Aurecon Australia Pty Ltd
ABN 54 005 139 873
Level 14, 32 Turbot Street
Brisbane QLD 4000
Locked Bag 331
Brisbane QLD 4001
Australia

T +61 7 3173 8000
F +61 7 3173 8001
E brisbane@aurecongroup.com
W aurecongroup.com

Memorandum

To	**Andrew Stannard**	From	**Aurecon C/o Jane Stark**
Copy		Reference	**225678**
Date	**26 September 2012**	Pages (including this page)	**58**
Subject	**Fairview Ecological Assessment – Addendum to Lot 55 FTY1153**		

Mr Stannard

This memorandum relates to the ground-truthing of the proposed development areas shown in Figure 1.1. This memorandum documents the results of ecological investigations in the following areas only:

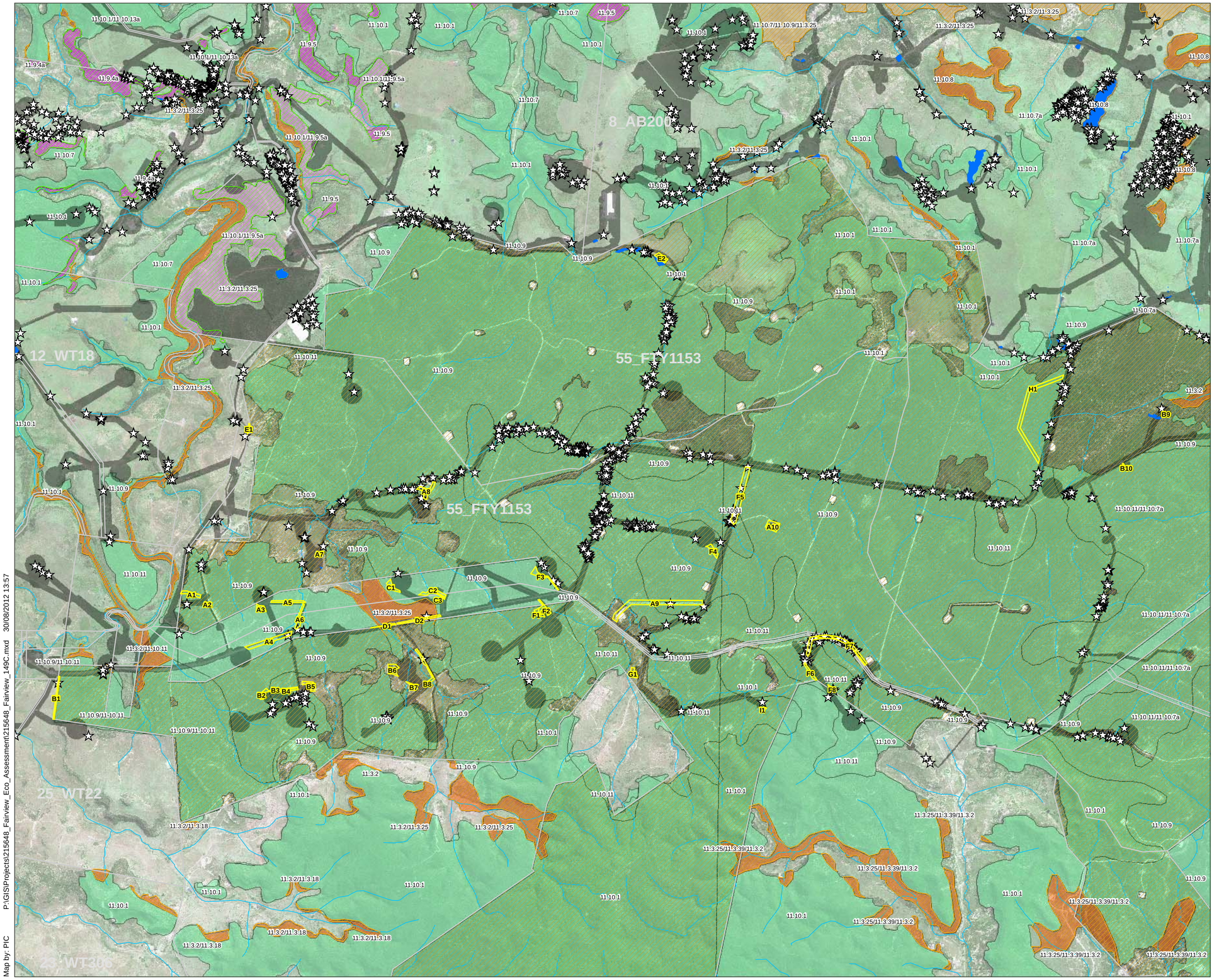
- Area A on Lot 55 FTY1153 and the Injune-Taroom Road easement
- Area B on Lot 55 FTY1153
- Area C on Lot 55 FTY1153
- Area D on the Injune-Taroom Road easement
- Area E on the Basin Road easement
- Area F on Lot 55 FTY1153 and the Injune-Taroom Road easement
- Area G on Lot 55 FTY1153
- Area H on Lot 55 FTY1153
- Area I on Lot 55 FTY1153

The ecological investigations were undertaken from 6 – 10 August 2012, 16 – 17 August 2012 and 10 September 2012 by four (4) Aurecon ecologists (John Lynn, Jenny Grundy, Kellie Butler and Joseph Callaghan).

A report specific to the proposed development areas within Lot 55 FTY1153 has been previously prepared and submitted to Santos (Ecological Assessment Report – Lot 55 FTY1153; Santos Document Reference 0020-GLNG-4-1.3-0072 and associated addendums).

This memorandum should be considered as an addendum to the report listed above. This memorandum is specific to the ecology of Areas A to I, as shown in Figure 1.1. For additional ecological information related to the proposed development that is in addition to that covered by this memorandum, please refer to the appropriate Lot-specific report.

It is important to note that the project is not assessable under the *Sustainable Planning Act 2009* (and subsequently the *Vegetation Management Act 1999*). The project is, however, assessable under the *Environmental Protection Act 1994*, and therefore the Regional Ecosystem (RE) classifications used in this report are based on the 'Biodiversity Status' of the vegetation and not the 'Vegetation Management Status' of the vegetation.



Legend

- EVNT and Type A Species
- EVNT Region
- Additional Areas Assessed
- Corridors - Ground Truth
- Watercourse

Amended Regional Ecosystem (Biodiversity Status)

- Endangered - Dominant
- Endangered - Sub-dominant
- Of Concern - Dominant
- Of Concern - Sub-dominant
- Not of Concern

ESA Mapping

- Category A
- Category B
- Category C

Source:
Cadastre: DERM, 2011.
ESAs: Coordinator-General's Evaluation Report for an Environmental Impact Statement – Gladstone Liquified Natural Gas GLNG Project (May 2010) and the Santos GLNG Project CSG Fields – Environmental Protocol for Constraints Planning and Field Development (September 2011). Note: No ESA buffers have been included on this figure.

Date: 30/08/2012 Version: 1

Map by: PIC P:\GIS\Projects\215648_Fairview_Eco_Assessment\215648_Fairview_149C.mxd 30/08/2012 13:57

A1 scale: 1:32,000

0 0.5 1 2 3 Kilometers

Job No: 225678

Coordinate system: GDA_1994_MGA_Zone_55

Santos Upstream Ecological Assessment

Figure 1.1: Additional Development Areas on Lot 55FTY1153 with REs and ESAs

1 Area A

1.1 General

There are ten (10) proposed development areas within Area A; located within Lot 55 FTY1153 and the Injune-Taroom Road easement (refer Figures 1.2, 1.3, 1.4, 1.5, 1.6 and 1.7). The proposed development areas are mapped as containing non-remnant vegetation, 'No concern at present' RE 11.10.9 and 'No concern at present' RE 11.10.11 on the Department of Environment and Heritage Protection (DEHP) certified RE mapping (v6.0b). Refer to Table 1.1 for RE descriptions.

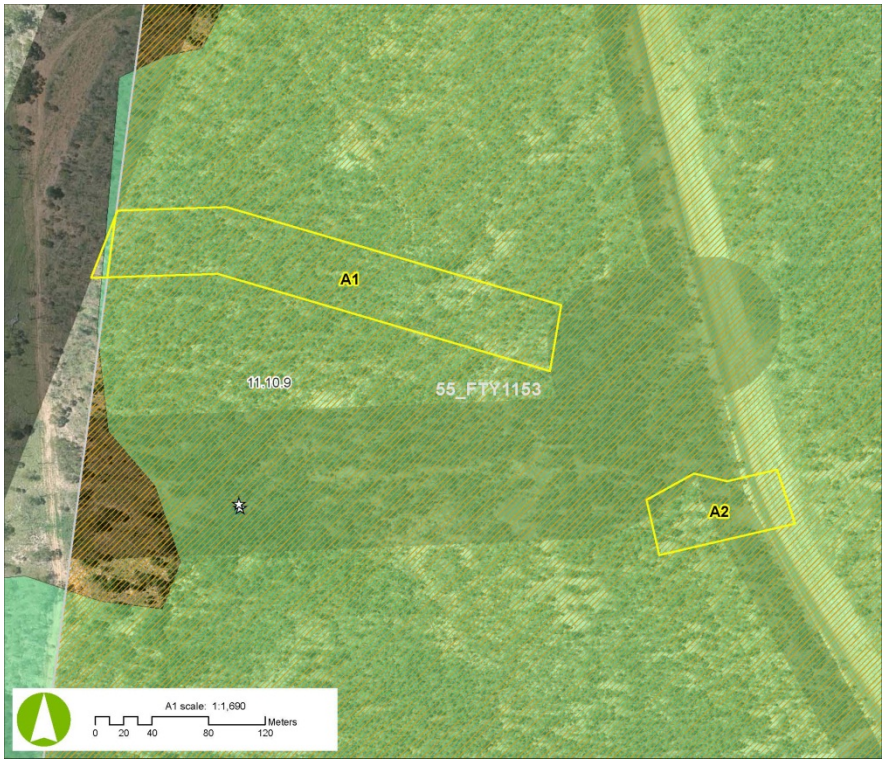


Figure 1.2 **Aerial photograph of Areas A1 and A2**

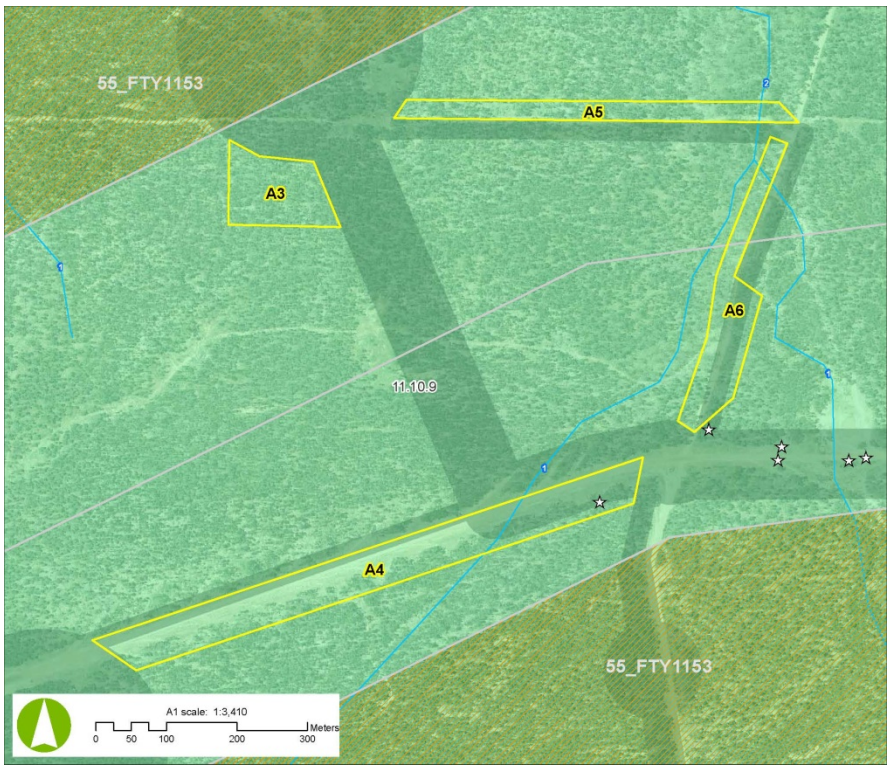


Figure 1.3 **Aerial photograph of Areas A3, A4, A5 and A6**

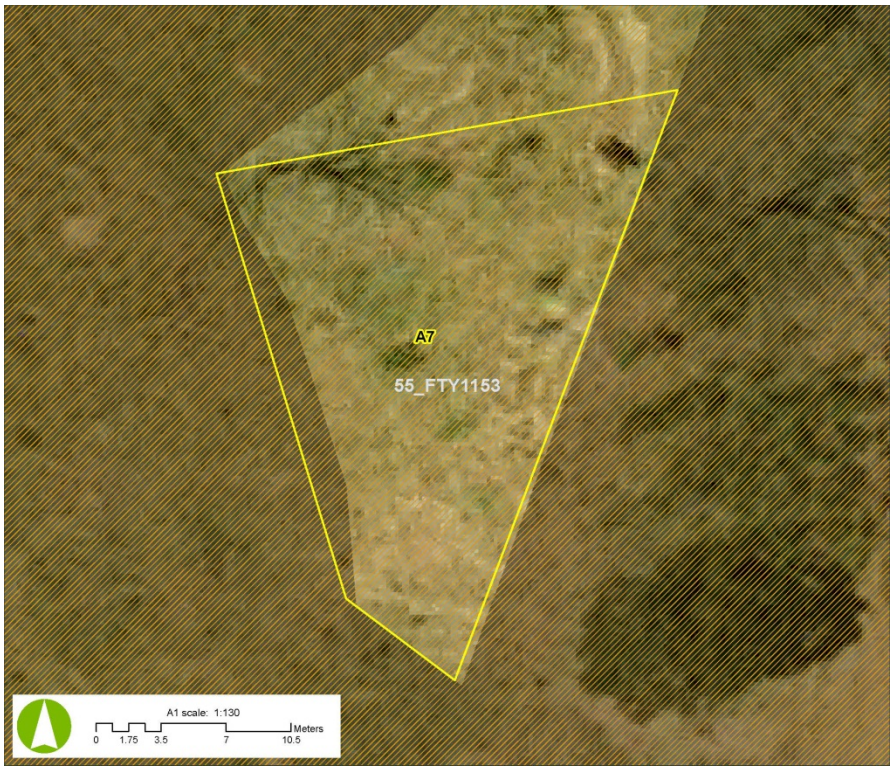


Figure 1.4 **Aerial photograph of Area A7**

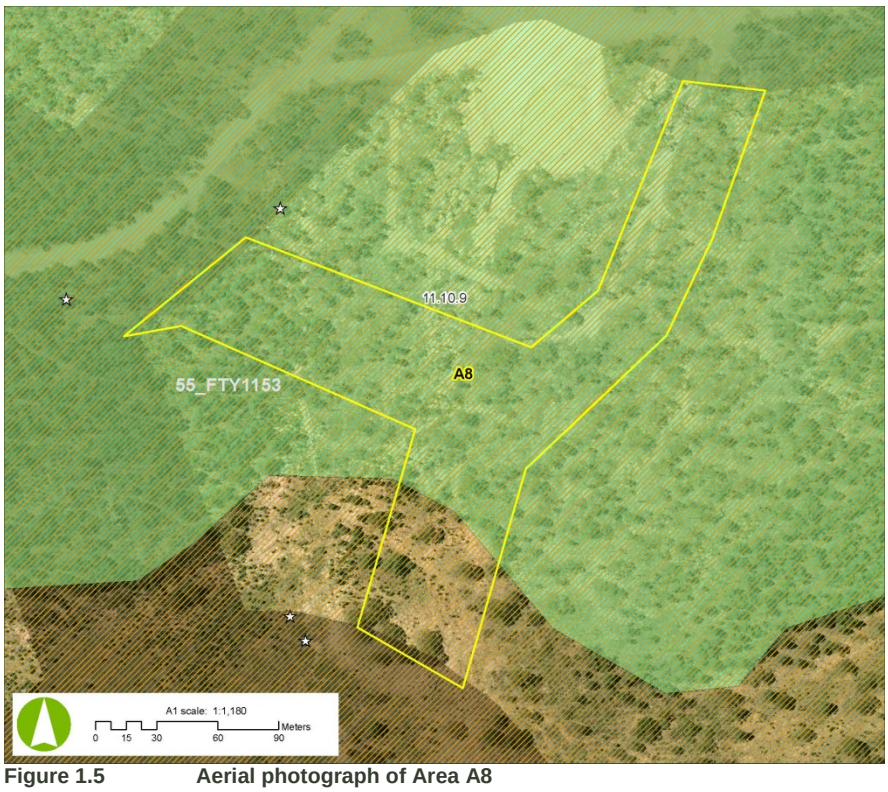


Figure 1.5 **Aerial photograph of Area A8**

Figure 1.6 **Aerial photograph of Area A9**

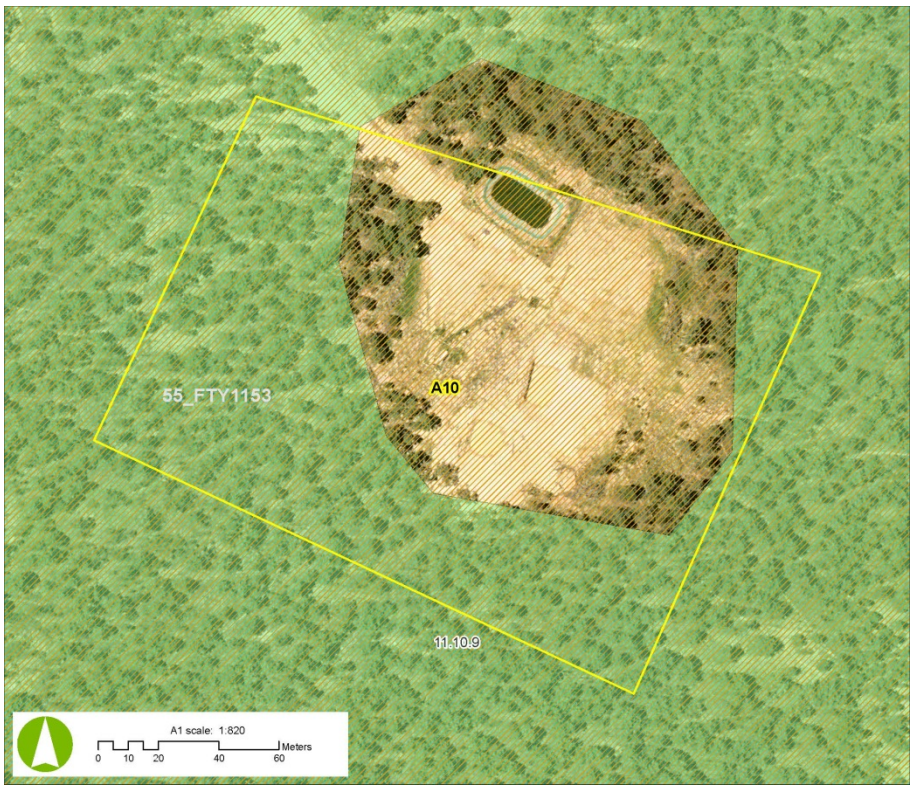


Figure 1.7 **Aerial photograph of Area A10**

Table 1.1 **Description of Regional Ecosystems within the proposed development areas**

RE	Biodiversity Status	Description
11.3.2	Of concern	*Eucalyptus populnea* woodland on alluvial plains
11.3.25	Of concern	*Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines
11.10.7a	No concern at present	*Eucalyptus crebra* and/or *E. melanophloia* woodland on coarse-grained sedimentary rocks
11.10.9	No concern at present	*Callitris glaucophylla* woodland on course grained sedimentary rocks

Areas A1, A2, A7, A8, A9 and A10 are located within a 'Category C' Environmentally Sensitive Area (ESA) which is associated with a Forestry Lease area of the Hallet State Forest.

