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Project: Fairview Ecological
Assessment Report

Proposed Quarries on Lots 4 WT217, 12
WT218 and 13 WT218.

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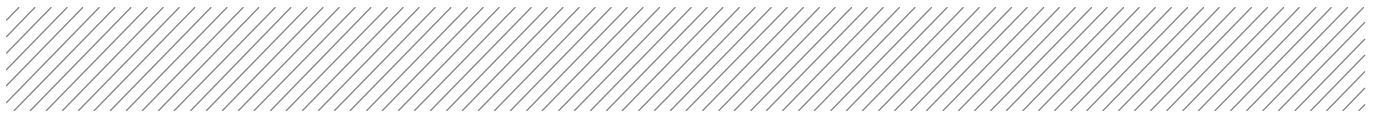
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1 Background

1.1 Project Description

Santos Ltd (Santos) have commissioned Aurecon Australia Pty Ltd (Aurecon) to undertake ecological investigations of proposed areas of development for the expansion of the Fairview Gas Fields.

The Fairview gas fields are situated approximately 40km from Injune in southern Queensland. This area is characterised by elevated sandstone ranges including the Carnarvon and Expedition Ranges and part of the Mount Hutton and Kongabula Ranges. The Dawson River and other smaller watercourses drain this area and the vegetation is dominated by Eucalyptus and White Cypress Pine woodland, Brigalow and Semi-evergreen Vine Thicket (Eddie, 2007).

Much of this area has been subjected to cattle grazing and other agricultural practices as well as previous development associated with the gas fields.

This report is specific to the proposed quarry locations on the following lots:

- 4 WT217 – as identified in Fluor Drawing number 6305-500SK-103, Rev B
- 12 WT218 – as identified in Fluor Drawing number 6399-500SK-117, Rev A
- 13 WT218 – as identified in Fluor Drawing number 6310-500SK-100, Rev A

Note that the subject of this report is solely related to the proposed quarry locations on the above mentioned lots.

1.1.1 Purpose of Report

The aim of this report is to provide an ecological assessment of the proposed quarry locations on Lots 4 WT217, 12 WT218 and 13 WT218 (Figures 3.1, 3.2 and 3.3 respectively), and to identify areas and species of notable ecological or conservation value. This report does not make any recommendations regarding the development in relation to any Santos environmental authorities or other approvals.



2 Methodology

2.1 Desktop Methodology

Proposed development areas have been projected on a range of maps provided by Santos. These maps include Regional Ecosystem (RE) Mapping (version 6.0; Department of Environment and Resource Management [DERM]), Environmentally Sensitive Area (ESA) mapping, drainage mapping and aerial photography. Where available ahead of time, these resources were reviewed to determine target areas for the field inspection. It is important to note that the RE classifications used in this report are based on the 'biodiversity status' of the vegetation and not the '*Vegetation Management Act 1999* (VM Act) status' of the vegetation.

2.2 Field Methodology

The proposed development areas were assessed by two (2) Aurecon ecologists (Vanessa Boettcher and Cassandra Arkinstall) on 3 November 2011. These assessments were to determine the existing vegetation communities and habitat value of the proposed clearing within the development areas as well as to verify the RE Mapping as produced by DERM.

GIS environmental constraints layers (eg RE Mapping, ESA mapping etc) and high resolution aerial photography were uploaded onto a toughbook (C5 mobile clinical assistant CFT-001 – Motion computing), with an integrated GPS used to locate surveys areas. Handheld Garmin GPS units (GPS map 76) were also used during the field investigations. It should be noted that while efforts were made to ensure the GPS co-ordinates provided in this report are accurate, a margin of error approximately +/- 15 m is expected due to the limitations of the devices used and the recording environment.

The areas assessed were of varying widths and lengths as shown in Figure 3.1, Figure 3.2 and Figure 3.3.

The ground-truthing of the proposed development areas included undertaking detailed flora species surveys including sampling of unknown flora, and recording all incidental fauna observations. All species known to be of conservation significance (such as endangered, vulnerable, near threatened or Type A species under the *Nature Conservation Act 1992* [NC Act] or endangered, vulnerable or rare species under the *Environment Protection and Biodiversity Conservation Act 1999* [EPBC Act]) were recorded using the toughbook.

A list of flora species observed in the proposed development areas has been included in Appendix A. Incidental fauna observations are provided in the relevant sections throughout this report.



