Compressor Site HCS-04 Ecological Assessment Fairview Gas Fields Santos

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aurecon

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This document is solely for the purposes of an ecological assessment and does not provide any legal advice regarding development locations and/or activities

Contents

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).

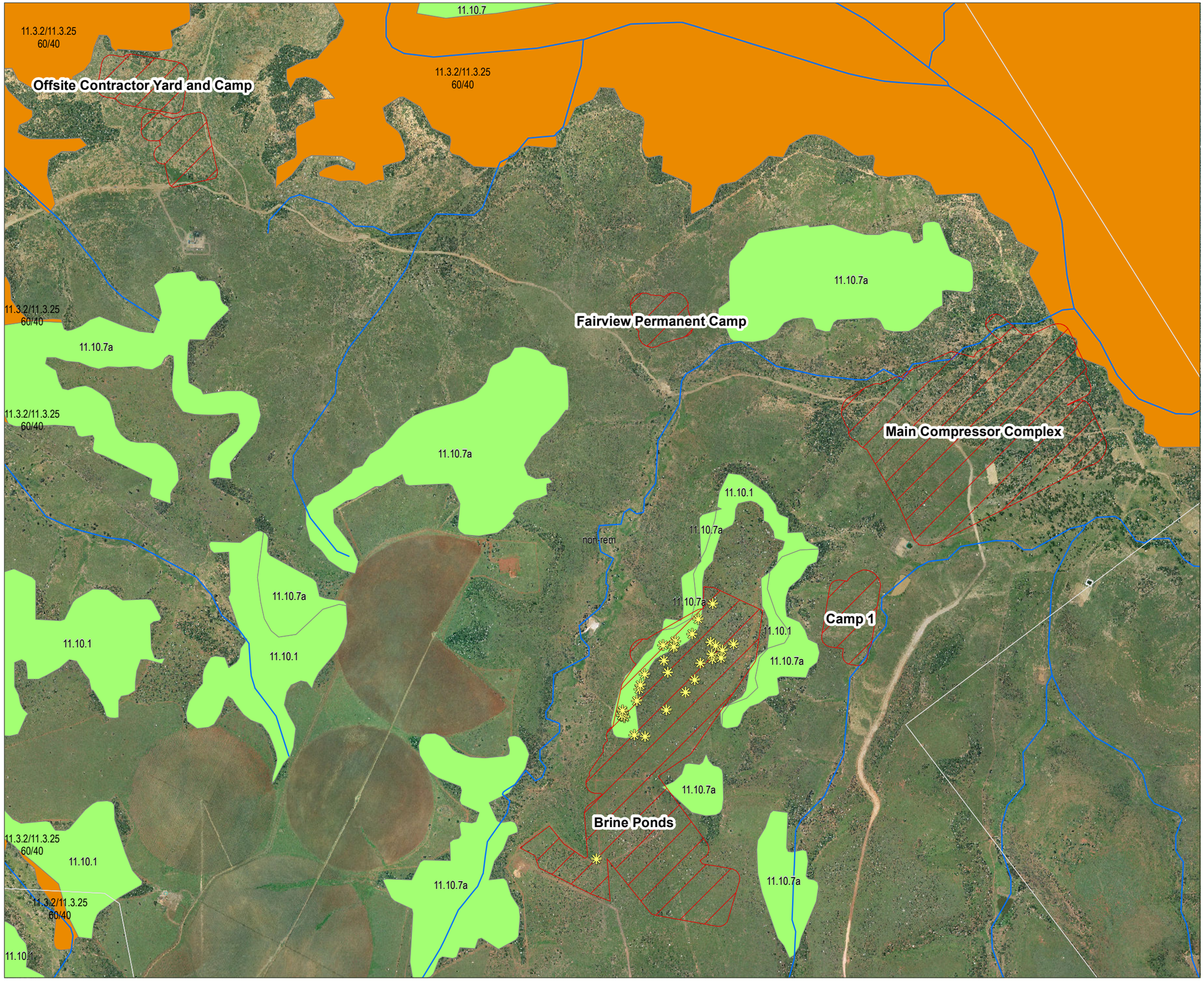
Much of this area has been subjected to cattle grazing and other agricultural practices as well as previous development associated with the gas fields.

This report is specific to the proposed development known as Compressor Site HCS-04 and the surrounding infrastructure associated with that development. The HCS-04 development is located on Lot 8 AB200. The main compressor site complex includes the compressor site, immediately adjacent contractor yards, laydown areas, offices and sewage treatment plant. Other infrastructure includes the Fairview Permanent Camp, Camp 1, Off-site Contractor Yard and Off-site Camp. These areas can be seen in **Figure 1-1**.

This report will also address the areas known as the Brine Ponds which are located near the main compressor site complex (see **Figure 1-1**).