Two (2) 'watercourses' currently mapped on the DEHP hydrology layer (v6.0) occur within Area A, including:

- A 'stream order 1' 'watercourse' flowing south to north through Areas A4, A5 and A6
- A 'stream order 1' 'watercourse' flowing south-east to north-west through Area A9

The vegetation within Area A was dominated by *Callitris glaucophylla* (White cypress pine) with evidence of selective thinning of *Eucalyptus* spp. due to forestry practices. The vegetation within Area A was also disturbed due to agricultural practices (ie cattle grazing). Minor fire disturbance and erosion were present.

The landform throughout the majority of Area A is flat to undulating and has light brown sandy soils. The landform of Area A8 has a 10% slope with a southern aspect.

1.2 Floristics

The canopy layer within Area A was approximately 8 to 12 m in height with approximately 30% vegetation cover. The canopy layer was dominated by *C. glaucophylla* (White cypress pine), with *Allocasuarina luehmannii* (Bull oak), *Eucalyptus melanophloia* (Silver-leaved ironbark), *Eucalyptus chloroclada* (Dirty gum), *Eucalyptus populnea* (Poplar box), *Eucalyptus tereticornis* (Queensland blue gum) and *Corymbia citriodora* (Spotted gum) occurring in lower proportions (refer Photo 1.1). Numerous dead trees (stags) were also present in the canopy layer with some containing hollows. The sub-canopy layer was approximately 4 to 6 m in height with approximately 10% vegetation cover and was dominated by *C. glaucophylla* (White cypress pine). Other native species also occurring in this stratum included *Corymbia tessellaris* (Moreton bay ash), *E. tereticornis* (Queensland blue gum), *A. luehmannii* (Bull oak), *Eremophila mitchellii* (False sandalwood) and *Ficus rubiginosa* (Rock fig).

The sparse shrub layer was approximately 1 to 3 m in height with approximately 5% vegetation cover. The shrub layer was dominated by *Acacia decora* (Pretty wattle) and also contained juvenile *C. glaucophylla* (White cypress pine), juvenile *E. populnea* (Poplar box), juvenile *E. melanophloia* (Silver leaved ironbark), *Petalostigma pubescens* (Quinine), *E. mitchellii* (False sandalwood), *Maireana microphylla* (Small-leaf bluebush), *Acacia leiocalyx* (Black wattle), *Alphitonia excelsa* (Red ash), *Geijera parviflora* (Wilga), *Grevillea striata* (Beefwood), *Eremophila longifolia* (Creek wilga), *Alectryon diversifolius* (Scrub boonaree) and *Acacia excelsa* (Ironwood) at lower densities.

Photo 1.1 **Facing east within Area A**

The ground layer had approximately 85% vegetation cover and consisted of *P. ciliare* (Buffel grass), *Sporobolus creber* (Western rat's tail grass), *Verbena tenuisecta* (Mayne's curse), *Goodenia glabra* (Smooth goodenia), *Melinis repens* (Red natal), *Juncus usitatus* (Common rush), *Enneapogon avenaceus* (Common bottle washer), *Cymbopogon refractus* (Barbwire grass), *Eragrostis brownii* (Brown's love grass) and *Cheilanthes sieberi* (Mulga fern). One 'Class 2 pest' declared under the *Land Protection (Pest and Stock Route Management) Act 2002* (LP Act) was also observed in the ground layer; *Opuntia tomentosa* (Velvety tree pear).

A full list of species recorded within the entire proposed development areas is outlined in Attachment 1.

Two (2) Type A restricted plant species listed under the provisions of the *Nature Conservation Act 1992* (NC Act) were recorded within Area A (ie *Cymbidium canaliculatum* (Black orchid) and *Brachychiton populneus* (Kurrajong)). These individuals and their locations are listed in Table 1.2.

Table 1.2 Locations of Type A restricted plant species within Area A

Scientific name	Common name	Easting (GDA 94, Zone 55)	Northing (GDA 94, Zone 55)	Count
Brachychiton populneus	Kurrajong	693595	7143748	1
Cymbidium canaliculatum	Black orchid	693441	7143646	4
Cymbidium canaliculatum	Black orchid	695643	7146126	1
Cymbidium canaliculatum	Black orchid	699784	7144172	1

No flora species of conservation significance (ie 'endangered', 'vulnerable' and 'near threatened' species under the provisions of the Queensland NC Act or 'critically endangered', 'endangered' and 'vulnerable' species as listed under the provisions of the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act)) were recorded within Area A.

1.3 Habitat values

Twenty (20) fauna species were observed within Area A, consisting of one (1) amphibian, seventeen (17) birds and two (2) mammals. Traces of three (3) mammals were also recorded within the proposed development area (refer Table 1.3).

Table 1.3 Fauna species observed within Area A

Scientific name	Common name	Comment
Amphibian		
Bufo marinus	Cane toad	Dead
Birds		
Acanthiza nana	Yellow thornbill	
Corvus coronoides	Australian raven	
Cracticus torquatus	Grey butcherbird	
Dacelo novaeguineae	Laughing kookaburra	
Gymnorhina tibicen	Australian magpie	

Scientific name	Common name	Comment
Lichmera indistincta	Brown honeyeater	
Malurus melanocephalus	Red-backed fairy-wren	
Manorina melanocephala	Noisy miner	
Ocyphaps lophotes	Crested pigeon	
Pachycephala rufiventris	Rufous whistler	
Pardalotus striatus	Striated pardalote	
Petroica goodenovii	Red-capped robin	
Philemon corniculatus	Noisy friarbird	
Rhipidura leucophrys	Willie wagtail	
Smicrornis brevirostris	Weebill	
Strepera graculina	Pied currawong	
Struthidea cinerea	Apostle bird	
Mammals		
Macropus giganteus	Eastern grey kangaroo	Observed individuals and tracks
Oryctolagus cuniculus	European rabbit	
Isoodon macrourus	Northern brown bandicoot	Observed diggings only
Sus scrofa	Pig	Observed tracks only
Dromaius novaehollandiae	Emu	Observed tracks only

Area A contained the following habitat resources:

- Canopy cover suitable for shelter, foraging and perching
- Hollow-bearing stags
- Fissured tree bark
- Dense groundcover vegetation (ie grassy tussocks)
- Woody debris (ie felled timber, including hollow-bearing logs)
- Rock cover and rocky outcrops
- Watercourse habitat (including banks)

The canopy cover and hollow-bearing stags were considered suitable for utilisation by arboreal mammals and birds as shelter and nesting sites. The dense groundcover, fissured tree bark, woody debris and rocky outcrops may provide suitable habitat in the form of shelter and foraging sites for reptiles and small mammals. The drainage line and associated sandy banks may provide potential habitat for birds (eg Rainbow bee-eater (*Merops ornatus*)) and amphibians. An inactive bird nest was also observed in a *C. glaucophylla* (White cypress pine), however the species that utilised the nest was unable to be determined.

No fauna species of conservation significance (ie 'endangered', 'vulnerable' and 'near threatened' species as listed under the provisions of the NC Act or 'critically endangered', 'endangered' and 'vulnerable' as listed under the provisions of the EPBC Act were recorded within Area A.

Overall, the habitat value within Area A is considered to be moderate in relation to the ability to support endemic fauna species.

2 Area B

2.1 General

There are ten (10) proposed development areas within Area B, located mostly in the south-western portion of Lot 55 FTY1153. Area B10 is located in the eastern portion of Lot 55 FTY1153 (refer Figures 2.1, 2.2, 2.3, 2.4 and 2.5). The proposed development areas are mapped as 'No concern at present' RE 11.10.9, 'No concern at present' RE 11.10.9/11.10.11 and 'No concern at present' RE 11.10.11/11.10.7a on the DEHP certified RE mapping (refer Table 1.1).

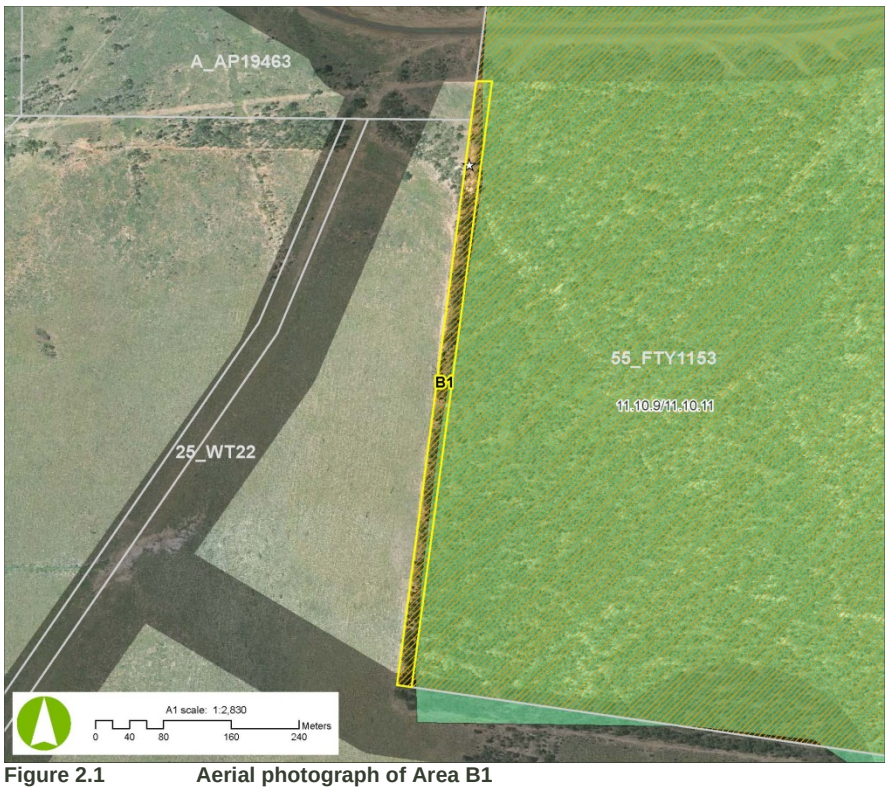


Figure 2.1 **Aerial photograph of Area B1**

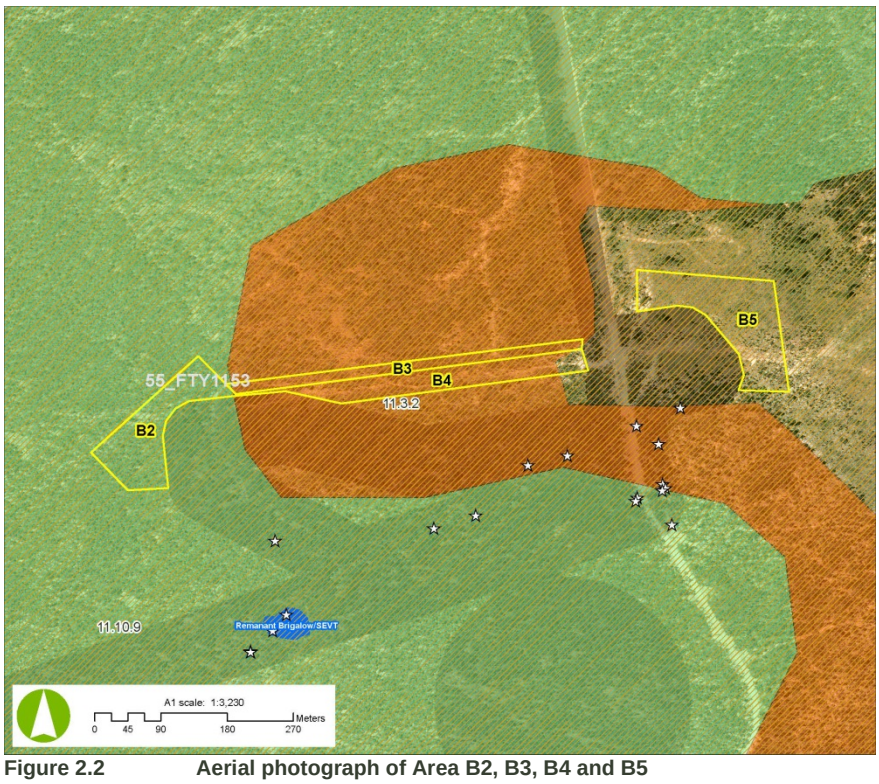


Figure 2.2 **Aerial photograph of Area B2, B3, B4 and B5**

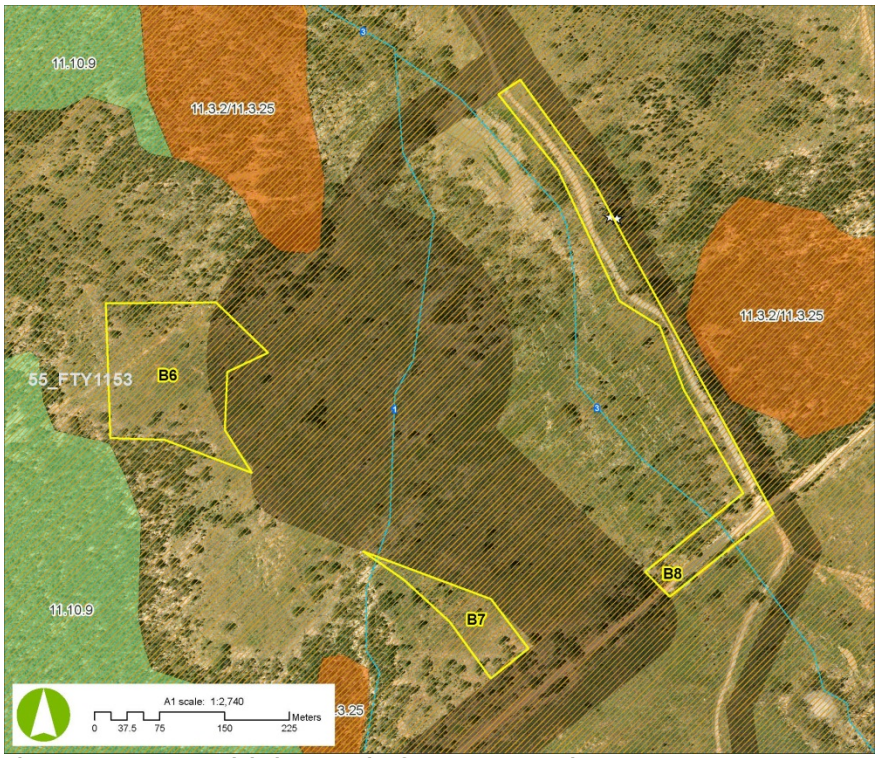


Figure 2.3 **Aerial photograph of Area B6, B7 and B8**

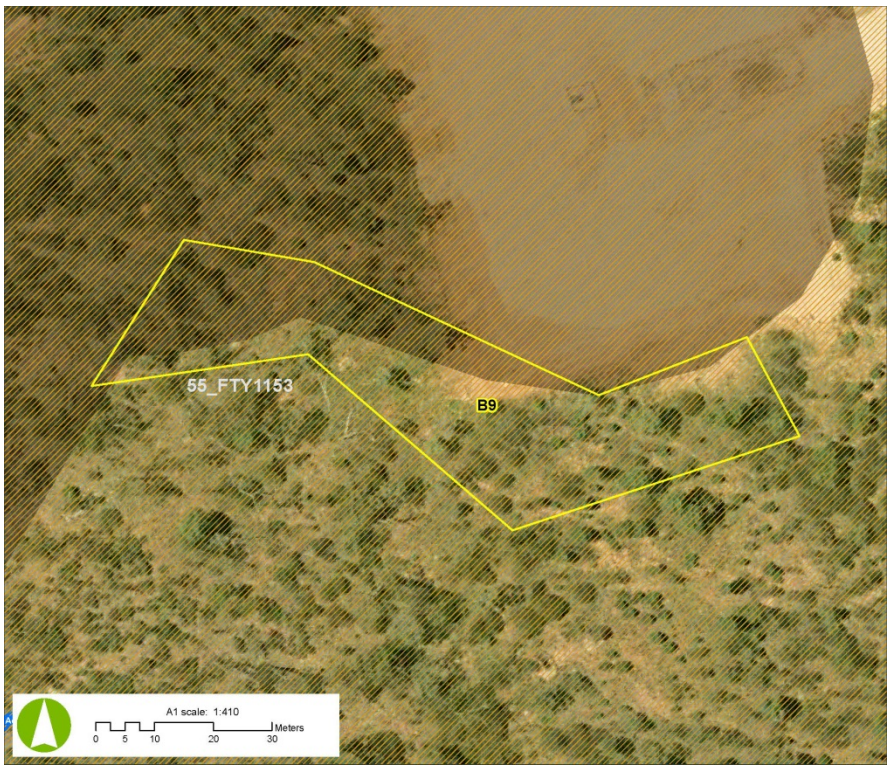


Figure 2.4 **Aerial photograph of Area B9**

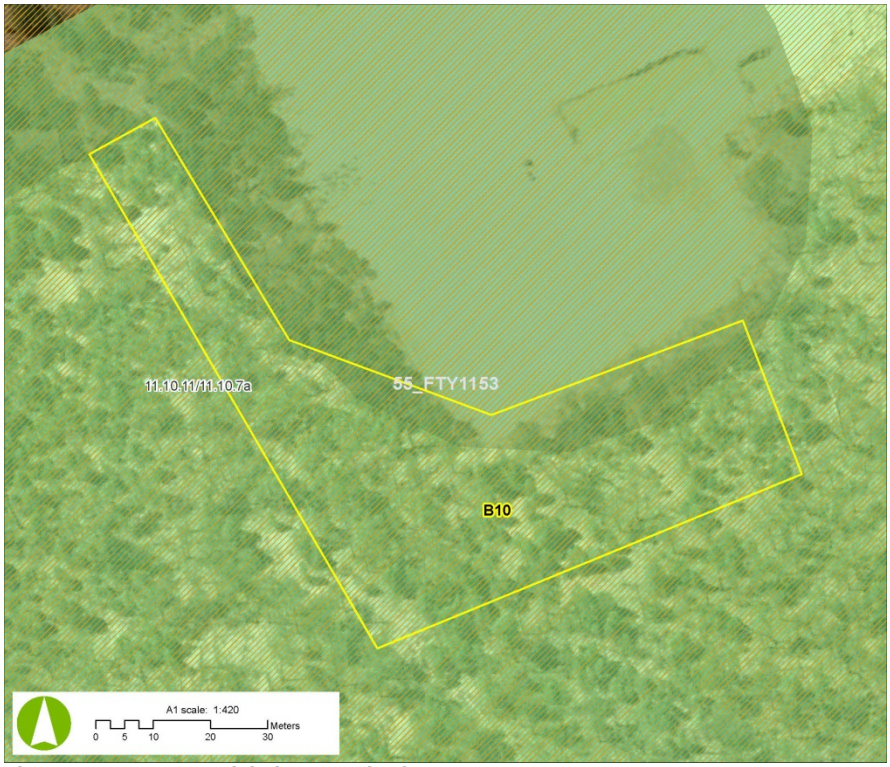


Figure 2.5 **Aerial photograph of Area B10**

All of the proposed development areas are located within a 'Category C' ESA which is associated with a Forestry Lease area of the Hallet State Forest.