3 Ecological assessment

3.1 Proposed Quarry on Lot 4 WT217

3.1.1 General

The proposed quarry on Lot 4 WT217 is located in a previously disturbed area and is predominantly mapped as non-remnant vegetation on the DERM RE mapping. Small areas of Least Concern remnant vegetation (RE 11.10.1/11.10.13) are mapped as occurring in the southern extent of the quarry site. Field inspections determined the remnant extent of the RE mapping to be incorrect and is discussed further below.

No ESA's are mapped within or adjacent to the proposed quarry site. The nearest ESA is located approximately 800m to the south-west and is a Category C ESA (Of Concern vegetation).

No mapped watercourses occur within the development area. The nearest mapped watercourse is approximately 190m to the south-east.

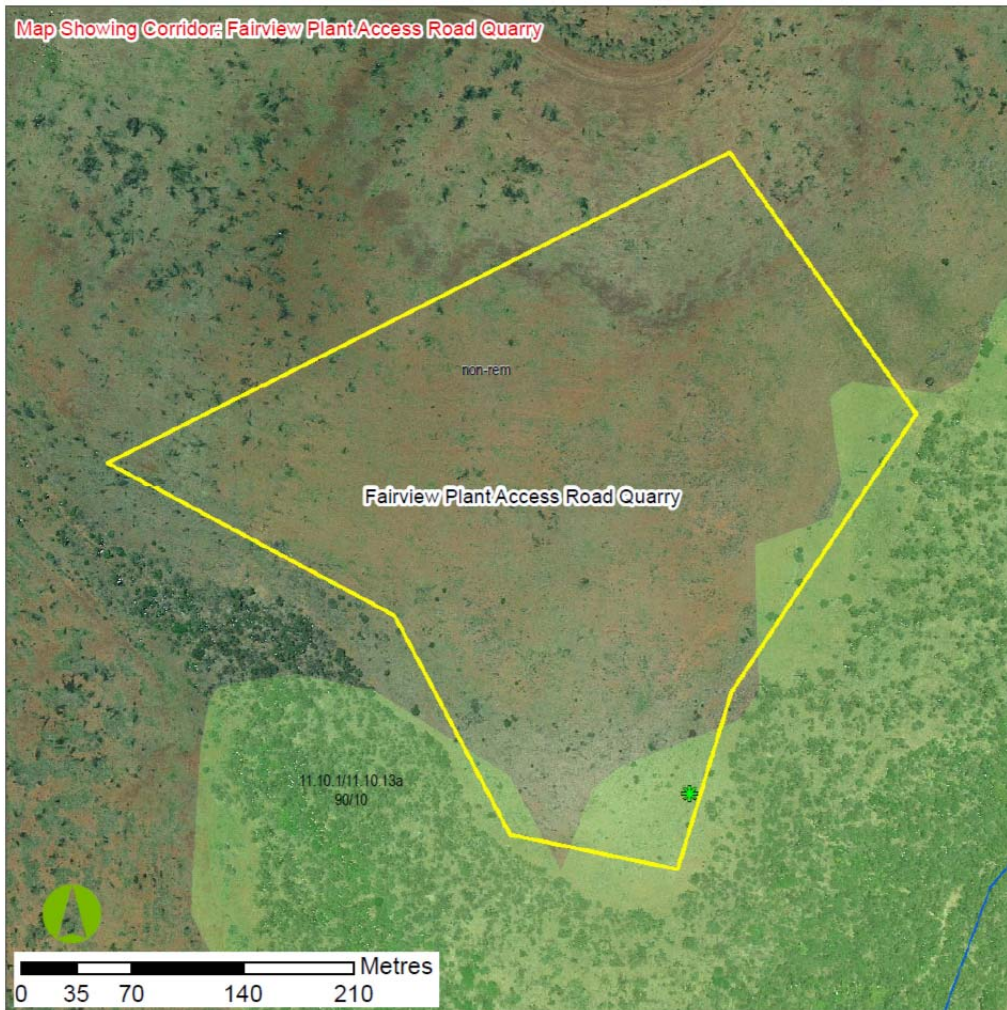


Figure 3.1.1 Location of proposed quarry site on Lot 4 WT217

3.1.2 Floristics

The area of the proposed quarry development has been extensively cleared previously and is currently dominated by shrubby regrowth vegetation with very limited mature trees present. The regrowth vegetation is dominated by *Acacia leiocalyx* (Black Wattle) and the ground layer is predominantly native grasses including *Aristida calycina* (Dark Wiregrass), *Aristida caput-medusae* (Many Headed Wiregrass) and *Chloris pectinata* (Comb Chloris).