1.2 Purpose of report

The aim of this report is to provide an ecological assessment of the development site only and identify areas or 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.



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Legend

- Brachychiton spp.
- 100K Drainage
- Footprints

Regional Ecosystem Mapping

- Non-remnant / regrowth
- Endangered - Sub-dominant
- Endangered - Dominant
- Of Concern - Sub-dominant
- Of Concern - Dominant
- Not Of Concern
- Plantation forest
- Water

Type A species locations are indicative only with accuracy +/- 20m.
Not all juvenile Brachychitons may be represented due to their dense coverage in the area - an assessment of these locations should occur prior to or at the time of clearing

Date: 07/04/2011 Version: 1

Map by: MooreNK P:\CW\215648 Santos\Mapping\HCS04_Report Figure 1.mxd 07/04/2011 08:13

A3 scale: 1:20,000

0 440 880 m

Job No: 215648

Coordinate system: GDA 1994 MGA Zone 55

Santos Fairview HCS-04

Figure 1-1: Aerial View of Footprint

2. Methodology

2.1 Desktop Methodology

Areas of development have been projected on various maps as provided by Santos. These maps include Regional Ecosystem (RE) mapping, Environmentally Sensitive Areas (ESA) mapping, drainage mapping and aerial photography. Where available ahead of time, these resources were reviewed to determine areas of focus for the field inspection.

It is important to note that throughout this report areas of remnant vegetation are referred to as 'endangered', 'of concern' and 'no concern at present' regional ecosystems. The classification used for this report is based on the 'biodiversity status' of the vegetation not the 'Vegetation Management Act status' of the vegetation. This is important as some areas mapped on the RE mapping (which used the VMA status) are categorised as 'of concern' but are referred to in this report as 'endangered'.

2.2 Field Methodology

The proposed development sites were inspected by four (4) Aurecon ecologists (Jane Stark, Vanessa Boettcher, Sarah Stone and Cassandra Arkinstall) on 15 March 2011. The inspections aimed to assess the existing vegetation communities and habitat value of the proposed development areas.

GIS layers of the proposed development locations and environmental constraints mapping (eg Regional Ecosystem Mapping, Ecologically Significant Area Mapping) and high resolution aerial photography were uploaded onto a toughbook (C5 mobile clinical assistant CFT-001 – Motion computing) with an integrated GPS to facilitate the detection of boundaries whilst traversing the site. Handheld Garmin GPS units (GPSmap 76) were also used in the inspection. It should be noted that while all efforts were made to ensure the accuracy of GPS co-ordinates provided in this report, they should only be considered to be accurate to +/- 15 metres due to the limitations of the GPS devices used.

The ground-truthing of these sites included undertaking detailed flora species observations including sampling of unknown flora. All flora species known to be of conservation significance (such as endangered, vulnerable, near threatened or Type A species under the *Nature Conservation Act 1992* or endangered, vulnerable or rare species under the *Environment Protection and Biodiversity Conservation Act 1999*) were recorded by GPS. Fauna observations were also recorded during the inspection.

A list of flora species observed in the development areas has been included in **Appendix A**.

3. Ecological Assessment of Development Areas

3.1 Compressor Site Complex

General

The main compressor site complex consists of a proposed disturbance area of approximately 100 hectares and can be seen in **Figure 3-1**.

The area is mapped mainly as non-remnant vegetation on the RE mapping except for a very small (0.35ha) area on the north-eastern corner. This area of remnant vegetation is mapped as 11.3.2/11.3.25 which is a dominant 'of concern' RE polygon. The area is also mapped as 'Category C' ESA due to the 'of concern' vegetation. The RE description for the remnant vegetation is incorrect and is discussed further below.

The Dawson River runs along the eastern side of the site. The high bank of the river is approximately 50 metres from the edge of the mapped disturbance area and the current channel containing water flow is approximately 90 metres from the site. The Dawson River is a major watercourse and is mapped as a stream order six (6). A low order (stream order 1) watercourse occur along the northern side of the compressor site (see **Figure 3-1**) and partially within the disturbance footprint. Another stream order 1 watercourse occurs approximately 60m south of the compressor site.