Three (3) 'watercourses' that are mapped on the DEHP hydrology layer occur within or in close proximity to Area B, including:

- A 'stream order 1' 'watercourse' flowing south to north through Area B7
- A 'stream order 3' 'watercourse' flowing south-east to north-west through Area B8 which converges with the previously mentioned 'stream order 1' 'watercourse'
- A 'stream order 2' 'watercourse' occurs approximately 50 m west of Area B9

The vegetation within Area B consisted mostly of *E. populnea* (Poplar box) and *C. glaucophylla* (White cypress pine) with evidence of selective thinning of *Eucalyptus* spp. due to forestry practices. The vegetation within Area B was also disturbed due to agricultural practices (ie cattle grazing) and therefore the ground cover was dominated by the exotic pasture species, *P. ciliare*. Minor erosion was also present due to cattle movement.

The landform of Area B is flat to gently undulating and has light brown sandy soils.

2.2 Floristics

The canopy layer within Area B was approximately 7 to 12 m in height with approximately 25% vegetation cover. The canopy layer was dominated by *E. populnea* (Poplar box), with *C. glaucophylla* (White cypress pine) stags, *G. striata* (Beefwood), *E. melanophloia* (Silver leaved ironbark), *A. luehmannii* (Bull oak), *E. mitchellii* (False sandalwood), *E. chloroclada* (Dirty gum) and *Angophora floribunda* (Rough-barked apple) occurring at lower proportions (refer Photo 2.1).

Photo 2.1 **Facing south-west within Area B**

The sub-canopy layer was approximately 4 to 6 m in height with approximately 15% vegetation cover and was dominated by *C. glaucophylla* (White cypress pine). Other species occurring commonly in this stratum included *Citrus glauca* (Native lime) and *E. mitchellii* (False sandalwood).

The shrub layer was approximately 1 to 3.5 m in height with approximately 30% vegetation cover. The shrub layer was dominated by *E. mitchellii* (False sandalwood), with juvenile *C. glaucophylla* (White cypress pine), juvenile *E. populnea* (Poplar box), juvenile *A. luehmannii* (Bull oak), *G. parviflora* (Wilga), *Carissa ovata* (Currant bush), *Dianella caerulea* (Blue flax-lily), *G. striata* (Beefwood), *Dodonaea viscosa* (Hopbush), *Xanthium occidentale* (Noogoora burr), *Lomandra longifolia* (Long-leaved matrush), *Owenia acidula* (Emu apple) and *A. leiocalyx* (Black wattle) occurring at lower densities. One 'Class 2 pest' declared under the LP Act was also observed in the shrub layer (ie *O. tomentosa* [Velvet Tree Pear]).

The ground layer had approximately 70% vegetation cover and was dominated by *P. ciliare* (Buffel grass). Other species occurring in the ground layer at lower densities included *Eragrostis sororia* (Blue love grass), *C. refractus* (Barbwire grass), *Cyperus difformis* (Dirty dora), *V. tenuisecta* (Mayne's curse), *Austrostipa verticillata* (Slender bamboo grass), *Chloris virgata* (Silky-topped rhodes grass), *Senecio lautus* (Fire weed), *Aristida caput-medusae* (Many-headed wiregrass), *S. creber* (Western rats tail), *Bidens pilosa* (Cobbler's pegs), *Chrysocephalum apiculatum* (Yellow buttons) and *Malvastrum americanum* (Spiny malvastrum). One 'Class 2 pest' declared under the LP Act was also observed in the ground layer (ie *Opuntia stricta* (Prickly pear)).

A full list of species recorded within the entire proposed development areas is outlined in Attachment 1.

No Type A restricted plant species listed under the provisions of the NC Act were recorded within Area B.

No flora conservation significant fauna species as listed under the provisions of the NC Act and/or the EPBC Act were recorded within the proposed development areas.

2.3 Habitat values

One (1) reptile and fourteen (14) bird species were observed within Area B during the field investigations. Traces of an additional three (3) mammals were also recorded and are listed in Table 2.1.

Table 2.1 Fauna species observed within Area B

Scientific name	Common name	Comment
Birds		
Anhinga novaehollandiae	Australasian darter	
Ardea pacifica	White-necked heron	
Chenonetta jubata	Australian wood duck	
Corvus coronoides	Australian raven	
Eopsaltria australis	Eastern yellow robin	
Grallina cyanoleuca	Magpie lark	
Manorina melanocephala	Noisy miner	
Meliphaga lewinii	Lewin's honeyeater	
Pardalotus striatus	Striated pardalote	

Scientific name	Common name	Comment
Philemon corniculatus	Noisy friarbird	
Rhipidura leucophrys	Willie wagtail	
Smicrornis brevirostris	Weebill	
Strepera graculina	Pied currawong	
Struthidea cinerea	Apostle bird	
Mammals		
Felis catus	Cat	Observed tracks only
Macropus sp.		Observed scats and tracks only
Oryctolagus cuniculus	European rabbit	Observed scats only
Reptiles		
Carlia pectoralis	Open-litter rainbow skink	

Area B contained the following habitat resources:

- Canopy cover suitable for shelter, foraging and perching
- Hollow-bearing stags
- Fissured tree bark
- Dense groundcover vegetation (ie grassy tussocks)
- Woody debris (ie felled timber, including hollow-bearing logs)
- Minor leaf litter
- Termite mounds

The canopy cover and hollow-bearing stags were considered suitable for utilisation by arboreal mammals and birds as shelter and nesting sites. The dense groundcover, fissured tree bark, woody debris and minor leaf litter may provide suitable habitat sites for reptiles and small mammals.

No fauna conservation significant fauna species as listed under the provisions of the NC Act and/or the EPBC Act were recorded within the proposed development areas.

Overall, the habitat value within Area B is considered low to moderate in relation to the ability to support endemic fauna species.

3 Area C

3.1 General

There are three (3) proposed development areas within Area C, located in the western portion of Lot 55 FTY1153 (refer Figure 3.1). The proposed development areas are mapped as 'No concern at present' RE 11.10.9 on DEHP certified RE mapping (refer Table 1.1).

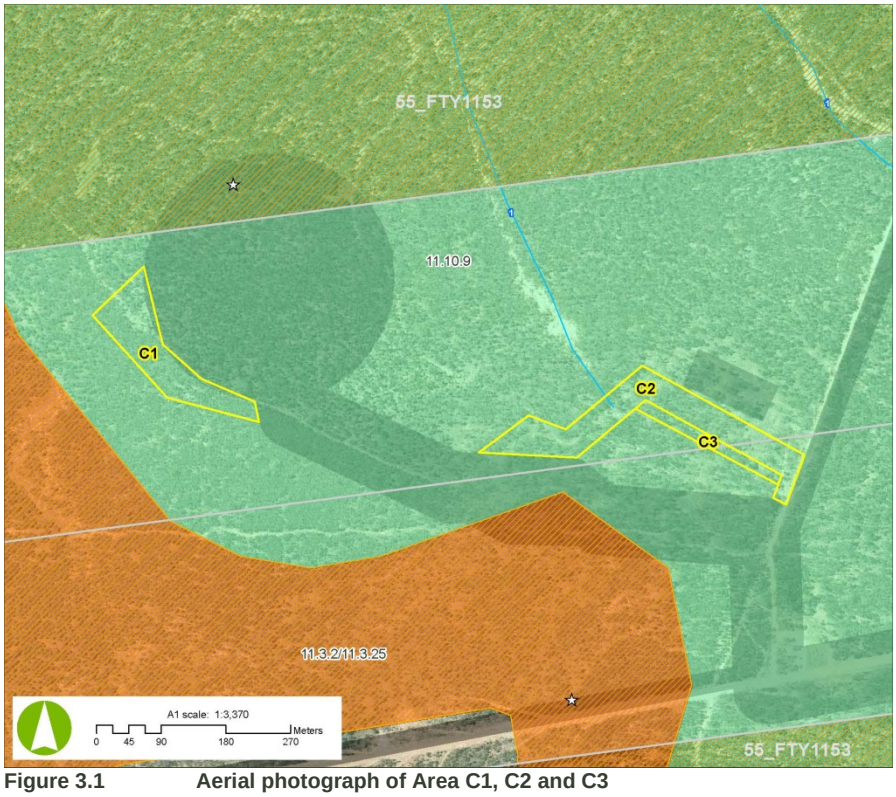


Figure 3.1 Aerial photograph of Area C1, C2 and C3

There are no ESAs located within the proposed development areas. Two (2) 'Category C' ESAs are, however, located in close proximity to the proposed development areas:

- A 'Category C' ESA which is associated with an 'Of concern' RE (11.3.2/11.3.25) is located approximately 50 m south of Area C2
- A 'Category C' ESA which is associated with a Forestry Lease is located approximately 45 m north of Area C1

One (1) 'watercourse' that is mapped on the DEHP hydrology layer occurs within Area C:

- A 'stream order 1' 'watercourse' flowing south to north through Area C2

The vegetation within Area C is dominated by *C. glaucophylla* (White cypress pine) with evidence of selective thinning of *Eucalyptus* spp. due to forestry practices.

The landform of Area C is flat with light brown sandy soils present.

3.2 Floristics

The sparse canopy layer within Area C was approximately 8 to 11 m in height with approximately 10% vegetation cover. The canopy layer was dominated by *C. glaucophylla* (White cypress pine), with *A. luehmannii* (Bull oak), *E. populnea* (Poplar box), stags, *E. melanophloia* (Silver leaved ironbark), *E. chloroclada* (Dirty gum) and *C. citriodora* (Spotted gum) occurring at lower densities.

The sub-canopy layer was approximately 4 to 7 m in height with approximately 35% vegetation cover and was dominated by *C. glaucophylla* (White cypress pine). Other species occurring commonly in this stratum included *E. mitchellii* (Wilga), *A. luehmannii* (Bull oak) and *E. populnea* (Poplar box).

The sparse shrub layer within Area C was approximately 1 m in height with approximately 1% vegetation cover. The shrub stratum contained *L.longifolia* (Long-leaved matrush) and juvenile *C. glaucophylla* (White cypress pine).

The ground layer had approximately 80% vegetation cover and was dominated by *Chloris pectinata* (Comb chloris). Other species occurring in the ground layer at lower densities included *E. brownii* (Brown's love grass), *S. creber* (Western rats tail), *C. difformis* (Dirty dora), *V. tenuisecta* (Mayne's curse), *C. sieberi* (Mulga fern), *G. glabra* (Smooth goodenia), *A. caput-medusae* (Many-headed wiregrass), *Lomandra leucocephala* (Woolly-headed matrush) and *C. refractus* (Barbwire grass).

A full list of species recorded within the entire proposed development areas is outlined in Attachment 1.

No Type A restricted plant species listed under the provisions of the NC Act were recorded within Area C.

No flora species of conservation significance as listed under the provisions of the NC Act and/or the EPBC Act were recorded within Area C.

3.3 Habitat values

Six (6) bird species were observed during the field investigations. Traces of an additional two (2) mammals were also recorded and are listed in Table 3.1.

Table 3.1 Fauna species observed within Area C

Scientific name	Common name	Comment
Birds		
Geopelia humeralis	Bar-shouldered dove	
Manorina melanocephala	Noisy miner	
Pardalotus striatus	Striated pardalote	
Rhipidura albiscapa	Grey fantail	
Strepera graculina	Pied currawong	
Struthidea cinerea	Apostle bird	
Mammals		
Macropus sp.		Observed scats only
Sus scrofa	Pig	Observed tracks only

Area C contained the following habitat resources:

- Canopy cover suitable for shelter, foraging and perching

- Hollow-bearing stags
- Some fissured tree bark
- Dense groundcover vegetation (ie grassy tussocks)
- Woody debris (ie felled timber, including hollow-bearing logs)
- Minor leaf litter
- Minor rocky crevices

The canopy cover and hollow-bearing stags were considered suitable for arboreal mammals and birds. The fissured tree bark, dense groundcover, woody debris, minor leaf litter and minor rocky crevices may provide suitable habitat for reptiles and small mammals.

No species of conservation significance as listed under the provisions of the NC Act and/or the EPBC Act were recorded within Area C.

Overall, the habitat value within Area C is considered low to moderate in relation to the ability to support endemic fauna species.

4 Area D

4.1 General

There are two (2) proposed development areas within Area D on the southern border of the Injune-Taroom Road easement. The proposed development areas are mapped as 'non-remnant' vegetation, 'No concern at present' RE 11.10.9 and 'Of concern' RE 11.3.2/11.3.25 on the DEHP certified RE mapping (refer Figure 4.1). A 'Category C' ESA associated with the 'Of concern' RE 11.3.2/11.3.25 vegetation polygon occurs within the west of Area D1 and within the east of Area D2 (refer Table 1.1).

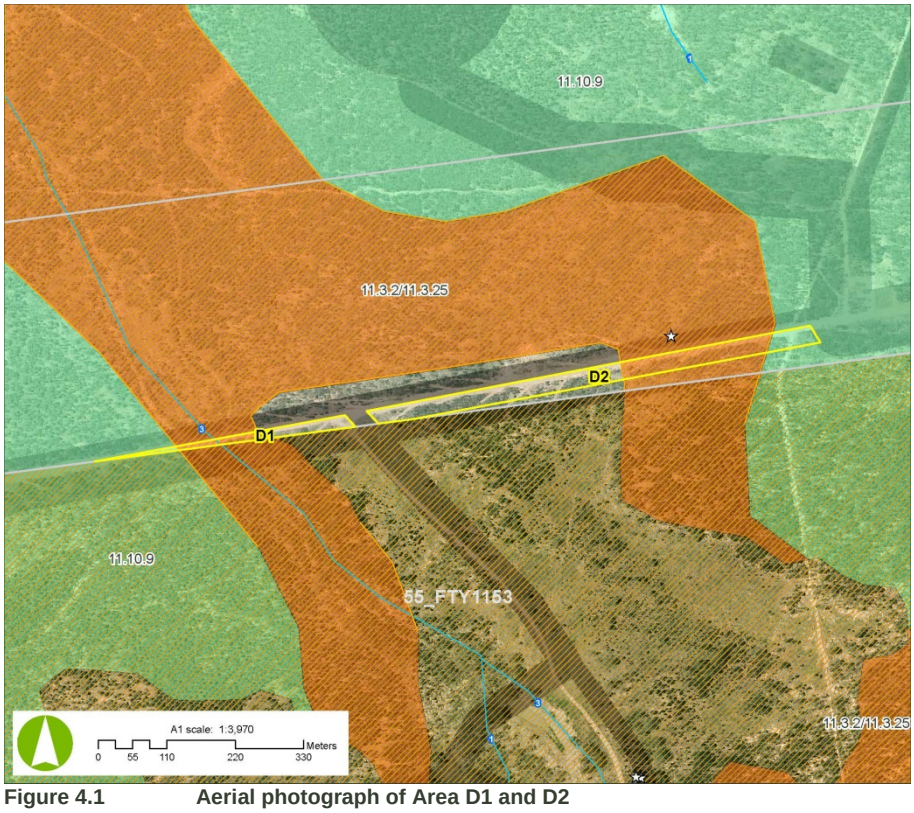


Figure 4.1 Aerial photograph of Area D1 and D2

The proposed development areas are located directly adjacent to a 'Category C' ESA which is associated with a Forestry Lease area on Lot 55 FTY1153 to the south.

One (1) DEHP mapped 'stream order 3' 'watercourse' flowing south-west to north-west occurs within Area D1 (refer Photo 4.1).

Photo 4.1 'Stream order 3' 'water course' within Area D facing east

The landform of Area D is flat to gently undulating with sandy soils present.

4.2 Floristics

The canopy stratum within Area D was dominated by *C. glaucophylla* (White cypress pine) with *A. luehmannii* (Bull oak) and various *Eucalyptus* spp. typical to the region also present (refer Photo 4.2).