The RE mapping illustrates remnant Least Concern vegetation within the southern portion of the quarry site. Field inspections observed the whole of the quarry site to be limited to regrowth vegetation and therefore the remnant extent of the RE mapping is inaccurate. This is evident on the aerial imagery where the mature vegetation can be seen adjacent but not within the quarry site.

One species listed as Endangered under the provisions of the NC Act was observed within the proposed quarry site. A single *Melaleuca irbyana* (Swamp Tea Tree) approximately 4m tall was recorded in the south-eastern portion of the site. Details of the location of the species is outlined in **Error! Reference source not found..**

Table 3.1.1 Species of conservation significance at the proposed quarry site

Species	Easting (GDA94, Zone 55)	Northing (GDA94, Zone 55)
<i>Melaleuca irbyana</i>	688287	7161080

No other species of conservation significance under the NC Act and/or EPBC Act were observed within the proposed quarry area. Additionally, no Type A restricted species were recorded with the quarry site.

3.1.3 Habitat Values

The habitat values of the proposed quarry location are considered low due to the lack of mature vegetation, limited woody debris and high level of previous disturbance. No significant habitat features such as tree hollows, rocky outcrops or watercourses were evident in the proposed development area.

Accordingly, the species utilising resources in the proposed development region are most likely to be limited to common, generalist species that are able to adapt to significant habitat disturbances (ie House mouse [*Mus musculus*], macropods etc).

Incidental fauna species recorded at the quarry site are outlined in Table 3.2. No threatened fauna species under the NC Act and/or EPBC Act were observed at the site.

Table 3.1.2 Fauna species recorded at the proposed quarry site

Scientific Name	Common Name
<i>Eudynamys scolopacea</i>	Common Koel
<i>Corvus orru</i>	Torresian Crow
<i>Taenipygia bichenovii</i>	Double Barred Finche
<i>Anthus novaeseelandiae</i>	Richard’s Pipit
<i>Gymnorhina tibicen</i>	Magpie
<i>Stuthidea cincera</i>	Apostlebird
<i>Strepera graculina</i>	Pied Currawong
<i>Malurus melanocephalus</i>	Red Back Fairy Wren
<i>Smicronis bevrostris</i>	Weebill
<i>Cracticus nigrogularis</i>	Pied Butcherbird

3.2 Proposed Quarry on Lot 12 WT218

3.2.1 General

The proposed quarry on Lot 12 WT218 is located entirely within non-remnant vegetation on the DERM RE mapping which was confirmed during field inspections (see Figure 3.2).

No ESA’s are mapped within the proposed development area. The nearest ESA is located approximately 1 km to the south-west and is a Category C ESA (Of Concern vegetation).

No mapped watercourses occur within the proposed quarry location. The nearest mapped watercourse is approximately 530 m to the north.

