauna habitat. The stormwater outlet location is within cleared lands and River-flat Eucalypt Forest. This may be suitable for Cumberland Plain Land Snail as the Cumberland Plain Woodland vegetation exists in very close proximity.

The presence of one live snail or empty shells (dead snails) is indicative of a larger population being present. This is because this species is known to burrow into the soil becoming undetectable during survey. As this species is a hermaphrodite it is able to breed by copulating with itself and a new population can be created from one individual. The viability of the population depends more on the quality of habitat present including presence of suitable vegetation ie Cumberland Plain Woodland, presence of moist refuge areas such as deep native litter around the base of trees and large diameter logs or stumps greater than 15 cm in diameter under which snails can survive and be protected from predation. Habitat for this species can be simply enriched through revegetation and placement of large hardwood logs part buried on the ground or in a pile.

In considering the species is hermaphroditic and the loss or modification of vegetation and potential habitat is less than 1% of the adjoining bushland, the impacts to the species are unlikely to be significant.

It is considered that the proposal is unlikely to disrupt the life cycle for any of these listed species such that a viable local population would be placed at risk of extinction.

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

There are two (2) endangered populations within a 10km radius of the site, these include:

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

The vegetation within the remnant bushland area provides, at best, marginal habitat for the species, however, no specimens were observed within the study area.

The study area does not occur within Kemps Creek, however, *Dillwynia tenuifolia* is a listed vulnerable species under the *TSC Act* and is considered accordingly.

The White-fronted Chat population in the Sydney Metropolitan Catchment Management Area may cover the study area, however, none have been observed within a 10km radius of the site previously and are not expected to occur.

Therefore, it is considered that the action proposed is not likely to have an adverse effect on the life cycle of these species that constitute the endangered populations such that a viable local population of these species is likely to be placed at risk of extinction.

c) In the case of a critically endangered or endangered ecological community, whether the action proposed:

i. Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

The stormwater pipe and outlet will go through River-flat Eucalypt Forest EEC. The loss or modification of natural vegetation is likely to be much less than 200m² and within the local context where it occurs dominantly along creek lines and drainages, this is not considered to be significant. The loss or modification of EEC vegetation within the locality is less than 1% which may add to cumulative impacts on the EEC locally but will not have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

Cumberland Plain Woodland was present locally also but there will be no loss or modification proposed to this EEC.

ii. Is likely to substantially and adversely modify the composition such that its local occurrence is likely to be placed at risk of extinction,

It is unlikely that the proposed development will adversely modify the composition of this community such that its local occurrence is likely to be placed at risk of extinction.

d) In relation to the habitat of threatened species, populations or ecological community:

i. The extent to which habitat is likely to be removed or modified as a result of the action proposed, and

The extent of possible clearing or modification is expected to be much less than 200m².

ii. Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

The proposed stormwater pipe and outlet may provide a temporary barrier to movement for the Cumberland Plain Land Snail, however, it will not fragment or isolate populations. The proposal will not have these types of impacts on any other species being assessed as the small slither of bushland being impacted will likely regenerate.

Therefore, it is considered that known habitat for a threatened species, population or ecological community within the local area and region is unlikely to become isolated or fragmented as a result of the proposal.

iii. The importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality

The only importance of the vegetation and habitat possibly affected by the proposal is that any clearing in a linear fashion may provide a temporary barrier to the movement of the Cumberland Plain Snail, and that the vegetation is a state (state only) listed EEC. The amount of removal or modification is small in a local context and will not fragment or isolate habitat which could be detrimental to the long term survival of any assessed species.

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

The site has not been identified as critical habitat within the provisions of the *TSC Act*. Therefore, this matter does not require any further consideration at this time.

f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan

Draft state recovery plans have been prepared for the following threatened species with potential habitat within the subject site:

- Green and Golden Bell Frog (*Litoria aurea*) (DEC 2005)

Approved state recovery plans have been prepared for the following threatened species with potential habitat within the subject site:

- *Acacia pubescens* (NPWS 2003)
- Koala (*Phascolarctos cinereus*) (DEC 2008)
- *Pimelea spicata* (DEC 2004)

It is considered that the proposed development is generally consistent with the objectives or actions of the above mentioned draft and approved recovery plans.

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

A key threatening process is defined in the *TSC Act* as a process that threatens, or could threaten, the survival or evolutionary development of species, populations or ecological communities.

The current list of key threatening processes under the *TSC Act*, and whether the proposed activity is recognised as a threatening process, is shown below.

Listed key threatening process (as described in the final determination of the Scientific Committee to list the threatening process)	Is the development or activity proposed of a class of development or activity that is recognised as a threatening process?		
	Likely	Possible	Unlikely
Alteration of habitat following subsidence due to longwall mining			✓
Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands		✓	
Anthropogenic climate change			✓
Bushrock removal			✓
Clearing of native vegetation		✓	
Competition and habitat degradation by feral goats			✓
Competition and grazing by the feral European Rabbit (<i>Oryctolagus cuniculus</i>)			✓
Competition from feral honeybees			✓
Death or injury to marine species following capture in shark control programs on ocean beaches			✓
Entanglement in, or ingestion of anthropogenic debris in marine and estuarine environments			✓
Forest Eucalypt dieback associated with over-abundant psyllids		✓	