Photo 4.2 **Depiction of typical vegetation within Area D. Photograph is facing north-east along the transect**

The canopy stratum had a height range of between 10 to 14 m. The canopy stratum had a relatively dense vegetation cover which was reflected in a high Foliage Projection Cover (FPC) of approximately 43 % and a high stem count of 700 stems/ha. FPC was calculated using the line-intercept method over a 100 m transect adapted from Eyre *et al*, 2011 and stem count per hectare was extrapolated from five (5) 10 m by 2 m survey quadrats (refer Appendix B).

The boundaries between the 'remnant' (11.10.9 and 11.3.2/11.3.25) vegetation polygons and 'non-remnant' vegetation polygons were not clearly definable during ground-truthing (refer Table 4.1). The indiscernibility between the interface of the 'remnant' and 'non-remnant' vegetation polygons was exacerbated by disturbance from edge effects associated with the adjacent road. Ground-truthing identified that throughout Area D, floristic composition and geology were considered to be analogous with RE 11.10.9 as described in the Regional Ecosystem Description Database (REDD v6.0b). Area D is also mapped on the 1:100,000 Geology layer as having soil analogous with land zone 9 (consolidated fine-grained sedimentary soil). This indicates that the floristic composition and geology within Area D is not considered analogous with the current RE mapping of the 'Of concern' RE

11.3.2/11.3.25 and 'non-remnant' polygons (as per the REDD description). Area D does not, however, meet the minimum size criteria of 5 ha for inclusion in an RE amendment report.

The sub-canopy within Area D was dominated by *C. glaucophylla* (White cypress pine) with associated *E. melanophloia* (Silver leaved ironbark), *A. luehmannii* (Bull oak), *E. populnea* (Poplar box) and *G. parviflora* (Wilga). The sub-canopy stratum had a height range of 6 to 7 m and was relatively dense which was reflected in a high vegetation cover (FPC approximately 53%) and high stem count (5000 stems/ha) (refer Appendix B).

The shrub stratum was dominated by juvenile *C. glaucophylla* (White cypress pine) with juvenile *E. populnea* (Poplar box) and *A. decora* (Pretty wattle) also present in lower proportions. The shrub layer was relatively sparse which was reflected in a low stem count of 200 stems/ha (refer Appendix B). The shrub stratum had a height range of 1 to 3.5 m.

The ground stratum within Area D was co-dominated by *P. ciliare* (Buffel grass) and *Heteropogon contortus* (Black spear grass) with *A. caput-medusae* (Many-headed wiregrass) and *C. pectinata* (Comb chloris) occurring commonly. The ground stratum vegetation along the extent of the 'watercourse' contained species typically associated with areas of increased soil moisture (ie *Phragmites australis* (Common reed) and *J. usitatus* (Juncus)). The ground stratum had approximately 75% vegetation cover.

A full list of species recorded within the entire proposed development areas is outlined in Attachment 1.

One (1) 'Type A restricted plant' species (ie *Brachychiton populneus* (Kurrajong)) was recorded within the proposed development areas (refer Table 4.1).

Table 4.1

Scientific Name	Common Name	Easting (GDA 94, Zone 55) (Grid: UTM)	Northing (GDA 94, Zone 55) (Grid: UTM)
Brachychiton populneus	Kurrajong	695741	7143967

No flora species of conservation significance as listed under the provisions of the NC Act and/or the EPBC Act were recorded within Area D.

4.3 Habitat Values

One (1) reptile and thirteen (13) bird species were observed during the field investigations. Traces of an additional two (2) mammals were also recorded and are listed in Table 4.2.

Table 4.2 Fauna species observed within Area D

Scientific name	Common name	Comments
Birds		
Coturnix ypsilophora	Brown quail	
Cracticus nigrogularis	Pied butcherbird	
Gymnorhina tibicen	Australian magpie	
Manorina melanocephala	Noisy miner	
Meliphaga lewinii	Lewin's honeyeater	

Scientific name	Common name	Comments
Neochmia temporalis	Red-browed finch	
Pardalotus striatus	Striated pardalote	
Philemon corniculatus	Noisy friarbird	
Platycercus adscitus	Pale-headed rosella	
Smicrornis brevirostris	Weebill	
Strepera graculina	Pied currawong	
Struthidea cinerea	Apostle bird	
Taeniopygia bichenovii	Double-barred finch	
Reptiles		
Carlia sp.	Rainbow skink	
Mammals		
Felis catus	Cat	Observed tracks only
Macropus sp.		Observed tracks only

Area D contained the following habitat resources:

- Canopy cover suitable for shelter, foraging and perching
- Some fissured tree bark
- Dense groundcover vegetation (ie grassy tussocks)
- Minor leaf litter
- Minor rocky crevices
- Woody debris (ie fallen / felled timber)

The canopy cover was considered suitable habitat (eg nesting sites in tree hollows, feeding sites) for arboreal mammals and birds. The fissured tree bark, dense groundcover, woody debris, minor leaf litter and minor rocky crevices may provide suitable habitat (eg shelter, foraging and nesting sites) for reptiles and small mammals.

No fauna species of conservation significance as listed under the provisions of the NC Act and/or the EPBC Act were recorded within Area D.

Overall, the habitat value within Area D is considered moderate in relation to the ability to support endemic fauna species.

5 Area E

5.1 General

Area E comprised of two (2) investigation areas located adjacent to the western and northern property boundaries of Lot 55 FTY1153 (refer Figures 5.1 and 5.2). The proposed development area is mapped entirely as 'non-remnant' vegetation on the DEHP certified RE mapping.

A small area within Area E2 is mapped as a Brigalow Threatened Ecological Community (TEC), which was considered to be correct upon previous investigations in the field (refer Figure 5.2).

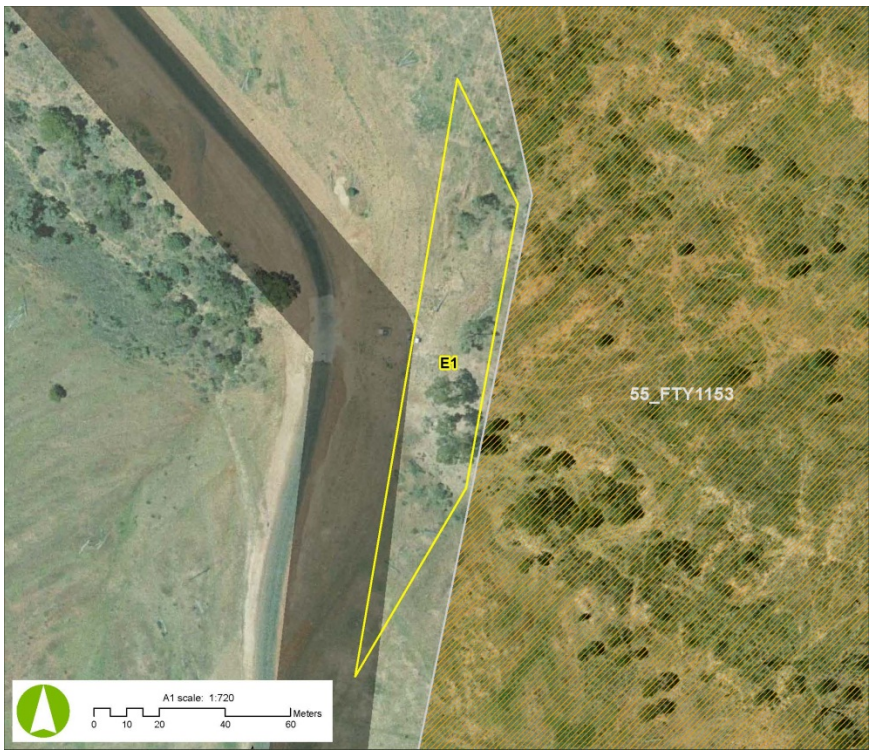


Figure 5.1 **Aerial photograph of Area E1**

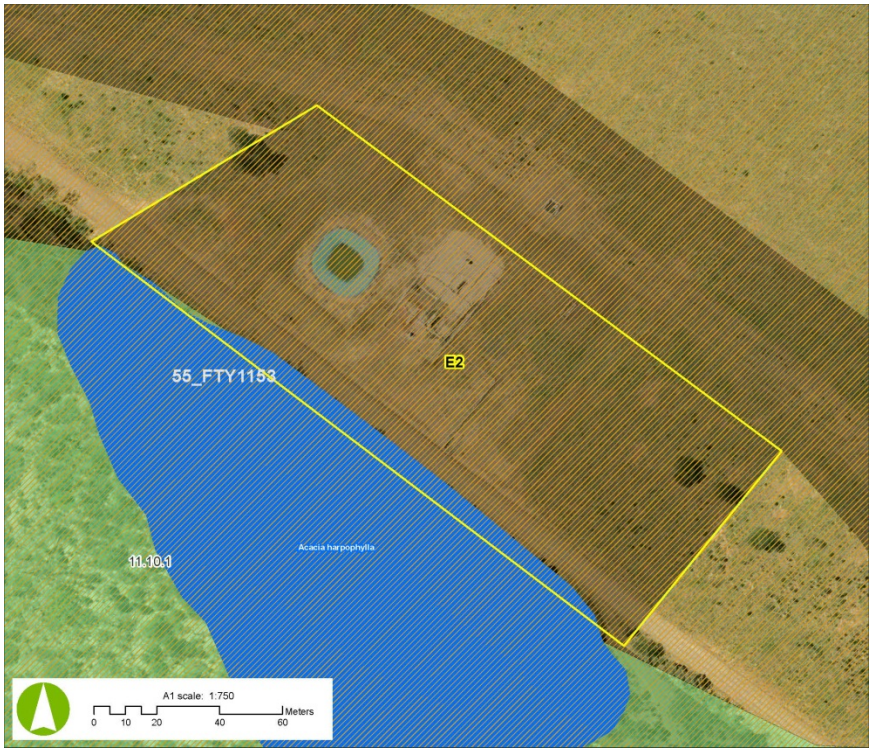


Figure 5.2 **Aerial photograph of Area E2**

Area E1 is located less than 5 m west of a 'Category C' ESA which is associated with a Forestry Lease area that occurs within Lot 55 FTY1153. Area E2 is mapped entirely as a 'Category C' ESA due to a Forestry Lease area.

There are no DEHP mapped 'watercourses' located within or in close proximity to Area E1. A minor drainage line with defined banks which is not mapped on the DEHP hydrology layer was, however, observed within Area E1. A 'stream order 1' 'watercourse' is mapped approximately 450 m north of Area E2, flowing south-west to north-east through the area. Another 'stream order 1' 'watercourse' is mapped approximately 300 m south of Area E2, flowing south to north-east through the area.

The landform of Area E1 slopes downwards to the drainage line that traverses the middle portion of the proposed development area. The soil structure was comprised of medium brown silty soil. The landform or Area E2 is flat due to previous disturbance from existing infrastructure.

5.2 Floristics

The landscape of Area E was a highly modified environment as a result of disturbance from the construction of the adjacent road. Vegetation within the proposed development area occurred in patches and was highly fragmented from surrounding vegetation in all directions (refer Photo 5.1).

Photo 5.1 **Depiction of typical vegetation within Area E**

The canopy stratum within Area E consisted of a single *G. striata* (Beefwood) with a height of 7 m which covered approximately 1% of the proposed development area. There was no vegetation present within the proposed development area that constituted a sub-canopy stratum.

The shrub stratum within Area E was dominated by *E. mitchellii* (False sandalwood) with associated *A. decora* (Pretty wattle) and *Acacia macradenia* (Zigzag wattle) also present. The shrub stratum had a height range of 1 to 4 m and covered approximately 10% of the proposed development area.

The ground stratum within Area E was dominated by *P. ciliare* (Buffel grass) and had a vegetation cover of approximately 80%. The ground stratum was typical of disturbed, cleared landscapes in the region and contained exotic secies including *Cirsium vulgare* (Black spear thistle), *V. tenuisecta* (Mayne's curse) and *B. pilosa* (Cobblers pegs). Native species in the ground layer included *G. glabra* (Smooth goodenia), Barbwire grass), *E. sororia* (Blue love grass), *T. triandra* (Kangaroo grass), *C. apiculatum* (Yellow buttons) and *Sclerolaena birchii* (Galvanised burr).

A full list of species recorded within the entire proposed development areas is outlined in Attachment 1.

No Type A restricted plant species listed under the provisions of the NC Act were recorded within Area E.

No flora species of conservation significance as listed under the provisions of the NC Act and/or the EPBC Act were recorded within Area E.

5.3 Habitat Value

Four (4) fauna species were observed during field investigations (refer Table 5.1). The species were all birds which are commonly found in the area.

Table 5.1 Fauna species observed within Area E

Scientific Name	Common name
Birds	
Eolophus roseicapilla	Galah
Ocyphaps lophotes	Crested pigeon
Pardalotus striatus	Striated pardalote
Smicrornis brevirostris	Weebill

Habitat opportunities within Area E included:

- Dense groundcover vegetation (ie grassy tussocks)
- Woody debris from fallen timber
- Minor leaf litter
- Drainage line

The dense groundcover could provide habitat opportunities (eg foraging, nesting and shelter sites) for small mammals and reptiles. There were limited amounts of woody debris from fallen timber, low amounts of leaf litter in the ground stratum which could be utilised by reptiles or small mammals. The drainage line may provide temporary habitat for amphibians if inundated. The potential for fauna to utilise these sites as habitat was, however, reduced as a result of the disturbance from the adjacent road and the fragmentation from surrounding vegetation.

No fauna species of conservation significance as listed under the provisions of the NC Act and/or the EPBC Act were recorded within Area E.

The overall habitat value of Area E is considered low due to its level of disturbance and fragmentation from surrounding vegetation.

6 Area F

6.1 General

There are eight (8) proposed development areas within Area F; located on Lot 55 FTY1153 and the Injune-Taroom Road easement (refer Figures 6.1, 6.2, 6.3 and 6.4). The proposed development areas are mapped as 'No concern at present' RE 11.10.9', 'No concern at present' RE 11.10.10 and 'non-remnant' vegetation (refer Table 1.1).