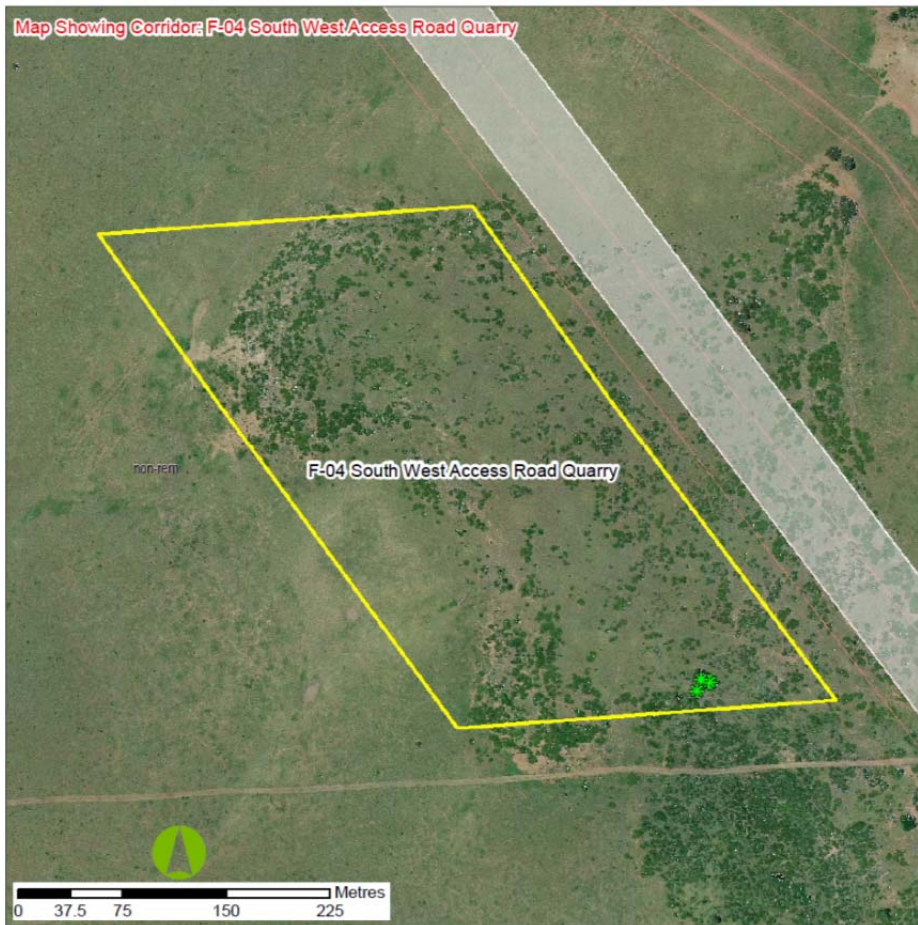


Figure 3.2.1 Location of proposed quarry site on Lot 12 WT218

3.2.2 Floristics

The proposed quarry location is currently non-remnant vegetation and has been subjected to a high level of disturbance. The area contains very limited mature vegetation and is dominated by shrubby regrowth including *Acacia harpophylla* (Brigalow), *Carissa ovata* (Currant Bush) and *Erythroxylum austral* (Turkey Bush). The dense ground cover was dominated by *Pennisetum ciliare* (Buffel Grass) and other non-native grasses and forbs.

Two species listed as a Type A restricted plant under the provisions of the NC Act was recorded at the proposed site – *Brachychiton rupestris* (Narrow Leaved Bottle tree) and *Brachychiton populneus* (Kurrajong). Four individuals of these species were observed at the southern boundary of the site. The co-ordinates of their location are provided below in Table 3.2.1.3.

Table 3.2.1 Location of Type A species within proposed quarry location

Species	Easting (GDA94, Zone 55)	Northing (GDA94, Zone 55)
<i>Brachychiton rupestris</i>	688094	7149205
<i>Brachychiton rupestris</i>	688104	7149211
<i>Brachychiton rupestris</i>	688105	7149212
<i>Brachychiton populneus</i>	688098	7149213

No other species of conservation significance under the NC Act and/or the EPBC Act were observed at the proposed development site.

3.2.3 Habitat Values

The habitat values of the proposed quarry location are considered to be low to moderate. The area has been heavily disturbed and contains very little mature vegetation however it does contain a very dense ground cover and shrubby regrowth layer which would provide some cover for small mammals and reptiles. The area also contained a moderate amount of woody debris including large hollow logs which are also possible habitat for small mammals and reptiles.

No threatened fauna species under the NC Act and/or EPBC Act were observed at the proposed quarry location. Incidental fauna recorded at the site are outlined in Table 3.4.

Table 3.2.2 Incidental fauna recorded at the proposed quarry location

Scientific Name	Common Name
<i>Taeniopygia bichenovii</i>	Double Barred Finch
<i>Malurus melanocephalus</i>	Red Back Fairy Wren
<i>Pardolotus striatus</i>	Striated Pardolote
<i>Centropus phasianinus</i>	Pheasant Coucal

3.3 Proposed Quarry on Lot 13 WT218

3.3.1 General

The proposed quarry location on Lot 13 WT18 is currently mapped as non-remnant on the DERM RE mapping which was confirmed during field inspections. The proposed development location is illustrated in Figure 3.3.

No ESA's are mapped within the proposed quarry site. The nearest ESA is location approximately 620m to the south-east and is a Category B ESA (Endangered vegetation).