Listed key threatening process (as described in the final determination of the Scientific Committee to list the threatening process)	Is the development or activity proposed of a class of development or activity that is recognised as a threatening process?		
	Likely	Possible	Unlikely
and bell miners			
High frequency fire resulting in the disruption of life-cycle processes in plants and animals and loss of vegetation structure and composition			✓
Herbivory and environmental degradation caused by feral deer			✓
Importation of red imported fire ants into NSW			✓
Infection by <i>Psittacine circoviral</i> (beak and feather) disease affecting endangered psittacine species and populations			✓
Infection of frogs by amphibian chytrid causing the disease <i>chytridiomycosis</i>			✓
Introduction and establishment of Exotic Rust Fungi of the order <i>Pucciniales</i> pathogenic on plants of the family Myrtaceae		✓	
Infection of native plants by <i>Phytophthora cinnamomi</i>		✓	
Introduction of the large earth bumblebee (<i>Bombus terrestris</i>)			✓
Invasion and establishment of exotic vines and scramblers		✓	
Invasion and establishment of Scotch Broom (<i>Cytisus scoparius</i>)			✓
Invasion and establishment of the Cane Toad (<i>Bufo marinus</i>)			✓
Invasion, establishment and spread of <i>Lantana camara</i>			✓
Invasion of native plant communities by bitou bush and boneseed <i>Chrysanthemoides monilifera</i>			✓
Invasion of native plant communities by exotic perennial grasses			✓
Invasion of native plant communities by African Olive (<i>Olea europaea</i> subsp. <i>cuspidata</i>)			✓
Invasion of the Yellow Crazy Ant (<i>Anoplolepis gracilipes</i>)			✓
Loss of hollow bearing trees			✓
Loss and / or degradation of sites used for hill-topping by butterflies			✓
Predation and hybridisation by feral dogs (<i>Canis lupus familiaris</i>)			✓
Predation by the European Red Fox (<i>Vulpes vulpes</i>)			✓
Predation by the Feral Cat (<i>Felis catus</i>)			✓
Predation by Plague Minnow or Mosquito Fish (<i>Gambusia holbrooki</i>)			✓
Predation by the Ship Rat (<i>Rattus rattus</i>) on Lord Howe Island			✓
Predation, habitat degradation, competition & disease transmission from Feral pigs (<i>Sus scrofa</i>)			✓
Removal of dead wood and dead trees			✓

Summary of “likely” or “possible” Key Threatening Processes

Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands

In accordance with the *Water Management Act (WM Act)*, consideration is to be given to the impact of the proposed action on local watercourses and native vegetation riparian buffers and stormwater measures proposed, must be in accordance with current NSW Office of Water guidelines for controlled activities.

Clearing of native vegetation

The proposal will remove or modify a very small patch of natural vegetation which is part of an EEC. The size of the removal or modification is too small to be considered a significant impact, however, it adds to a cumulative process within the local landscape.

Forest Eucalypt dieback associated with over-abundant psyllids and bell miners

Broad-scale canopy dieback associated with psyllids and Bell Miners usually occurs in disturbed landscapes, and involves interactions between habitat fragmentation, logging, nutrient enrichment, altered fire regimes and weed-invasion (Wardell-Johnson *et al.* 2006). At present, no single cause explains this form of dieback, and it appears that 'Forest eucalypt dieback associated with over-abundant psyllids and Bell Miners' cannot be arrested by controlling a single factor. Over-abundant psyllid populations and Bell Miner colonies tend to be initiated in sites with high soil moisture and suitable tree species where tree canopy cover has been reduced by 35 – 65 % and which contain a dense understorey, often of *Lantana camara* (C Stone *in litt.*). Such conditions arise as a consequence of landscape-level disturbance of forest ecosystems.

Due to the complex interaction between factors that have been altered as a consequence of landscape-level disturbance, there is at present no obvious means of arresting the threat presented by 'Forest eucalypt dieback associated with over-abundant psyllids and Bell Miners'. Moreover, expert opinion varies considerably as to which factors are causes of dieback and which factors are effects. Broad-scale research and adaptive management are required to understand how to best manage this threatening process, to prevent its expansion throughout forests of eastern New South Wales.

To minimise the risk of this threatening process it is recommended that disturbance to natural vegetation areas should be avoided and minimised where possible, avoid inadvertently or deliberately increasing soil moisture such as through disposal of runoff or stormwater and delivering treated runoff directly into a waterway, avoid actions that increase nitrogen or moisture levels in the soil, control and eradicate weeds such as Lantana, Wandering Jew, Privet and invasive vines that increase soil moisture through shading, and restore all disturbed areas back to the original native vegetation community.

Introduction and establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae

Myrtle Rust may be spread via machinery, animals and humans as well as by environmental factors such as wind. The presence of machinery and construction works is likely to slightly increase the potential for spread of this newly listed key threatening process. Similar protocols as to *Phytophthora cinnamomi* should be applied.

Infection of native plants by Phytophthora cinnamomi

The proposal may temporarily increase the risk of fungal infection on site as it may be spread via vehicular movement and relocation of soil and vegetation. Consequently, standard *Phytophthora cinnamomi* protocol applies to the cleaning of all plant, equipment, hand tools and work boots prior to delivery onsite to ensure that there is no loose soil or vegetation material caught under or on the equipment and within the tread of vehicle tyres. Any equipment found to contain soil or vegetation material is to be cleaned in a quarantined work area or wash station and treated with anti-fungal pesticides.

Invasion and establishment of exotic vines and scramblers

The proposal is of a class of development recognised as a threatening process due to the presence of Blackberry. The disturbance of the soils may initiate growth within the study area and the potential for these species to invade sensitive vegetation surrounding. Therefore, a weed control program is recommended to ensure there is adequate eradication, and control of species such as Blackberry.