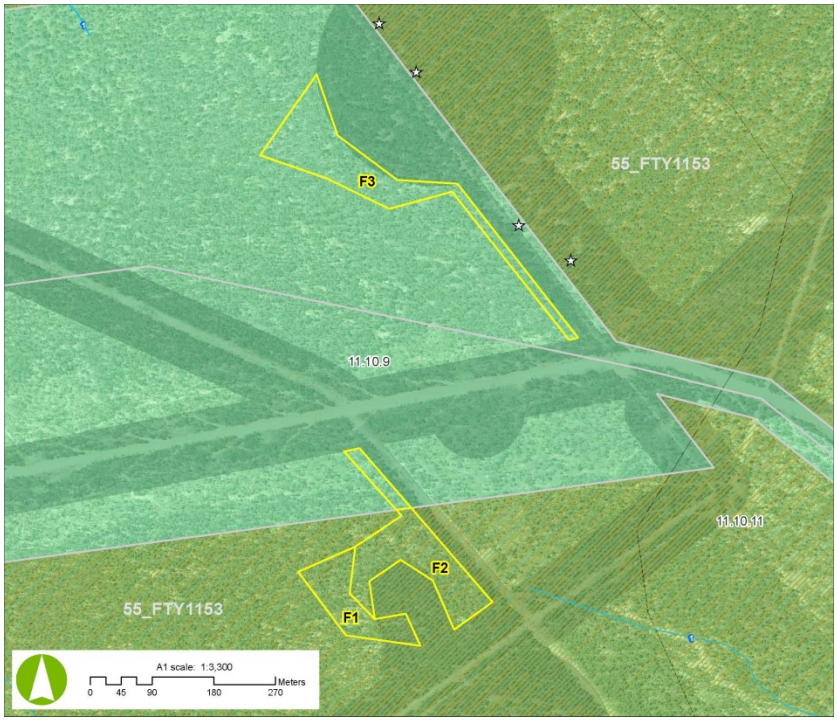


Figure 6.1 **Aerial photograph of Area F1, F2 and F3**

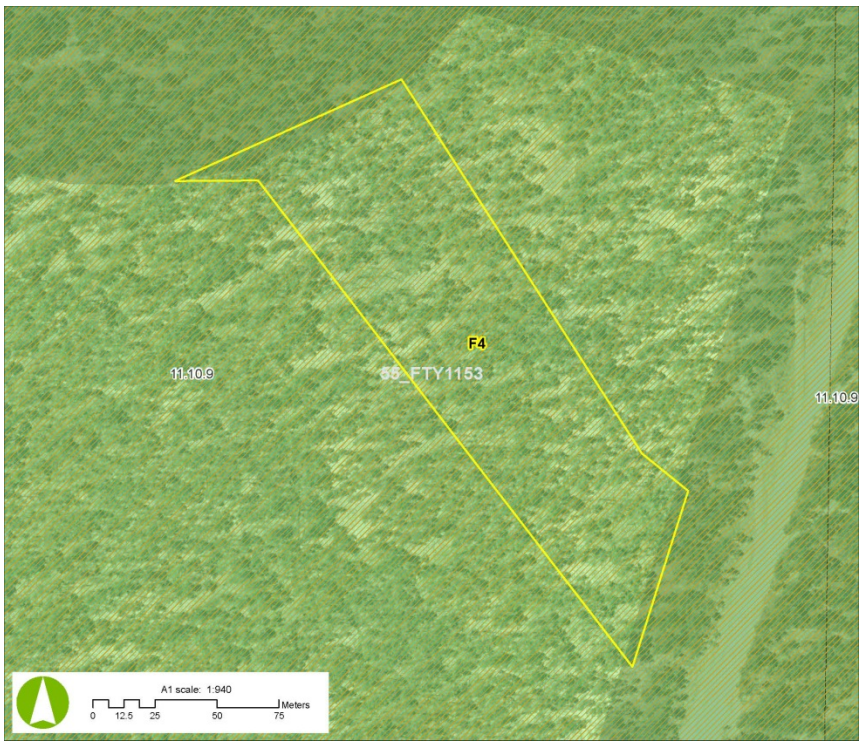


Figure 6.2 **Aerial photograph of Area F4**

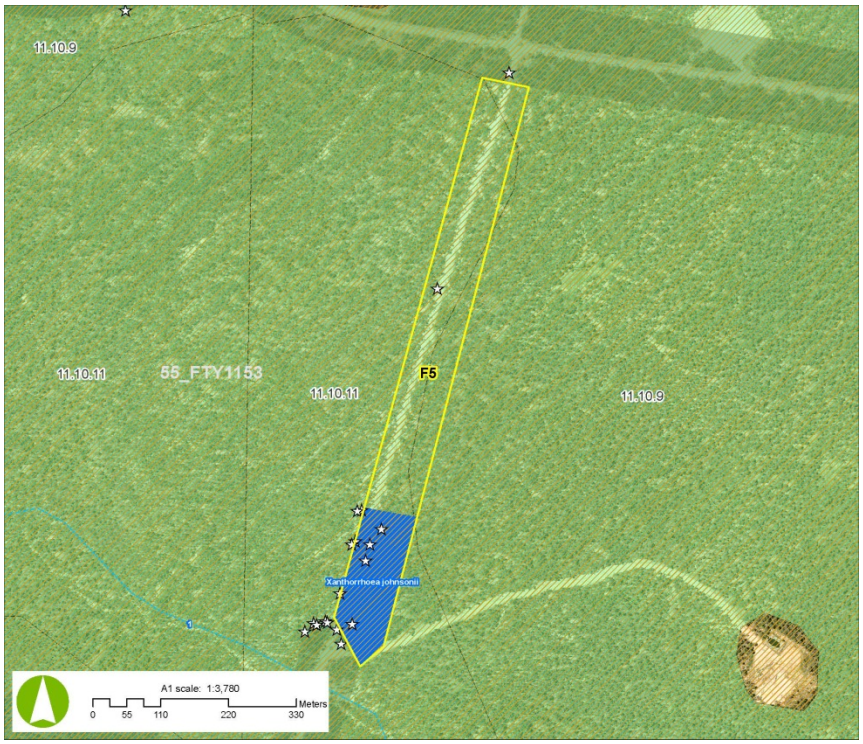


Figure 6.3 **Aerial photograph of Area F5**

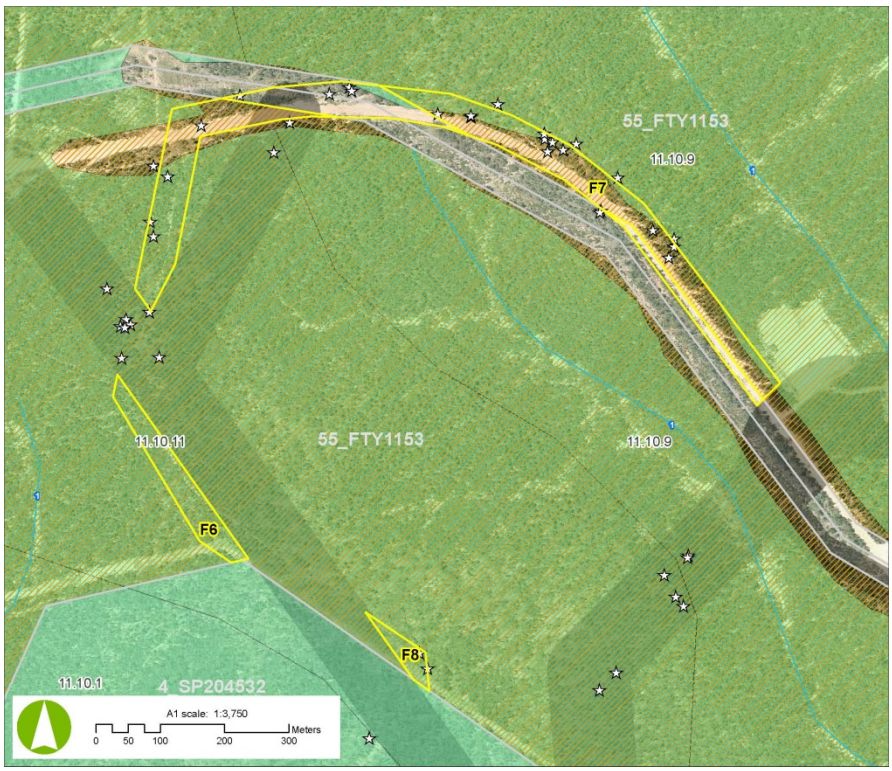


Figure 6.4 **Aerial photograph of Area F6, F7 and F8**

All of the proposed development areas are located within or in close proximity to a 'Category C' ESA which is associated with a Forestry Lease area of the Hallet State Forest. Area F1, F4, F5, F6 and F8 are located entirely within the 'Category C' ESA. Area F2 and F7 are located partially within the 'Category C' ESA and partially on the Injune-Taroom Road easement. Area F3 is located entirely on the Injune-Taroom Road easement and approximately 45 m west of the 'Category C' ESA.

There are no DEHP mapped 'watercourses' within the proposed development areas. Three (3) mapped 'watercourses' are, however, located in close proximity to Area F:

- A 'stream order 1' 'watercourse' flowing west to east is located approximately 55 m east of Area F2.
- A 'stream order 1' 'watercourse' flowing south-east to north-west is located approximately 60 m south of Area F5.
- A 'stream order 1' 'watercourse' flowing north to south is located approximately 45 m south of the middle portion of Area F7

The landform of Area F is flat to gently undulating and the soil structure was comprised mostly of sandy soils. Areas in the south (ie Area F6 and F8) contained clay soils.

6.2 Floristics

The majority of the landscape within Area F contained mature woody vegetation and has only been subject to minor disturbance associated with selective timber harvesting. This is reflected in the RE mapping for the majority of the investigation areas which are classified as 'remnant' vegetation (either RE 11.10.9 or 11.10.10). Area F7 is the only investigation area that contains 'non-remnant' vegetation

which can be attributed to clearing associated with the Injune-Taroom Road easement (refer Figure 6.4).

The canopy stratum within Area F was dominated by *C. glaucophylla* (White cypress pine) and had a vegetation cover of approximately 15% (refer Photo 6.1). Other canopy species recorded included *C. citriodora* (Spotted gum), stags, *A. luehmannii* (Bull oak) and *E. populnea* (Poplar box). The height range of the canopy stratum was approximately 10 to 14 m.

Photo 6.1 **Depiction of typical vegetation within Area F**

The sub-canopy was also dominated by *C. glaucophylla* (White cypress pine) with associated *E. populnea* (Poplar box) and had a vegetation cover of approximately 35%. Other species recorded included *A. luehmannii* (Bull oak), stags, *E. melanophloia* (Silver leaved ironbark) and *Petalostigma pubescens* (Quinine). The height range of the sub-canopy stratum was 5 to 8 m.

The species composition and vegetation structure of the canopy / sub-canopy strata identified within the proposed development area was analogous with the REDD description of their respective current RE classifications.

The shrub stratum was dominated juvenile *C. glaucophylla* (White cypress pine) and was relatively sparse (approximately 2% vegetation cover). Other species recorded within the shrub stratum of Area F included juvenile *A. luehmannii* (Bull oak), juvenile *G. striata* (Beefwood), *P. pubescens* (Quinine) and juvenile *E. melanophloia* (Silver leaved ironbark). The shrub stratum had a height range of approximately 1 to 3 m.

The ground stratum within Area F was dominated by *E. brownii* (Brown's love grass) and had a vegetation cover of approximately 75%. The vegetation within the ground stratum was co-dominated by several grasses including; *E. sororia* (Blue love grass), *C. refractus* (Barbwire grass), *Aristida*

holathera (Tall wire grass), *Enneapogon polyphyllus* (Limestone bottle washer) and *A. caput-medusae* (Many-headed wiregrass). Exotic weed cover in the ground stratum was relatively low (approximately 5%) which included *P. ciliare* (Buffel grass), *O. tomentosa* (Velvety tree pear) and *V. tenuisecta* (Mayne's curse).

A full list of species recorded within the entire proposed development areas is outlined in Attachment 1.

Three (3) 'Type A restricted plant' species as defined under the provisions of the NC Act were identified within Area F; *Xanthorrhoea johnsonii* (Grass tree), *C. canaliculatum* (Black orchid) and *B. populneus* (Kurrajong) (refer Table 6.1). A large population of *X. johnsonii* (Grass tree) was identified within approximately 2 ha in the southern portion of Area F5. An estimation of the patch density within the southern portion of Area F5 was calculated from two (2) quadrats (refer Tables 6.2, 6.3 and 6.4). This area has been captured as an ENVT region (refer Figure 6.3).

Table 6.1 Locations of Type A restricted plant species within Area F

Scientific name	Common name	Easting (GDA 94, Zone 55) (Grid: UTM)	Northing (GDA 94, Zone 55) (Grid: UTM)	Count
Brachychiton populneus	Kurrajong	702066	7143405	1
Brachychiton populneus	Kurrajong	701070	7146443	1
Brachychiton populneus	Kurrajong	700954	7146093	1
Brachychiton populneus	Kurrajong	702762	7143445	1
Brachychiton populneus	Kurrajong	702868	7143372	1
Brachychiton populneus	Kurrajong	702876	7143402	1
Brachychiton populneus	Kurrajong	702876	7143390	1
Brachychiton populneus	Kurrajong	702844	7143415	1
Brachychiton populneus	Kurrajong	702724	7143550	1
Brachychiton populneus	Kurrajong	702704	7143540	1
Brachychiton populneus	Kurrajong	702679	7143537	1
Brachychiton populneus	Kurrajong	702675	7143557	1
Brachychiton populneus	Kurrajong	702674	7143565	1
Brachychiton populneus	Kurrajong	702602	7143611	1
Brachychiton populneus	Kurrajong	702560	7143593	2
Brachychiton populneus	Kurrajong	702141	7143578	2
Brachychiton populneus	Kurrajong	702371	7143637	1
Brachychiton populneus	Kurrajong	702340	7143627	1
Brachychiton populneus	Kurrajong	702200	7143624	1
Brachychiton populneus	Kurrajong	702089	7143498	1
Brachychiton populneus	Kurrajong	702061	7143428	1
Brachychiton populneus	Kurrajong	702060	7143287	2

Scientific name	Common name	Easting (GDA 94, Zone 55) (Grid: UTM)	Northing (GDA 94, Zone 55) (Grid: UTM)	Count
Brachychiton populneus	Kurrajong	702480	7142756	1
Brachychiton populneus	Kurrajong	702493	7142733	2
Brachychiton populneus	Kurrajong	702066	7143515	1
Brachychiton populneus	Kurrajong	702394	7143630	2
Cymbidium canaliculatum	Black orchid	702436	7143631	1
Brachychiton populneus	Kurrajong	702451	7143617	1
Brachychiton populneus	Kurrajong	702462	7143621	1
Brachychiton populneus	Kurrajong	702484	7143613	1
Cymbidium canaliculatum	Black orchid	702508	7143596	1
Cymbidium canaliculatum	Black orchid	702761	7143443	1
Cymbidium canaliculatum	Black orchid	702788	7143497	1
Cymbidium canaliculatum	Black orchid	702687	7143552	5
Cymbidium canaliculatum	Black orchid	702375	7143632	2
Xanthorrhoea johnsonii	Grass tree	700863	7145702	9
Xanthorrhoea johnsonii	Grass tree	700831	7145733	10
Xanthorrhoea johnsonii	Grass tree	700824	7145731	6
Xanthorrhoea johnsonii	Grass tree	700820	7145682	1
Xanthorrhoea johnsonii	Grass tree	700815	7145677	10

Table 6.2 ***X. johnsonii*** **(Grass tree) recorded within Quadrat 1 (E: 700845, N:7145677)**

Quadrat One (Q1)	
Size (S1)	220 m^2
Plants recorded	106
Plants per m^2 (P1)	0.48

Table 6.3 ***X. johnsonii*** **(Grass tree) recorded within Quadrat 2 (E: 700837, N: 7145651)**

Quadrat Two (Q2)	
Size (S2)	175 m^2
Plants recorded	61
Plants per m^2 (P2)	0.35

Table 6.4 **Summary of *X. johnsonii* (Grass tree) recorded within survey quadrats**

Patch in the southern portion of Area F	
Size (S3)	20 092 m^2
Total area assessed (S1 + S2)	375 m^2
Total plants recorded in Q1 and Q2	167
Average plants per m^2 (P3)	0.415
Plants in southern portion of Area F (P3xS3)	Approximately 8 338 plants

No flora species of conservation significance as listed under the provisions of the NC Act and/or the EPBC Act were recorded within Area F.

6.3 Habitat Value

Eleven (11) bird species were observed during the field investigations. Traces of an additional two (2) mammals were also recorded and are listed in Table 6.5.

Table 6.5 **Fauna species observed within Area F**

Scientific name	Common name	Comments
Birds		
Corvus coronoides	Australia raven	
Cracticus nigrogularis	Pied butcherbird	
Dacelo novaeguineae	Laughing kookaburra	
Manorina melanocephala	Noisy miner	
Pardalotus striatus	Striated pardalote	
Philemon corniculatus	Noisy friarbird	
Rhipidura albiscapa	Grey fantail	
Smicrornis brevirostris	Weebill	
Strepera graculina	Pied currawong	
Struthidea cinerea	Apostle bird	
Taeniopygia bichenovii	Double-barred finch	
Mammals		
Macropus sp.		Observed scats only
Oryctolagus cuniculus	European rabbit	Observed scats only

Habitat opportunities within Area F included:

- Canopy cover suitable for shelter, foraging and perching
- Fissured tree bark
- Limited amounts of dense groundcover vegetation (ie grassy tussocks)
- Woody debris (ie fallen/felled timber, hollow-bearing logs)
- Leaf litter

The relatively intact canopy stratum could provide suitable habitat (eg feeding sites, nesting sites) for bird species. Hollow-bearing stags within the canopy stratum could provide suitable habitat for birds and arboreal mammals. The fissured tree bark, woody debris and limited amounts of dense groundcover in the ground stratum could provide suitable habitat (eg foraging, nesting and shelter sites) for small mammals and reptiles.

The overall habitat value of Area F is considered moderate as a result of the evidence outlined above.

7 Area G

7.1 General

Area G area is comprised of one (1) investigation area, located on Lot 55 FTY1153 (refer Figure 7.1). Area G1 is currently mapped as non-remnant vegetation on the DEHP certified RE mapping.

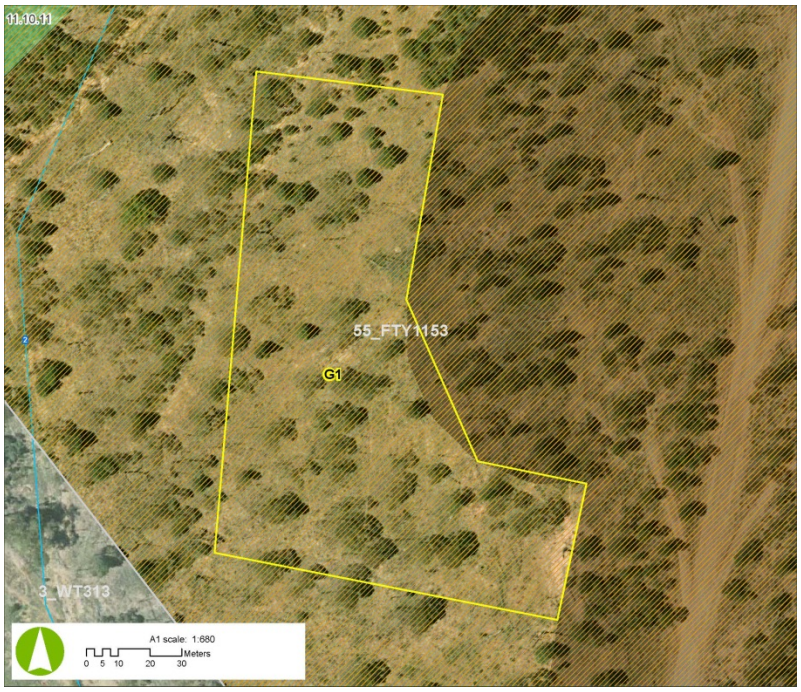


Figure 7.1 **Aerial photograph of Area G1**

The proposed development area is located within a 'Category C' ESA which is associated with a Forestry Lease area of the Hallet State Forest.

There are no DEHP mapped 'watercourses' within the proposed development area. One (1) mapped 'watercourse' is, however, located in close proximity:

- A 'stream order 2' 'watercourse' flowing south to north is located approximately 50 m west

The landform of Area G is flat and the soil structure is comprised of brown medium brown sandy soils.

7.2 Floristics

The canopy stratum within Area G was dominated *E. populnea* (Poplar box) with associated *C. glaucophylla* (White cypress pine). The canopy stratum had a vegetation cover of approximately 15% and a height range of 9 to 12 m (refer Photo 7.1).

Photo 7.1 **Depiction of typical vegetation within Area G**

The sub-canopy stratum was co-dominated by *E. populnea* (Poplar box) and *C. glaucophylla* (White cypress pine) and had a vegetation cover of approximately 10%. Other species typical of the region were also observed within the sub-canopy including *E. mitchellii* (Wilga), *A. luehmannii* (Bull oak), *E. melanophloia* (Silver leaved ironbark) and stags. The sub-canopy had a height range of 5 to 7 m.

There was a relatively sparse shrub stratum (5% vegetation cover) within Area G which was dominated by juvenile *C. glaucophylla* (White cypress pine). Juvenile *E. populnea* (Poplar box), juvenile *A. luehmannii* (Bull oak), juvenile *E. melanophloia* (Silver leaved ironbark) and stags were also recorded within the shrub stratum. The shrub stratum had a height range of 1 to 3 m.

There was a relatively dense ground stratum (98% vegetation cover) within Area G which was dominated by *P. ciliare* (Buffel grass). Other exotic species observed included *P. ciliare* (Buffel grass), *V. tenuisecta* (Mayne's curse), *B. pilosa* (Cobblers pegs) and *O. tomentosa* (Velvety tree pear) which resulted in a relatively high weed cover percentage of 40%. Native grasses including *C. pectinata* (Comb chloris), *H. contortus* (Black spear grass), *Themeda triandra* (Kangaroo grass) and *E. refractus* (Barbwire grass) were also recorded within the proposed development area at lower densities.

A full list of species recorded within the entire proposed development areas is outlined in Attachment 1.

No Type A restricted plant species listed under the provisions of the NC Act were recorded within Area G.

No flora species of conservation significance as listed under the provisions of the NC Act and/or the EPBC Act were recorded within Area G.

7.3 Habitat Value

Three (3) incidental fauna species were recorded during field investigations (refer Table 7.1). The species were all birds which are commonly found in the area.