No mapped watercourses occur within the quarry location and the nearest mapped watercourse is located approximately 130m to the south-east and is Hutton Creek

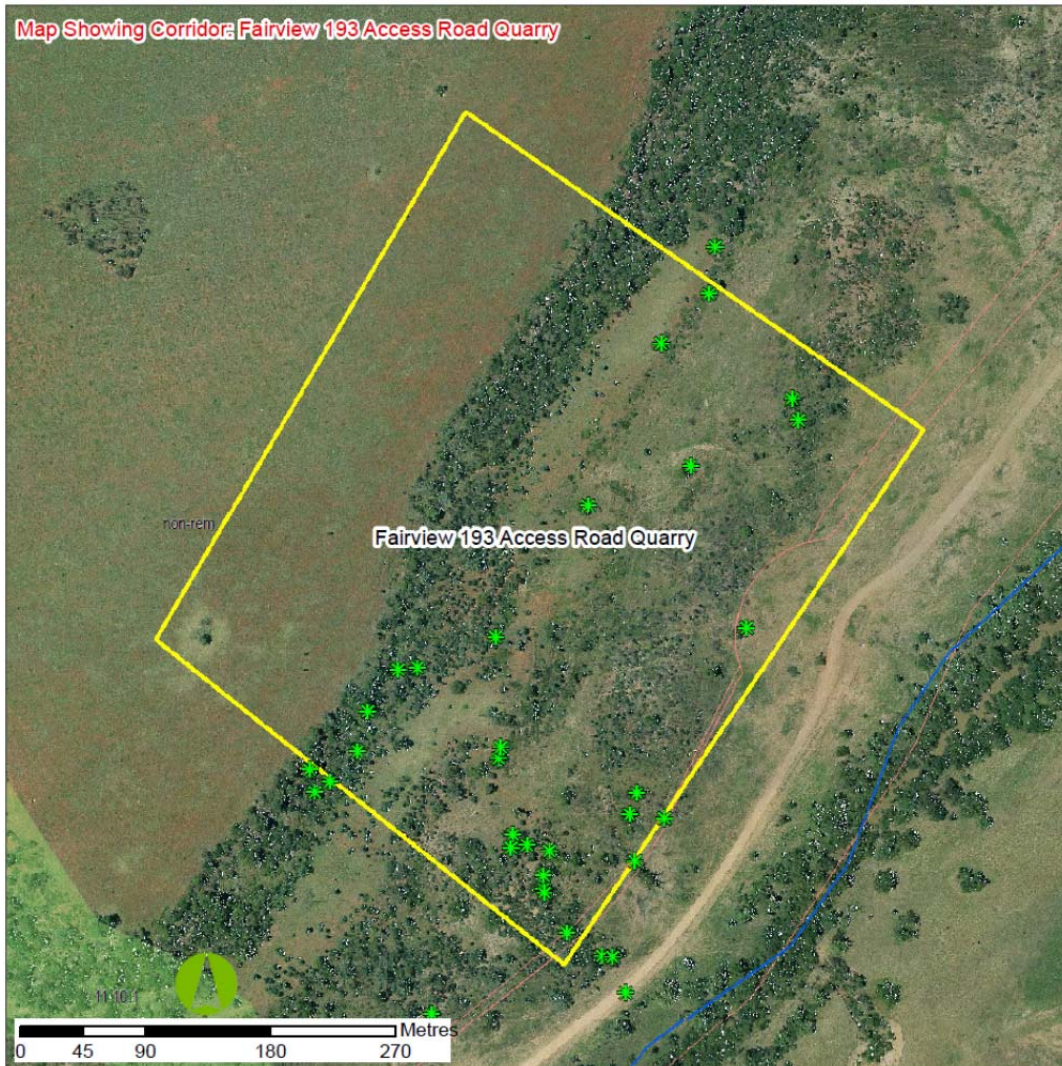


Figure 3.3.1 Location of proposed quarry site on Lot 13 WT218

3.3.2 Floristics

The proposed quarry location is a disturbed environment and occurs across a relatively flat plateau over a very steep drop off and the lower toe slope. The area is mapped as non-remnant vegetation which is correct although scattered mature vegetation exists throughout the site.

The vegetation on the very steep descent contains species characteristic of the endangered ecosystem Semi-evergreen Vine Thicket (SEVT) and is more dense than the scattered vegetation over the rest of the site. However, the area has been disturbed, is quite patchy, is invaded by dense *Pennisetum cilare* (Buffel Grass) and contains a high prevalence of Eucalypt vegetation which indicates the area is not remnant SEVT.

Multiple Type A restricted plants under the provisions of the NC Act were observed within the proposed quarry location. The details of these species are outlined in Table 3.3.1 below.