Table 7.1 Fauna species observed within Area G

Scientific name	Common name
Birds	
Pardalotus striatus	Striated pardalote
Philemon corniculatus	Noisy friarbird
Smicrornis brevirostris	Weebill

Habitat opportunities within Area G included:

- Dense groundcover vegetation (ie grassy tussocks)
- Woody debris (ie stags and hollow-bearing logs)
- Leaf litter

Stags occurring in the sub-canopy and hollow-bearing logs could potentially provide habitat opportunities (eg nesting and shelter sites) for small mammals, birds and reptiles. There were potential habitat opportunities (eg shelter, foraging and nesting sites) available for utilisation by fauna within the dense groundcover and leaf litter in the ground stratum of Area G.

No fauna species of conservation significance as listed under the provisions of the NC Act and/or the EPBC Act were recorded within Area G.

The overall habitat value of Area G is considered low to moderate as a result of the evidence outlined above.

8 Area H

8.1 General

Area H is comprised of one (1) investigation area in the north-east of Lot 55 FTY1153 (refer Figure 8.1). The proposed development area is currently mapped as 'No concern at present' RE 11.10.9.

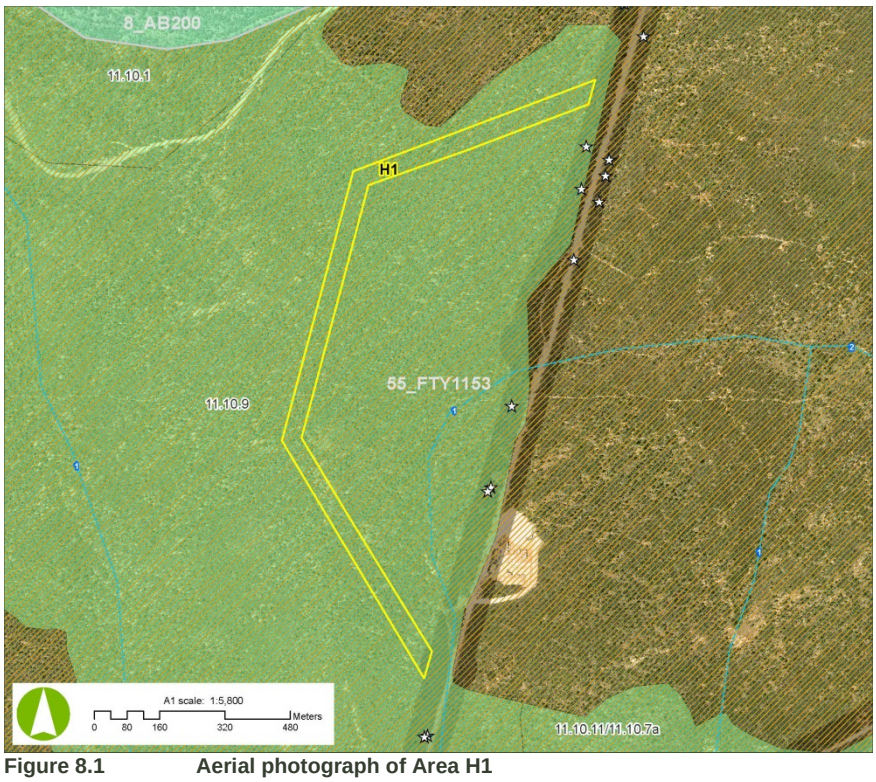


Figure 8.1 **Aerial photograph of Area H1**

The proposed development area is located within a 'Category C' ESA which is associated with a Forestry Lease area of the Hallet State Forest.

There are no mapped 'watercourses' located within the proposed development area. One (1) mapped 'watercourse' is, however, located in close proximity to Area H:

- A 'stream order 1' 'watercourse' flowing south to north is located approximately 50 m east of the southern portion of Area H

The landform of the proposed development area is flat to gently undulating and the soil structure was comprised of sandy soils.

8.2 Floristics

The canopy stratum within Area H was mostly dominated by *C. glaucophylla* (White cypress pine) and had a vegetation cover of approximately 15% (refer Photo 8.1). There were some small patches in the northern portion of Area H that were dominated by *E. melanophloia* (Silver leaved ironbark). The canopy stratum also contained *C. citriodora* (Spotted gum), stags, *C. tessellaris* (Moreton bay ash), *Corymbia erythrophloia* (Gum-topped bloodwood) and *Eucalyptus exserta* (Queensland peppermint). The height range of the canopy stratum was 10 to 16 m.

Photo 8.1 **Depiction of typical vegetation within Area H**

The sub-canopy stratum within Area H was dominated by *Acacia longispicata* (Slender-flowered wattle) and had a vegetation cover of approximately 35%. The sub-canopy also contained *A. excelsa* (Red ash), *E. populnea* (Poplar box), *A. luehmannii* (Bull oak), *A. leiocalyx* (Black wattle), *C. erythrophloia* (Gum-topped bloodwood) and *P. pubescens* (Quinine). The sub-canopy stratum had a height range of 6 to 8 m.

The shrub stratum within Area H was dominated by juvenile *C. glaucophylla* (White cypress pine) and had a vegetation cover of approximately 20%. The shrub stratum also contained juveniles of species recorded in the canopy/sub-canopy strata in addition to other species typically observed in the region (eg *Psydrax oleifolia* (Hat Stand), *Hakea lorea* (Bootlace oak) and *G. parviflora* (Wilga)). The shrub stratum had a height range of 1 to 5 m.

The ground stratum was dominated by *A. caput-medusae* (Many-headed wiregrass) and had an approximate vegetation cover of 60%. Vegetation cover in the ground stratum was patchy in certain areas where sandy bare earth and/or minor rocky outcrops were exposed. The exotic weed cover within the proposed development area was relatively low (less than 5%) which included *P. ciliare* (Buffel grass), *O. tomentosa* (Velvety tree pear) and *V. tenuisecta* (Mayne's curse). Weed cover was denser in the northern and southern portions of Area H which are in close proximity to a vehicle

access road. A full list of species recorded within the entire proposed development areas is outlined in Attachment 1.

One (1) Type A restricted plant species (ie *Brachychiton populneus* (Kurrajong)) was recorded within the proposed development area. These individuals and their location are listed in Table 8.1 (refer Table 8.1).

Table 8.1 Locations of Type A restricted plant species within Area H

Scientific Name	Common Name	Easting (GDA 94, Zone 55) (Grid: UTM)	Northing (GDA 94, Zone 55) (Grid: UTM)
Brachychiton populneus	Kurrajong	705870	7146542
Brachychiton populneus	Kurrajong	705643	7146985
Brachychiton populneus	Kurrajong	705542	7147118

No flora species of conservation significance as listed under the provisions of the NC Act and/or the EPBC Act were recorded within Area H.

8.3 Habitat Value

One (1) reptile and ten (10) bird species were observed during the field investigations. Traces of an additional two (2) fauna species were also recorded and are listed in Table 8.2.

Table 8.2 Fauna species observed within Area H

Scientific name	Common name	Comments
Birds		
Alectura lathami	Australian brush-turkey	Observed nest only
Cacatua galerita	Sulphur-crested cockatoo	
Corvus coronoides	Australian raven	
Geopelia humeralis	Bar-shouldered dove	
Lichenostomus keartlandi	Grey-headed honeyeater	
Manorina melanocephala	Noisy miner	
Melithreptus albogularis	White-throated honeyeater	
Pardalotus striatus	Striated pardalote	
Rhipidura albiscapa	Grey fantail	
Smicrornis brevirostris	Weebill	
Strepera graculina	Pied currawong	
Mammals		
Macropus sp.		Scats observed only
Isoodon macrourus	Northern brown bandicoot	Observed diggings only
Reptiles		
Carlia sp.		

Habitat opportunities within Area H included:

- Canopy cover suitable for shelter, foraging and perching
- Fissured tree bark
- Patchy dense groundcover vegetation (ie grassy tussocks)
- Woody debris (ie stags with hollow-bearing logs)
- Leaf litter
- Some rocky outcrops
- Termite mounds

The canopy cover and stags could provide suitable habitat (eg shelter, foraging, perching and nesting sites) for bird species. Hollow-bearing logs within the ground stratum could provide suitable habitat for small mammals. The fissured tree bark, leaf litter and limited amounts of dense groundcover could provide suitable habitat (eg foraging, nesting and shelter sites) for small mammals and reptiles in the ground stratum.

No fauna species of conservation significance as listed under the provisions of the NC Act and/or the EPBC Act were recorded within Area H.

The overall habitat value of Area H is considered moderate as a result of the evidence outlined above.

9 Area I

9.1 General

Area I is comprised of one (1) investigation area that is located on Lot 55 FTY1153 (refer Figure 9.1). Area I is currently mapped as 'No concern at present' RE 11.10.11 on the DEHP certified RE mapping.

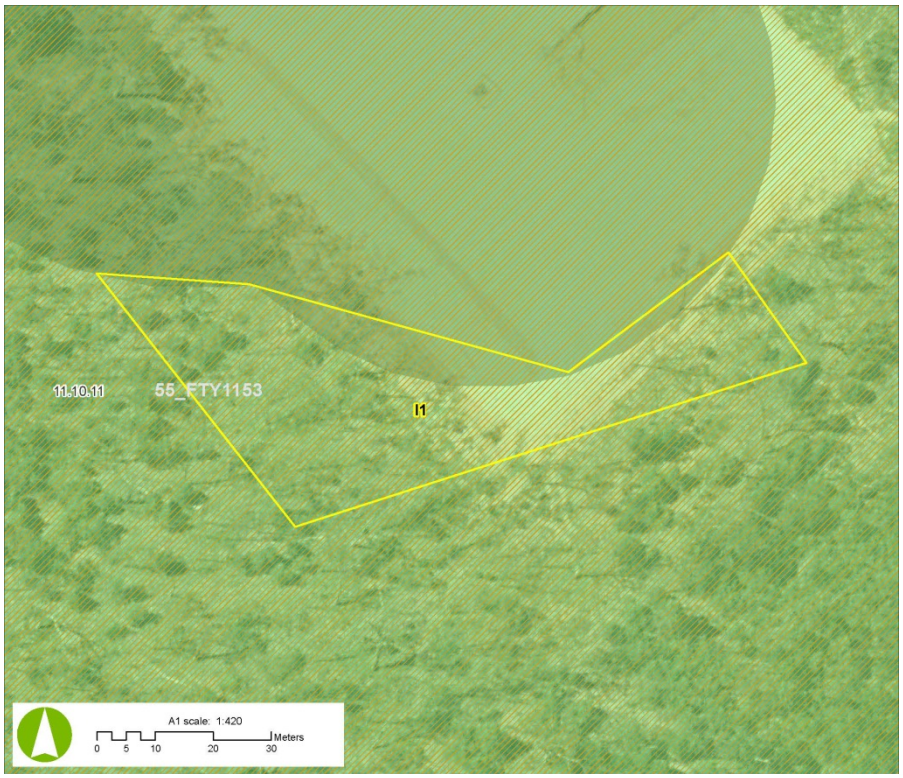


Figure 9.1 Aerial photograph of Area I1

The proposed development area is located within a 'Category C' ESA which is associated with a Forestry Lease area of the Hallet State Forest.

There are no DEHP mapped 'watercourses' within or in close proximity to the proposed development area.

The landform of Area I is flat and the soil structure is comprised of brown medium brown sandy-loam soils.

9.2 Florisitcs

The canopy stratum within Area I was dominated *E. populnea* (Poplar box) and had a vegetation cover of approximately 20% (refer Photo 9.1). The canopy stratum had a height range of 10 to 13 m.

Photo 9.1 **Depiction of typical vegetation within Area I**

The sub-canopy stratum consisted of *C. glaucophylla* (White cypress pine), *E. mitchellii* (Wilga), *A. luehmannii* (Bull oak) and had a vegetation cover of approximately 15%. The sub-canopy had a height range of 5 to 7 m.

The shrub stratum within Area I was dominated by *A. leiocalyx* (Black wattle) with associated juvenile *E. populnea* (Poplar box) and juvenile *A. luehmannii* (Bull oak). The shrub stratum had a height range of 1 to 3 m and vegetation cover of 15%.

There was a relatively dense ground stratum (95% vegetation cover) within Area I which was dominated by *T. triandra* (Kangaroo grass). Other native grasses including *C. pectinata* (Comb chloris), *A. caput-medusae* (Many-headed wiregrass) and *E. brownii* (Brown's love grass) were also recorded within the proposed development area at lower proportions. The weed cover within the ground stratum was approximately 15% which included *P. ciliare* (Buffel grass), in addition to the

exotic forbs; *V. tenuisecta* (Mayne's curse), *B. pilosa* (Cobblers pegs) and *Sida rhombifolia* (Paddy's lucerne). A full list of species recorded within the entire proposed development areas is outlined in Attachment 1.

No Type A restricted plant species listed under the provisions of the NC Act were recorded within Area I.

No flora species of conservation significance as listed under the provisions of the NC Act and/or the EPBC Act were recorded within Area I.

9.3 Habitat Value

Two (2) incidental fauna species were recorded during field investigations (refer Table 9.1). The species were birds which are commonly found in the area.

Table 9.1 Fauna species observed within Area I

Scientific Name	Common Name
Birds	
Manorina melanocephala	Noisy Miner
Pardalotus striatus	Striated Pardalote

Habitat opportunities within Area I included:

- Dense groundcover vegetation (ie grassy tussocks)
- Woody debris (ie timber with hollow-bearing logs)
- Leaf litter
- Moderate canopy cover suitable for shelter, foraging and perching
- Limited amounts of fissured tree bark

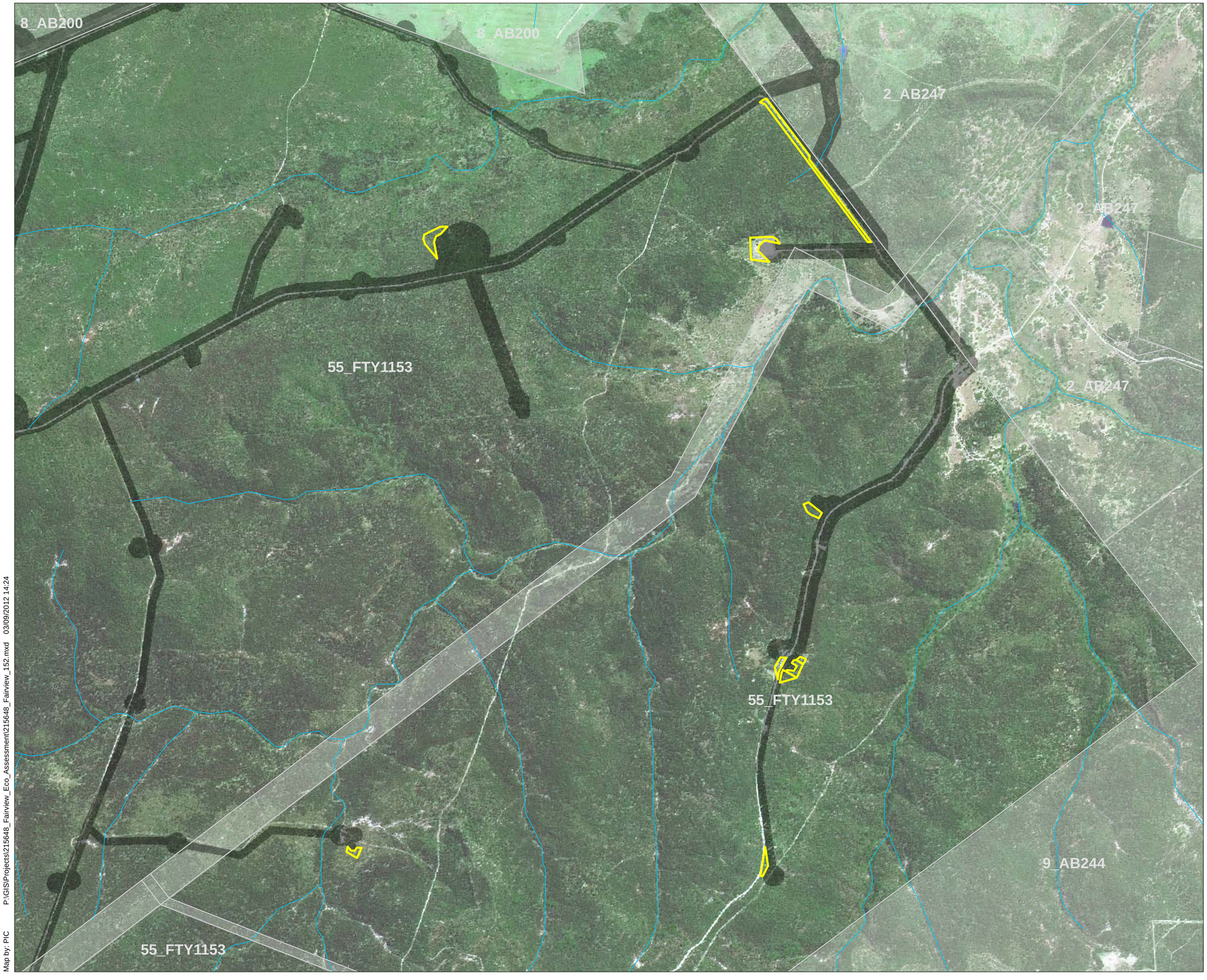
Dead stags in the ground stratum could potentially provide habitat opportunities (eg nesting and shelter sites) for small mammals and reptiles. Potential habitat opportunities (eg shelter, foraging and nesting sites) are available for utilisation by fauna within the dense groundcover and leaf litter in the ground stratum of Area I. There were also some opportunities for birds provided by the moderate amount of canopy cover.

No fauna species of conservation significance as listed under the provisions of the NC Act and/or the EPBC Act were recorded within Area I.

The overall habitat value of Area I is considered low to moderate as a result of the evidence outlined above.

10 Areas not ground-truthed due to control burning

Seven areas within the eastern portion of Lot 55 FTY1153 were not able to be ground-truthed due to control burning activities being undertaken at the time of the survey (refer Figure 10.1).



aurecon

Legend

- Areas Not Ground-Truthed Due to Control Burning
- Corridors - Ground Truth
- Watercourse
- Cadastre

Source:
Cadastre: DERM, 2011.

Date: 03/09/2012 Version: 1

Map by: PIC
P:\GIS\Projects\215648_Fairview_Eco_Assessment\215648_Fairview_152.mxd 03/09/2012 14:24

A1 scale: 1:12,500

0 250 500 1,000 Meters

Job No: 225678

Coordinate system: GDA_1994_MGA_Zone_55

Santos Upstream Ecological Assessment

Figure 10.1: Areas Not Ground-Truthed Due to Control Burning on Lot 55FTY1153

11 Conclusion

The proposed development areas on Lot 55 FTY1153 and road easements occur across a variety of landscape and vegetation types, including both 'remnant' and 'non-remnant' vegetation. There is a high proportion of 'remnant' vegetation within Lot 55 FTY1153, due to it being a Forestry Lease area of the Hallett State Forest. As a result, most of the proposed development areas were mapped as 'Category C' ESA. In addition, a small area within Area E2 is mapped as a Brigalow Threatened Ecological Community (TEC), which was considered to be correct upon previous investigations in the field.

Some Regional Ecosystem (RE) mapping was identified within areas mapped as 'remnant' 'Of concern' RE 11.3.2/11.3.25. In this case the land zone and vegetation composition is considered to be incorrect, and was more closely matched to the surrounding mapped 'No concern at present' RE 11.10.9 and 11.10.11. The areas identified did not, however, meet the minimum size criteria for inclusion in an RE amendment report.

Multiple 'watercourses' occur within, or in close proximity to, the proposed development areas. The 'watercourses' within the proposed development area have 'stream orders' ranging from 1 to 3.

Multiple 'Type A restricted plant' species were observed within the proposed development areas. These species included *Brachychiton populneus* (Kurrajong), *Xanthorrhoea johnsonii* (Grass tree) and *Cymbidium canaliculatum* (Black orchid).

The overall habitat values of the proposed development areas within Lot 55 FTY1153 were considered to be low to moderate.

No flora or fauna species of conservation significance (ie 'endangered', 'vulnerable' and 'near threatened' species under the provisions of the Queensland *Nature Conservation Act 1992* or 'critically endangered', 'endangered' and 'vulnerable' species as listed under the provisions of the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999*) were recorded within the proposed development areas.

12 References

Eyre, T.J., Kelly, A.L, Neldner, V.J., Wilson, B.A., Ferguson, D.J., Laidlaw, M.J. and Franks, A.J. (2011). *BioCondition: A Condition Assessment Framework for Terrestrial Biodiversity in Queensland*.

Department of Environment and Heritage Protection (DEHP) (2012) *Vegetation Management Act Regional Ecosystem and Remnant Map* (Version 6.1). Accessed August 2012.

Neldner, V.J., Wilson, B. A., Thompson, E.J. and Dillewaard, H.A. (2005) *Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland* (Version 3.1), Queensland Herbarium, Department of Environment and Heritage Protection (DEHP), Brisbane.

Attachment 1: Botanical species recorded at Areas A to I

Family	Scientific name	Common name	Notes
Adiantaceae	*Cheilanthes distans*	Bristly cloak fern	
Adiantaceae	*Cheilanthes sieberi*	Mulga fern	
Apiaceae	*Hydrocotyle laxiflora*	Stinking pennywort	
Apocynaceae	*Alstonia constricta*	Bitter bark	
Apocynaceae	*Carissa ovata*	Currant bush	
Apocynaceae	*Gomphocarpus physocarpus*	Balloon cotton bush	Non-native
Apocynaceae	*Marsdenia australis*	Marsdenia	
Apocynaceae	*Parsonsia straminea*	Common silkpod	
Asteraceae	*Bidens bipinnata*	Native cobblers pegs	
Asteraceae	*Bidens pilosa*	Cobblers pegs	Non-native
Asteraceae	*Calotis cuneifolia*	Purple burr daisy	
Asteraceae	*Calotis lappulacea*	Yellow burr daisy	
Asteraceae	*Calotis scabiosifolia*	Rough daisy burr	
Asteraceae	*Cassinia laevis*	Cough bush	
Asteraceae	*Chrysocephalum apiculatum*	Yellow buttons	
Asteraceae	*Cirsium vulgare*	Black spear thistle	Non-native
Asteraceae	*Conyza bonariensis*	Fleabane	Non-native
Asteraceae	*Podolepis jaceoides*	Showy copper-wire daisy	
Asteraceae	*Pterocaulon sphacelatum*	Apple bush	
Asteraceae	*Senecio lautus*	Fireweed	
Asteraceae	*Tridax procumbens*	Tridax daisy	Non-native
Asteraceae	*Xanthium occidentale*	Noogoora burr	Non-native
Asteraceae	*Xerochrysum bracteatum*	Everlasting daisy	
Bignoniaceae	*Pandorea pandorana*	Wonga vine	
Cactaceae	*Opuntia stricta*	Prickly pear	LP Act Class 2 Weed
Cactaceae	*Opuntia tomentosa*	Velvety tree pear	LP Act Class 2 Weed
Campanulaceae	*Wahlenbergia gracilis*	Sprawling bluebell	
Capparaceae	*Capparis lasiantha*	Native orange	
Capparaceae	*Capparis spinosa*	Caper bush	
Casuarinaceae	*Allocasuarina luehmannii*	Bull oak	
Chenopodiaceae	*Chenopodium desertorum*	Desert goosefoot	
Chenopodiaceae	*Einadia nutans*	Climbing saltbush	
Chenopodiaceae	*Maireana microphylla*	Small-leaf bluebush	
Chenopodiaceae	*Sclerolaena birchii*	Galvanised burr	
Convolvulaceae	*Ipomoea lonchophylla*	Cow vine	
Cupressaceae	*Callitris glaucophylla*	White cypress pine	

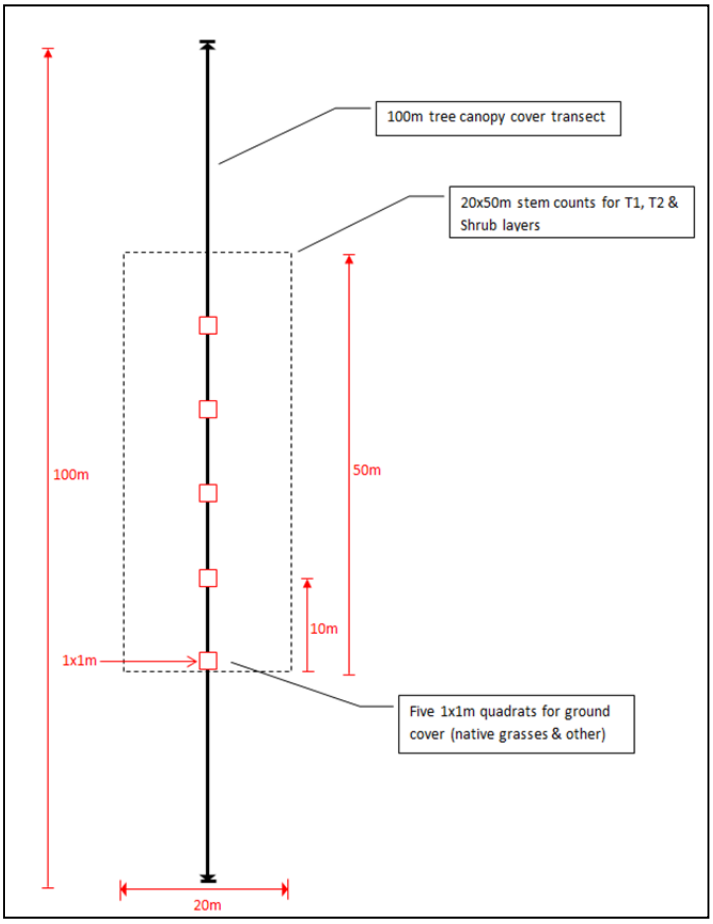
Family	Scientific name	Common name	Notes
Cyperaceae	*Cyperus difformis*	Dirty dora	
Euphorbiaceae	*Petalostigma pubescens*	Quinine	
Fabaceae	*Crotalaria* sp.		
Fabaceae	*Desmodium varians*	Tree foil	
Fabaceae	*Glycine tabacina*	Glycine pea	
Fabaceae	*Glycine tomentella*	Woolly glycine	
Fabaceae	*Indigofera hirsuta*	Hairy indigo	
Fabaceae	*Senna artemisioides*	Senna	
Fabaceae	*Senna coronilloides*	Coffee senna	
Fabaceae	*Tephrosia supina*	Tephrosia	
Goodeniaceae	*Goodenia glabra*	Smooth goodenia	
Hemerocallidaceae	*Dianella caerulea*	blue flax-lily	
Juncaceae	*Juncus usitatus*	Juncus	
Lamiaceae	*Plectranthus parviflorus*	Native coelus	
Laxmanniaceae	*Lomandra leucocephala*	Lomandra	
Laxmanniaceae	*Lomandra hystrix*	Creek mat rush	
Laxmanniaceae	*Lomandra longifolia*	Lomandra	
Malvaceae	*Malvastrum americanum*	Spiny malvastrum	Non-native
Malvaceae	*Sida cordifolia*	Flannel weed	Non-native
Malvaceae	*Sida corrugata*	Corrugated sida	
Malvaceae	*Sida rohlenae*	Shrub sida	
Malvaceae	*Sida subspicata*	Queensland hemp	
Meliaceae	*Owenia acidula*	Emu apple	
Mimosaceae	*Acacia catenulata*	Bendee	
Mimosaceae	*Acacia conferta*	Pine wattle	
Mimosaceae	*Acacia decora*	Pretty wattle	
Mimosaceae	*Acacia excelsa*	Iron wood	
Mimosaceae	*Acacia leiocalyx*	Black wattle	
Mimosaceae	*Acacia leptostachya*	Slender wattle	
Mimosaceae	*Acacia longispicata*	Slender-flowered wattle	
Mimosaceae	*Acacia macradenia*	Zigzag wattle	
Mimosaceae	*Acacia oswaldii*	Miljee	
Mimosaceae	*Acacia salicina*	Sally wattle	
Moraceae	*Ficus rubiginosa*	Moreton bay fig	
Myoporaceae	*Eremophila longifolia*	Dogwood	
Myoporaceae	*Eremophila mitchellii*	False sandalwood	
Myrtaceae	*Angophora floribunda*	Rough-barked apple	

Family	Scientific name	Common name	Notes
Myrtaceae	*Angophora leiocarpa*	Smooth-barked apple	
Myrtaceae	*Corymbia citriodora*	Lemon scented gum	
Myrtaceae	*Corymbia erythrophloia*	Gum-topped bloodwood	
Myrtaceae	*Corymbia tessellaris*	Moreton bay ash	
Myrtaceae	*Corymbia trachyphloia*	Small fruited bloodwood	
Myrtaceae	*Eucalyptus chloroclada*	Dirty gum	
Myrtaceae	*Eucalyptus exserta*	Queensland peppermint	
Myrtaceae	*Eucalyptus melanophloia*	Silver leaved ironbark	
Myrtaceae	*Eucalyptus populnea*	Poplar box	
Myrtaceae	*Eucalyptus tereticornis*	Queensland blue gum	
Oleaceae	*Jasminum simplicifolium*	Native jasmine	
Oleaceae	*Notelaea microcarpa*	Native olive	
Orchidaceae	*Cymbidium canaliculatum*	Black orchid	NC Act Type A Species
Phyllanthaceae	*Breynia oblongifolia*	Breynia	
Poaceae	*Aristida calycina*	Dark wiregrass	
Poaceae	*Aristida caput-medusae*	Many-headed wiregrass	
Poaceae	*Aristida holathera*	Tall wire grass	
Poaceae	*Aristida jerichoensis*	Jericho wire grass	
Poaceae	*Aristida ramosa*	Purple wire grass	
Poaceae	*Austrostipa ramosissima*	Stout bamboo grass	
Poaceae	*Chloris divaricata*	Windmill chloris	
Poaceae	*Chloris pectinata*	Comb chloris	
Poaceae	*Chloris virgata*	Feathertop rhodes grass	Non-native
Poaceae	*Cymbopogon obtectus*	Fluffy tops	
Poaceae	*Cymbopogon refractus*	Barbwire grass	
Poaceae	*Enneapogon avenaceus*	Common bottle washer	
Poaceae	*Enneapogon polyphyllus*	Limestone bottle washer	
Poaceae	*Eragrostis brownii*	Brown's love grass	
Poaceae	*Eragrostis cilianensis*		Non-native
Poaceae	*Eragrostis fallax*	Tall love grass	
Poaceae	*Eragrostis lacunaria*	Tall love grass	
Poaceae	*Eragrostis sororia*	Blue love grass	
Poaceae	*Heteropogon contortus*	Black spear grass	
Poaceae	*Iseilema vaginiflorum*	Red flinders	
Poaceae	*Melinis repens*	Red natal	Non-native
Poaceae	*Panicum effusum*	Inquisitive grass	
Poaceae	*Panicum maximum*	Green panic	Non-native

Family	Scientific name	Common name	Notes
Poaceae	*Pennisetum ciliare*	Buffel grass	Non-native
Poaceae	*Perotis rara*	Comet grass	
Poaceae	*Phragmites australis*	Common reed	
Poaceae	*Sorghum halepense*	Johnson grass	Non-native
Poaceae	*Sporobolus creber*	Western rats tail grass	
Poaceae	*Themeda avenacea*	Wild oats grass	
Poaceae	*Themeda triandra*	Kangaroo grass	
Portulacaceae	*Portulaca pilosa*	Hairy pigweed	Non-native
Proteaceae	*Grevillea striata*	Beefwood	
Proteaceae	*Hakea lorea*	Bootlace oak	
Rhamnaceae	*Alphitonia excelsa*	Red ash	
Rhamnaceae	*Ventilago viminalis*	Vine tree	
Rubiaceae	*Psydrax oleifolia*	Hat stand	
Rutaceae	*Citrus glauca*	Lime bush	
Rutaceae	*Geijera parviflora*	Wilga	
Sapindaceae	*Alectryon diversifolius*	Scrub boonaree	
Sapindaceae	*Atalaya hemiglauca*	Whitewood	
Sapindaceae	*Dodonaea boroniifolia*	Pinnate dodonaea	
Sapindaceae	*Dodonaea viscosa*	Sticky hopbush	
Solanaceae	*Solanum esuriale*	Brown potato bush	
Solanaceae	*Solanum nigrum*	Black nightshade	Non-native
Solanaceae	*Solanum parvifolium*		
Solanaceae	*Solanum seaforthianum*	Climbing nightshade	Non-native
Sterculiaceae	*Brachychiton populneus*	Kurrajong	NC Act Type A Species
Tiliaceae	*Grewia latifolia*	Dysentery plant	
Verbenaceae	*Verbena litoralis*	Tall verbena	Non-native
Verbenaceae	*Verbena tenuisecta*	Mayne's curse	Non-native
Verbenaceae	*Verbesina encelioides*	Crown beard	
Xanthorrhoeaceae	*Xanthorrhoea johnsonii*	Grasstree	NC Act Type A Species

Attachment 2: Detailed vegetation survey data collected for Area D

This attachment provides the ground cover, canopy cover and stem count data collected during the field investigation for Area D. The diagram below shows the transect arrangement in the field, and the areas within which the data was collected.



Ground cover data

The following values indicate the percentage of each ground cover category for five 1x1 m quadrats. The average ground cover for each category is also provided in the 'Averages' column.

Groundcover	Q 1 (%)	Q 2 (%)	Q 3 (%)	Q 4 (%)	Q 5 (%)	Averages (%)
Native grasses	20	5	10	2	25	12.4
Native forbs & herbs	2	1	5	10	1	3.8
Non-native grasses	15	15	15	65	10	24
Non-native forbs & herbs	0	0	0	0	0	0
Shrubs	0	0	0	0	0	0
Bare ground	15	55	10	0	10	18
Rock	0	0	0	0	0	0
Leaf litter	45	20	55	8	52	36
Woody debris	3	2	5	15	2	5.4

Stem count data

The following table is the stem count data collected during the field investigation for the Canopy (T1), Sub-canopy (T2) and Shrub layer (S1). The heights for each of the stratum are also defined below.

Transect	Stem counts per stratum per 50 x 2 m plots		
	T1 (10 - 14 m)	T2 (6 - 7 m)	S1 (1 – 3.5 m)
0-10 m	3	10	0
10-20 m	0	7	0
20-30 m	0	11	0
30-40 m	3	9	2
40-50 m	0	13	0
Totals	6	50	2

Stems per hectare calculations

- **T1** (10 - 14 m) – 600 stems per hectare
- **T2** (6 - 7 m) – 5 000 stems per hectare
- **S1** (1 – 3.5 m) – 200 stems per hectare

Foliage projective cover data

The total Foliage Projective Cover (FPC) for the T1 and T2 canopies along a 100 m transect, expressed as a percentage is:

- **T1** (10 - 14 m) – **42.72% FPC**
- **T2** (6 - 7 m) – **53.25% FPC**

The canopy transect data collected during the field investigation is provided in the following table.

Stratum	Distance Start	End	Total (m)
0-100 m			
T2	0	4.31	4.31
T1	2.4	9.72	7.32
T2	6.09	17.73	11.64
T1	10.93	16.48	5.55
T1	17.82	22.27	4.45
T2	18.21	25.84	7.63
T2	26.43	29.9	3.47
T2	31.92	35.7	3.78
T1	35.7	39	3.3
T2	37.5	39.54	2.04
T2	41.08	47.29	6.21
T1	43.04	44.47	1.43
T1	47.97	49.46	1.49
T2	50.07	52.62	2.55
T1	51.98	54.72	2.74
T2	54.1	55.91	1.81
T1	57.69	59.42	1.73
T2	59.78	60.69	0.91
T1	62.15	66.46	4.31
T2	62.39	63.67	1.28
T2	68.61	70.3	1.69
T1	76	83	7
T2	87	91.1	4.1
T2	92.2	93.43	1.23
T1	96	99.4	3.4
T2	99.4	100	0.6

Attachment 3: Relocation Assessments for 'Type A Restricted Plants'

The Type A species relocation assessments were undertaken in parallel to the ecological assessment of the proposed development areas within Lot 55 FTY1153. These assessments were undertaken to determine the number of existing Type A restricted plants present within the development areas, and their suitability for relocation from an ecological perspective. Safety, site accessibility and equipment availability/capacity were not considered as part of this assessment. Prior to making a decision to relocate an individual 'Type A restricted plant', field representatives are required to undertake a risk assessment in accordance with the Santos Environment Health Safety Management System (EHSMS) to determine whether it is safe to proceed with the proposed relocation.