Table 3.3.1 Type A restricted species recorded within the proposed quarry location

Species	Easting (GDA94, Zone 55)	Northing (GDA 94, Zone 55)
<i>Brachychiton rupestris</i>	691137	7151023
<i>Brachychiton australis</i>	691136	7151026
<i>Brachychiton australis</i>	691137	7151036
<i>Brachychiton rupestris</i>	691141	7151053
<i>Brachychiton populneus</i>	691113	7151055
<i>Brachychiton rupestris</i>	691125	7151058
<i>Brachychiton populneus</i>	691114	7151065
<i>Brachychiton populneus</i>	691199	7151080
<i>Brachychiton populneus</i>	691204	7151095
<i>Brachychiton populneus</i>	691104	7151119
<i>Brachychiton rupestris</i>	691003	7151125
<i>Brachychiton populneus</i>	691106	7151128
<i>Brachychiton populneus</i>	691010	7151153
<i>Brachychiton populneus</i>	691032	7151184
<i>Cymbidium canaliculatum</i>	691046	7151185
<i>Brachychiton rupestris</i>	691102	7151207
<i>Brachychiton populneus</i>	691283	7151214
<i>Brachychiton populneus</i>	691168	7151302
<i>Brachychiton rupestris</i>	691243	7151330
<i>Brachychiton rupestris</i>	691320	7151364
<i>Brachychiton rupestris</i>	691316	7151379
<i>Brachychiton rupestris</i>	691222	7151419
<i>Brachychiton populneus</i>	691256	7151454

No other species of conservation significance listed under the NC Act and/or EPBC Act were observed within the proposed quarry site.

3.3.3 Habitat Values

Habitat features of the proposed development area include:

- Dense ground cover
- Scattered mature vegetation
- Narrow band of more dense mature vegetation
- Rocky outcrops

- Moderate amount of woody debris

The overall habitat value of the area is considered moderate. The area contains numerous habitat features however the site is quite disturbed and invaded by exotic species.

One threatened fauna species listed under the NC Act and the EPBC Act was observed within the proposed quarry location. A Squatter Pigeon (*Geophaps scripta scripta*) is listed as vulnerable under the both the NC Act and EPBC Act.

Incidental fauna species recorded at the site are outlined in Table 3.3.2.

Table 3.3.2 Incidental fauna recorded at the proposed quarry location

Scientific Name	Common Name
<i>Trichoglossus haematodus</i>	Rainbow Lorikeet
<i>Gymnorhina tibicen</i>	Magpie
<i>Stuthidea cincera</i>	Apostlebird
<i>Geophaps scripta scripta</i>	Squatter Pigeon
<i>Scythrops novaehollandiae</i>	Channel Bill Cuckoo
<i>Manorina melanocephala</i>	Noisy Miner
<i>Dacelo novaeguineae</i>	Laughing Kookaburra
<i>Cacatua galerita</i>	Sulphur Crested Cockatoo
<i>Pardolotus striatus</i>	Striated Pardolote
<i>Philemon corniculatus</i>	Noisy Friarbird
<i>Malurus melanocephalus</i>	Red Backed Fairy Wren



4 Conclusion

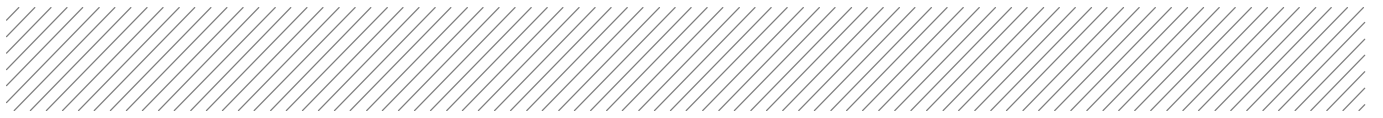
The three proposed quarry locations addressed in this report are all situated in disturbed environments which do not contain any remnant vegetation.

No ESA's or watercourses are mapped within any of the development sites.

One Endangered flora species (*Melaleuca irbyana*) was observed in the proposed quarry on Lot 4 WT217.

Multiple Type A restricted plants were observed in the quarry sites on Lots 12 and 13 WT218.

One Vulnerable fauna species (Squatter Pigeon – *Geophaps scripta scripta*) was observed within the proposed quarry location on Lot 13 WT218.