GIS environmental layers showing the location of previously identified Type A restricted plants and high resolution aerial photography were uploaded onto a Toughbook (C5 mobile clinical assistant CFT-001 – Motion computing), with an integrated GPS used to record individual specimens for assessment. Handheld Garmin GPS units (GPS map 78s) were also used during the field investigations. It should be noted that while efforts were made to ensure the GPS coordinates 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.

Each individual specimen was photographed and GPS coordinates recorded using a Garmin GPS unit and Toughbook. An assessment of the relocation potential of each specimen was undertaken based on likelihood of survival. Measurements were recorded for each relocatable specimen (ie height, canopy width, root ball depth, root ball width) and specific relocation management requirements were recorded for each individual specimen.

Type A restricted plants

The following sections outline the specific management requirements for each Type A restricted plant species identified within the proposed development areas. It is noted that all of the individuals located within the proposed development areas during these investigations were determined to be suitable for relocation.

Three (3) species were recorded within the proposed development areas during these assessments, including:

- *Brachychiton populneus*
- *Cymbidium canaliculatum*
- *Xanthorrhoea johnsonii*

The locations of the Type A restricted plants, relative to the proposed development areas, are provided in Figure 1.1 of the main report. Each Type A restricted plant has a unique identifier (eg ID3) which corresponds with the ID number in Table 1 below. Table 1 provides the measurements of each specimen and management measures relevant to the relocation of the specimen.

Due to the large amount of Type A restricted plants recorded, a photographic record of each individual plant was unable to be provided. However, some photographs have been provided in the following sections.

General management requirements

Prior to relocating an individual Type A restricted plant, a field representative is required to undertake a risk assessment in accordance with the Santos Environment Health Safety Management System (EHSMS) to determine whether it is safe to proceed with the proposed relocation.

The *GLNG Upstream Type A Restricted Plant Species Salvage Management Plan for the Coal Seam Gas Fields* (Santos, 2011) outlines selected methods of obtaining plants for translocation/relocation, general standards and management measures pertaining to the translocation and relocation and of Type A restricted plants. All relocation and translocation activities are to be undertaken in accordance with the Salvage Management Plan.

Aurecon Australia Pty Ltd
ABN 54 005 139 873
Level 14, 32 Turbot Street
Brisbane QLD 4000
Locked Bag 331
Brisbane QLD 4001
Australia

T +61 7 3173 8000
F +61 7 3173 8001
E brisbane@aurecongroup.com
W aurecongroup.com

Memorandum

Table 1 Relocation assessments for the 'Type A restricted plants' recorded within the proposed development areas on Lot 55 FTY1153

ID	Species	GPS ID/Coordinate		Is plant salvageable?	If not, provide reason	Management requirements	Measurements				Significant habitat value	Comments	Count
				(Yes/No)	**Disease, damaged, unlikely to survive due to poor health, other provide comments)*	*(Eg remove % foliage maintain orientation, reduce number of stems etc)*	*Tree height (m)*	*Tree width (m) (including foliage)*	*Root ball width (m)*	*Root ball depth (m)*	*(Nests, hollows etc*	*(eg other reasons for plant not being salvageable, seed/cutting availability etc)*	
1	*Cymbidium canaliculatum*	693441	7143646	Yes	N/A	Remove 1 metre above and 3 metres below orchid, maintain orientation	N/A	N/A	N/A	N/A	N/A	No major damage. Healthy	4
2	*Brachychiton populneus*	689621	7142863	Yes	N/A	Maintain orientation, reduce a minimum of 70% foliage	1.0	0.5	0.5	0.4	N/A	No major damage. Healthy individual	1
3	*Brachychiton populneus*	695678	7143259	Yes	N/A	Maintain orientation, reduce a minimum of 70% foliage	9.0	0.4	1.6	1.0	N/A	No major damage. Healthy individual	1
4	*Brachychiton populneus*	695735	7143967	Yes	N/A	Maintain orientation, reduce a minimum of 70% foliage	0.2	0.2	0.1	0.2	N/A	No major damage. Healthy individual	1
5	*Brachychiton populneus*	695643	7146126	Yes	N/A	Maintain orientation, reduce a minimum of 70% foliage	2.0	0.4	0.5	0.4	N/A	No major damage. Healthy individual	1
6	*Brachychiton populneus*	701070	7146443	Yes	N/A	Maintain orientation, reduce a minimum of 70% foliage	1.0	0.3	0.5	0.4	N/A	No major damage. Healthy individual	1
7	*Brachychiton populneus*	700954	7146093	Yes	N/A	Maintain orientation, reduce a minimum of 70% foliage	1.5	0.5	0.5	0.4	N/A	No major damage. Healthy individual	1
8	*Xanthorrhoea johnsonii*	700863	7145702	Yes	N/A	Remove all foliage	1.0	1.0	0.6	0.4	N/A	No major damage. Healthy	9
9	*Xanthorrhoea johnsonii*	700831	7145733	Yes	N/A	Remove all foliage	1.0	1.0	0.6	0.4	N/A	No major damage. Healthy	10
10	*Xanthorrhoea johnsonii*	700824	7145731	Yes	N/A	Remove all foliage	0.9	1.0	0.6	0.4	N/A	No major damage. Healthy	6
11	*Xanthorrhoea johnsonii*	700820	7145682	Yes	N/A	Remove all foliage	1.7	1.5	0.6	0.4	N/A	No major damage. Healthy individual	1
12	*Xanthorrhoea johnsonii*	700815	7145677	Yes	N/A	Remove all foliage	0.5	0.5	0.3	0.3	N/A	No major damage. Healthy	10
13	*Xanthorrhoea johnsonii*	700845	7145677	Yes	N/A	Remove all foliage	0.5	0.8	0.3	0.3	N/A	No major damage. Healthy	106
14	*Xanthorrhoea johnsonii*	700837	7145651	Yes	N/A	Remove all foliage	0.6	1.0	0.3	0.3	N/A	No major damage. Healthy	61
15	*Cymbidium canaliculatum*	699784	7144172	Yes	N/A	Remove 1 metre above and 3 metres below orchid, maintain orientation	N/A	N/A	N/A	N/A	N/A	No major damage. Healthy individual	1
16	*Cymbidium canaliculatum*	702508	7143596	Yes	N/A	Remove 1 metre above and 3 metres below orchid, maintain orientation	N/A	N/A	N/A	N/A	N/A	No major damage. Healthy individual	1
17	*Brachychiton populneus*	702762	7143445	Yes	N/A	Maintain orientation, reduce a minimum of 70% foliage	1.8	0.9	0.5	0.4	N/A	No major damage. Healthy individual	1
18	*Cymbidium canaliculatum*	702761	7143443	Yes	N/A	Remove 1 metre above and 3 metres below orchid, maintain orientation	N/A	N/A	N/A	N/A	N/A	No major damage. Healthy individual	1

Aurecon Australia Pty Ltd
ABN 54 005 139 873
Level 14, 32 Turbot Street
Brisbane QLD 4000
Locked Bag 331
Brisbane QLD 4001
Australia

T +61 7 3173 8000
F +61 7 3173 8001
E brisbane@aurecongroup.com
W aurecongroup.com

Memorandum

ID	Species	GPS ID/Coordinate		Is plant salvageable?	If not, provide reason	Management requirements	Measurements				Significant habitat value	Comments	Count
				(Yes/No)	**Disease, damaged, unlikely to survive due to poor health, other provide comments)*	*(Eg remove % foliage maintain orientation, reduce number of stems etc)*	*Tree height (m)*	*Tree width (m) (including foliage)*	*Root ball width (m)*	*Root ball depth (m)*	*(Nests, hollows etc*	*(eg other reasons for plant not being salvageable, seed/cutting availability etc)*	
19	*Brachychiton populneus*	702868	7143372	Yes	N/A	Maintain orientation, reduce a minimum of 70% foliage	0.8	0.4	0.5	0.4	N/A	No major damage. Healthy individual	1
20	*Brachychiton populneus*	702876	7143402	Yes	N/A	Maintain orientation, reduce a minimum of 70% foliage	13.0	4.0	1.5	1.0	N/A	No major damage. Healthy individual	1
21	*Brachychiton populneus*	702876	7143390	Yes	N/A	Maintain orientation, reduce a minimum of 70% foliage	0.6	0.2	0.5	0.4	N/A	No major damage. Healthy individual	1
22	*Brachychiton populneus*	702844	7143415	Yes	N/A	Maintain orientation, reduce a minimum of 70% foliage	0.6	0.2	0.5	0.4	N/A	No major damage. Healthy individual	1
23	*Cymbidium canaliculatum*	702788	7143497	Yes	N/A	Remove 1 metre above and 3 metres below orchid, maintain orientation	N/A	N/A	N/A	N/A	N/A	No major damage. Healthy individual	1
24	*Brachychiton populneus*	702724	7143550	Yes	N/A	Maintain orientation, reduce a minimum of 70% foliage	1.8	0.5	0.5	0.4	N/A	No major damage. Healthy individual	1
25	*Brachychiton populneus*	702704	7143540	Yes	N/A	Maintain orientation, reduce a minimum of 70% foliage	0.5	0.2	0.5	0.4	N/A	No major damage. Healthy individual	1
26	*Cymbidium canaliculatum*	702687	7143552	Yes	N/A	Remove 1 metre above and 3 metres below orchid, maintain orientation	N/A	N/A	N/A	N/A	N/A	No major damage. Healthy	5
27	*Brachychiton populneus*	702679	7143537	Yes	N/A	Maintain orientation, reduce a minimum of 70% foliage	0.5	0.1	0.5	0.4	N/A	No major damage. Healthy individual	1
28	*Brachychiton populneus*	702675	7143557	Yes	N/A	Maintain orientation, reduce a minimum of 70% foliage	0.5	0.2	0.5	0.4	N/A	No major damage. Healthy individual	1
29	*Brachychiton populneus*	702674	7143565	Yes	N/A	Maintain orientation, reduce a minimum of 70% foliage	0.7	0.3	0.5	0.4	N/A	No major damage. Healthy individual	1
30	*Brachychiton populneus*	702602	7143611	Yes	N/A	Maintain orientation, reduce a minimum of 70% foliage	0.6	0.4	0.5	0.4	N/A	No major damage. Healthy individual	1
31	*Brachychiton populneus*	702560	7143593	Yes	N/A	Maintain orientation, reduce a minimum of 70% foliage	0.9	0.5	0.5	0.4	N/A	No major damage. Healthy	2
32	*Brachychiton populneus*	702141	7143578	Yes	N/A	Maintain orientation, reduce a minimum of 70% foliage	1.5	0.9	0.5	0.4	N/A	No major damage. Healthy	2
33	*Brachychiton populneus*	702371	7143637	Yes	N/A	Maintain orientation, reduce a minimum of 70% foliage	1.3	0.4	0.5	0.4	N/A	No major damage. Healthy individual	1
34	*Cymbidium canaliculatum*	702375	7143632	Yes	N/A	Remove 1 metre above and 3 metres below orchid, maintain orientation	N/A	N/A	N/A	N/A	N/A	No major damage. Healthy	2
35	*Brachychiton populneus*	702340	7143627	Yes	N/A	Maintain orientation, reduce a minimum of 70% foliage	0.9	0.5	0.5	0.4	N/A	No major damage. Healthy individual	1

Aurecon Australia Pty Ltd
ABN 54 005 139 873
Level 14, 32 Turbot Street
Brisbane QLD 4000
Locked Bag 331
Brisbane QLD 4001
Australia

T +61 7 3173 8000
F +61 7 3173 8001
E brisbane@aurecongroup.com
W aurecongroup.com

Memorandum

ID	Species	GPS ID/Coordinate		Is plant salvageable?	If not, provide reason	Management requirements	Measurements				Significant habitat value	Comments	Count
				(Yes/No)	**Disease, damaged, unlikely to survive due to poor health, other provide comments)*	*(Eg remove % foliage maintain orientation, reduce number of stems etc)*	*Tree height (m)*	*Tree width (m) (including foliage)*	*Root ball width (m)*	*Root ball depth (m)*	*(Nests, hollows etc*	*(eg other reasons for plant not being salvageable, seed/cutting availability etc)*	
36	*Brachychiton populneus*	702200	7143624	Yes	N/A	Maintain orientation, reduce a minimum of 70% foliage	1.0	0.4	0.5	0.4	N/A	No major damage. Healthy individual	1
37	*Brachychiton populneus*	702089	7143498	Yes	N/A	Maintain orientation, reduce a minimum of 70% foliage	1.9	1.0	0.5	0.4	N/A	No major damage. Healthy individual	1
38	*Brachychiton populneus*	702061	7143428	Yes	N/A	Maintain orientation, reduce a minimum of 70% foliage	1.8	8.0	0.5	0.4	N/A	No major damage. Healthy individual	1
39	*Brachychiton populneus*	702066	7143405	Yes	N/A	Maintain orientation, reduce a minimum of 70% foliage	1.3	0.3	0.5	0.4	N/A	No major damage. Healthy individual	1
40	*Brachychiton populneus*	702060	7143287	Yes	N/A	Maintain orientation, reduce a minimum of 70% foliage	2.0	1.0	0.5	0.4	N/A	No major damage. Healthy	2
41	*Brachychiton populneus*	702031	7143268	Yes	N/A	Maintain orientation, reduce a minimum of 70% foliage	0.5	0.2	0.5	0.4	N/A	No major damage. Healthy individual	1
42	*Brachychiton populneus*	702022	7143264	Yes	N/A	Maintain orientation, reduce a minimum of 70% foliage	12.0	4.5	1.5	1.0	N/A	No major damage. Healthy individual	1
43	*Brachychiton populneus*	702480	7142756	Yes	N/A	Maintain orientation, reduce a minimum of 70% foliage	9.0	4.0	1.8	1.0	N/A	No major damage. Healthy individual	1
44	*Brachychiton populneus*	702493	7142733	Yes	N/A	Maintain orientation, reduce a minimum of 70% foliage	7.0	2.0	1.3	1.0	N/A	No major damage. Healthy	2
45	*Brachychiton populneus*	702017	7143216	Yes	N/A	Maintain orientation, reduce a minimum of 70% foliage	1.0	0.2	0.5	0.4	N/A	No major damage. Healthy	2
46	*Brachychiton populneus*	702066	7143515	Yes	N/A	Maintain orientation, reduce a minimum of 70% foliage	1.1	0.2	0.5	0.4	N/A	No major damage. Healthy individual	1
47	*Cymbidium canaliculatum*	689627	7142706	Yes	N/A	Remove 1 metre above and 3 metres below orchid, maintain orientation	N/A	N/A	N/A	N/A	N/A	No major damage. Healthy	1
48	*Brachychiton populneus*	695741	7143967	Yes	N/A	Maintain orientation, reduce a minimum of 70% foliage	0.2	0.2	0.1	0.25	N/A	No major damage. Healthy individual	1
49	*Brachychiton populneus*	702394	7143630	Yes	N/A	Maintain orientation, reduce a minimum of 70% foliage	1.1	0.3	0.5	0.4	N/A	No major damage. Healthy	2
50	*Cymbidium canaliculatum*	702436	7143631	Yes	N/A	Remove 1 metre above and 3 metres below orchid, maintain orientation	N/A	N/A	N/A	N/A	N/A	No major damage. Healthy individual	1
51	*Brachychiton populneus*	702451	7143617	Yes	N/A	Maintain orientation, reduce a minimum of 70% foliage	0.8	0.4	0.5	0.4	N/A	No major damage. Healthy individual	1
52	*Brachychiton populneus*	702462	7143621	Yes	N/A	Maintain orientation, reduce a minimum of 70% foliage	0.7	0.3	0.5	0.4	N/A	No major damage. Healthy individual	1
53	*Brachychiton*	702484	7143613	Yes	N/A	Maintain orientation, reduce a	1.7	1	0.5	0.4	N/A	No major damage. Healthy	1

Aurecon Australia Pty Ltd
ABN 54 005 139 873
Level 14, 32 Turbot Street
Brisbane QLD 4000
Locked Bag 331
Brisbane QLD 4001
Australia

T +61 7 3173 8000
F +61 7 3173 8001
E brisbane@aurecongroup.com
W aurecongroup.com

Memorandum

ID	Species	GPS ID/Coordinate		Is plant salvageable?	If not, provide reason	Management requirements	Measurements				Significant habitat value	Comments	Count
				(Yes/No)	**Disease, damaged, unlikely to survive due to poor health, other provide comments)*	*(Eg remove % foliage maintain orientation, reduce number of stems etc)*	*Tree height (m)*	*Tree width (m) (including foliage)*	*Root ball width (m)*	*Root ball depth (m)*	*(Nests, hollows etc*	*(eg other reasons for plant not being salvageable, seed/cutting availability etc)*	
	populneus					minimum of 70% foliage						individual	
54	*Brachychiton populneus*	705870	7146542	Yes	N/A	Maintain orientation, reduce a minimum of 70% foliage	1.3	0.8	0.5	0.4	N/A	No major damage. Healthy individual	1
55	*Brachychiton populneus*	705643	7146985	Yes	N/A	Maintain orientation, reduce a minimum of 70% foliage	2.3	1.5	0.5	0.4	N/A	No major damage. Healthy individual	1
56	*Brachychiton populneus*	705542	7147118	Yes	N/A	Maintain orientation, reduce a minimum of 70% foliage	1.8	1	0.5	0.4	N/A	No major damage. Healthy individual	1

Aurecon Australia Pty Ltd
ABN 54 005 139 873
Level 14, 32 Turbot Street
Brisbane QLD 4000
Locked Bag 331
Brisbane QLD 4001
Australia

T +61 7 3173 8000
F +61 7 3173 8001
E brisbane@aurecongroup.com
W aurecongroup.com

Memorandum


ID 1


ID 8


ID42


ID 45


ID 50


ID 55

Aurecon Australia Pty Ltd
ABN 54 005 139 873
Level 14, 32 Turbot Street
Brisbane QLD 4000
Locked Bag 331
Brisbane QLD 4001
Australia

T +61 7 3173 8000
F +61 7 3173 8001
E brisbane@aurecongroup.com
W aurecongroup.com

Memorandum