Appendix A

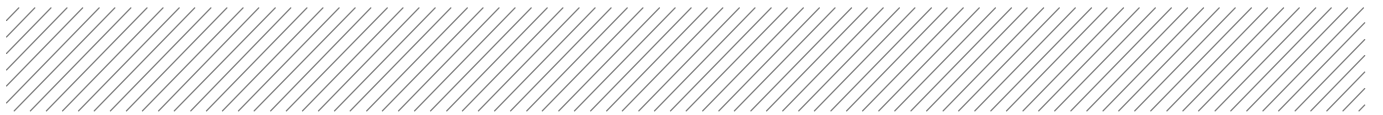
Botanical Species List

Flora species recorded within the proposed development area

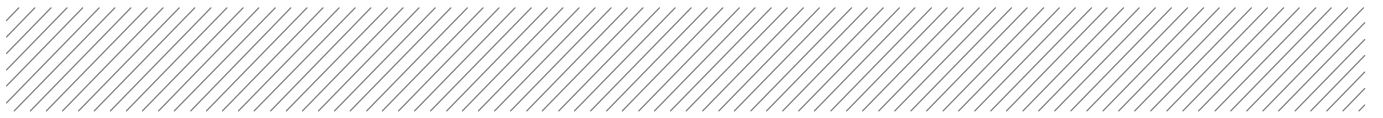
Scientific Name	Common Name	Lot 4 WT217	Lot 12 WT218	Lot 13 WT218
<i>Abutilon leucopetalum</i>	Abutilon		X	X
<i>Acacia deanii</i>	Dean's Wattle	X		
<i>Acacia decora</i>	Pretty Wattle			X
<i>Acacia excelsa</i>	Iron wood			X
<i>Acacia harpophylla</i>	Brigalow		X	X
<i>Acacia leiocalyx</i>	Black Wattle	X		
<i>Acacia longispicata</i>	Slender-flowered Wattle	X		
<i>Acacia salicina</i>	Sally Wattle			X
<i>Acalypha sp.</i>	Turkey Bush		X	X
<i>Alectryon connatus</i>	Grey Birdseye			X
<i>Alectryon diversifolius</i>	Scrub Boonaree		X	X
<i>Alphitonia excelsa</i>	Red Ash	X		X
<i>Alstonia constricta</i>	Bitter Bark	X	X	X
<i>Alternanthera dentata</i>	Joy Weed	X	X	X
<i>Apophyllum anomalum</i>	Warrior bush			X
<i>Argemone ochroleuca</i>	Mexican Poppy			X
<i>Aristida calycina</i>	Dark Wiregrass	X	X	
<i>Aristida caput medusae</i>	Curly Head Wiregrass	X	X	
<i>Atalaya hemiglauca</i>	Whitewood			X
<i>Austrostipa verticillata</i>	Slender Bamboo Grass			X
<i>Backhousia angustifolia</i>	Grey Myrtle		X	X
<i>Bothriochloa bladhii</i>	Forest Blue Grass			X
<i>Bothriochloa decipiens var. decipiens</i>	Pitted Bluegrass			X
<i>Brachychiton australis</i>	Broad Leaf Bottle Tree			X
<i>Brachychiton populneus</i>	Kurrajong			X
<i>Brachychiton rupestris</i>	Narrow Leaved Bottle Tree		X	X
<i>Bracteantha bracteata</i>	Everlasting Daisy	X	X	X
<i>Bursaria spinosa</i>	Prickly Pine		X	X

<i>Callitris glaucophylla</i>	White Cypress Pine	X	X	X
<i>Calotis lappulacea</i>	Yellow Burr Daisy	X	X	X
<i>Calotis scabiosifolia</i>	Rough Daisy Burr	X		
<i>Capillipedium spicigerum</i>	Scented-top grass			X
<i>Capparis loranthifolia</i>	Nipan, Wait a while		X	X
<i>Capparis spinosa</i>	Capparis midsize		X	X
<i>Carissa ovata</i>	Currant Bush		X	X
<i>Cheilanthes sieberi</i>	Mulga Fern	X	X	X
<i>Chloris pectinata</i>	Comb Chloris	X		
<i>Chloris truncata</i>	Windmill Grass		X	
<i>Cirsium vulgare</i>	Spear Thistle, Black Thistle			X
<i>Cissus opaca</i>	Native Grape		X	
<i>Citrus glauca</i>	Lime bush			X
<i>Conyza bonariensis</i>	Fleabane	X		X
<i>Corymbia clarksoniana</i>	Clarkson's Bloodwood	X		
<i>Corymbia tessellaris</i>	Moreton Bay Ash			X
<i>Crotalaria novae-hollandiae</i>	New Holland Rattlepod		X	
<i>Croton insularis</i>	Silver Croton	X	X	
<i>Cupaniopsis anacarioides</i>	Tuckeroo			X
<i>Cymbidium canaliculatum</i>	Black Orchid			X
<i>Cymbopogon refractus</i>	Barbwire Grass			X
<i>Cynodon dactylon</i>	Green Couch	X		
<i>Dianella caerulea</i>	Blue Flax-lily			X
<i>Einadia nutans</i>	Climbing Saltbush			X
<i>Eragrostis brownii</i>	Browns Lovegrass	X		
<i>Eragrostis sororia</i>	Woodland Lovegrass	X		
<i>Eremophila mitchellii</i>	False Sandalwood			X
<i>Eremophila sp.</i>	Eromophila		X	
<i>Eriochloa crebra</i>	Tall cupgrass	X		
<i>Eucalyptus melanophloia</i>	Silver Leaved Ironbark			X
<i>Eucalyptus populnea</i>	Poplar Box			X
<i>Eucalyptus sp.</i>	Eucalyptus (Juvenile)	X		

<i>Eulalia aurea</i>	Silky Browntop Grass	X		
<i>Euphorbia drummondii</i>	Caustic Weed	X		
<i>Eustrephus latifolia</i>	Wombat Berry			X
<i>Evolvulus alsinoides</i>	Speed Well	X		X
<i>Ficus rubiginosa</i>	Moreton Bay Fig			X
<i>Fimbristylis dichotoma</i>	Fimbristylis	X		
<i>Flindersia collina</i>	Leopardwood		X	X
<i>Geijera parviflora</i>	Wilga		X	X
<i>Glycine tomentella</i>	Hairy Glycine	X		X
<i>Gomphocarpus physocarpus</i>	Balloon Cotton Bush	X		X
<i>Goodenia sp.</i>	Goodenia	X		
<i>Grevillea striata</i>	Beefwood			X
<i>Grewia latifolia</i>	Dysentery Plant			X
<i>Hakea lorea</i>	Bootlace Oak			X
<i>Heteropogon contortus</i>	Black Spear Grass			x
<i>Hovea lorata</i>	Hovea			x
<i>Hovea planifolia</i>	Hovea			X
<i>Hydrocotyle laxiflora</i>	Pennywort	X		X
<i>Jasminum didymum subsp. racemosum</i>	Native Jasmine			X
<i>Juncus usitatus</i>	Juncus	X	X	
<i>Lepidium sagittulatum</i>	Pepper Cress	X	X	X
<i>Lomandra multiflora</i>	Lomandra			X
<i>Maireana microphylla</i>	Small-leaf Bluebush	X	X	
<i>Megathurus maximus</i>	Green Panic		X	
<i>Melaleuca irbyana</i>	Swamp Tea-tree	X		
<i>Melinis repens</i>	Red Natal	X	X	
<i>Opuntia tomentosa</i>	Velvety Tree Pear	X	X	X
<i>Oxalis stricta</i>	Yellow Wood Sorrel	X		X
<i>Pandorea pandorana</i>	Wonga Vine		X	X
<i>Panicum effusum</i>	Inquisitive Grass	X		
<i>Pennisetum ciliare</i>	Buffel Grass		X	X
<i>Petalostigma pubescens</i>	Quinine		X	



<i>Pittosporum spinescens</i>	Wallaby Apple	X		
<i>Plantago cunninghamii</i>	Sago Weed		X	
<i>Plectranthus parviflorus</i>	Native Coelus	X		X
<i>Podolepis jaceoides</i>	Showy Copper Wire Daisy	X	X	X
<i>Psyrdrax oleifolia</i>	Canthium		X	X
<i>Pterocaulon sphacelatum</i>	Apple Bush	X		
<i>Sclerolaena birchii</i>	Galvanised Burr	X		
<i>Senecio lautus</i>	Fire Weed		X	X
<i>Sida rhombifolia</i>	Paddy's lucerne	X		
<i>Sida rohlenae</i>	Shrub Sida	X		
<i>Sida subspicata</i>	Queensland Hemp	X		
<i>Solanum ellipticum</i>	Potato Bush	X		
<i>Solanum nigrum</i>	Black Nightshade		X	
<i>Sporobolus creber</i>	Western Rats Tail Grass			X
<i>Tephrosia supina</i>	Tephrosia		X	
<i>Themeda avenacea</i>	Wild Oats Grass	X		X
<i>Themeda triandra</i>	Kangaroo Grass			X
<i>Verbena litoralis</i>	Tall Verbena			X
<i>Verbena officinalis</i>	Common Verbena, Native Verbena		X	X
<i>Verbena tenuisecta</i>	Mayne's Curse	X	X	X
<i>Wahlenbergia communis</i>	Large Bluebells	X	X	X
<i>Wahlenbergia gracilis</i>	Sprawling Bluebell	X	X	





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