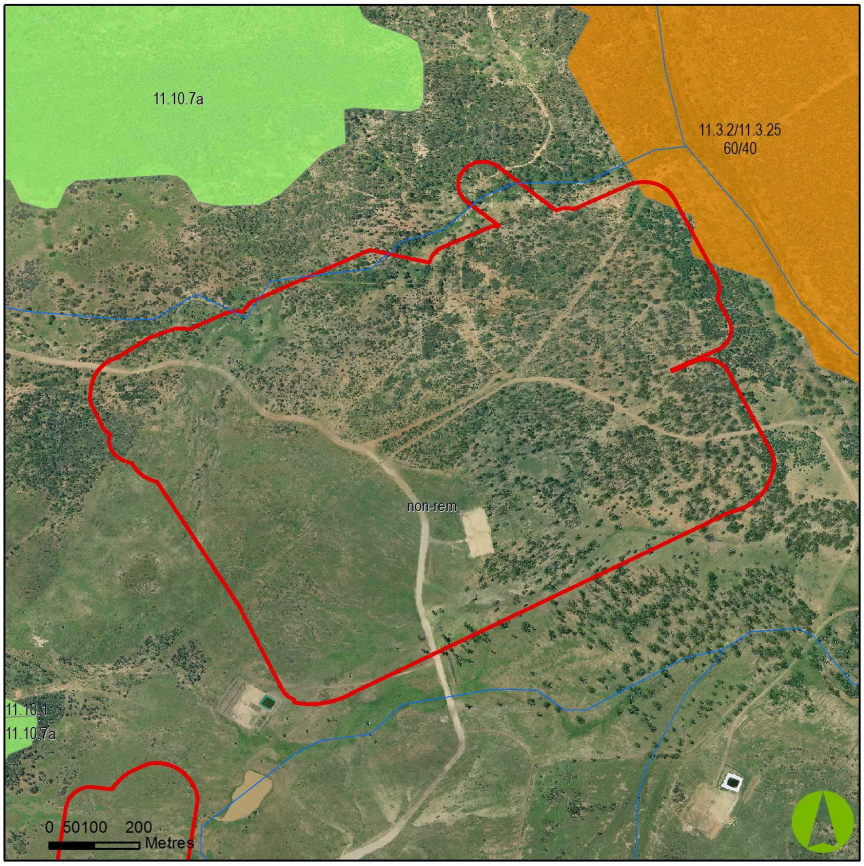

Figure 3-1: Aerial view of HCS04 Compressor Site Complex overlaid with RE mapping

Floristics and Habitat Values

The vegetation at the site was dominated by Buffel grass in the southern areas which appear to have been more heavily grazed and have less woody regrowth. The northern section nearer to the Dawson River contained more woody vegetation regrowth, mainly White Cypress Pine (*Callitris glaucophylla*) and Poplar Box (*Eucalyptus populnea*) and was less invaded by Buffel grass.

The majority of the regrowth vegetation consisted of Brigalow (*Acacia harpophylla*), Poplar Box, White Cypress Pine and False Sandalwood (*Eremophila mitchellii*). The ground cover was dominated by Buffel grass in most parts and a high prevalence of other weed species was recorded.

The very small area mapped as dominant 'of concern' remnant vegetation is incorrect. The area is mapped as 11.3.2/11.3.25. The RE 11.3.25 is a 'no concern at present' RE and is described as *Eucalyptus tereticornis* fringing drainage lines. This RE was observed immediately fringing the Dawson River but only extended approximately 20-30 metres from the current river channel within the high banks. Therefore RE 11.3.25 is correct however only occurs in a narrow strip either side of the Dawson River low flow channel (which is not located within the disturbance area).

RE 11.3.2 is an 'of concern' RE and is described as *Eucalyptus populnea* on alluvial plains. The compressor site is situated outside the high banks and is not on an alluvial plain. Therefore, the description of 11.3.2 is not correct as the area is not a landzone 3 (alluvial plain). Based on the geology, soils and elevation in the landscape, the compressor site is situated within a landzone 10.

Consequently, based on the vegetation present and the landzone, the most likely RE for this area is 11.10.7. This is a 'no concern at present' RE. Therefore, the clearing will not be occurring in any 'of concern' RE's or 'Category C' ESA.

No species of conservation significance under the EPBC Act or the NC Act were observed at the compressor site.

The habitat values of the site are low to moderate. The heavily grazed, Buffel dominated areas to the south of the site are low in species richness, have a high prevalence of weed species, did not contain a great amount of woody debris and occurred adjacent to one of the main access roads on site. The area in the north western corner (near the Dawson River) had a slightly higher habitat value due to the more dense regrowth, less Buffel grass invasion and notably more woody debris. Squatter pigeons (*Geophaps scripta scripta*) were noted in both areas of the compressor site, however more bird calls were heard in the north eastern section which is likely due to its close proximity to the Dawson River. Squatter pigeons are listed as an 'vulnerable' species under the EPBC Act and the NC Act

3.2 Fairview Permanent Camp

General

The area known as the Fairview Permanent Camp (see Figure 3-2) is approximately 7.1 ha and is located 1.2km from the main compressor site complex. The area is mapped as non-remnant vegetation on the RE mapping and is not located in or within 500 metres of any ESA's.

The area is gently undulating, cleared land and currently used for cattle grazing. The nearest watercourse is situated greater than 150 metres to the south-east.

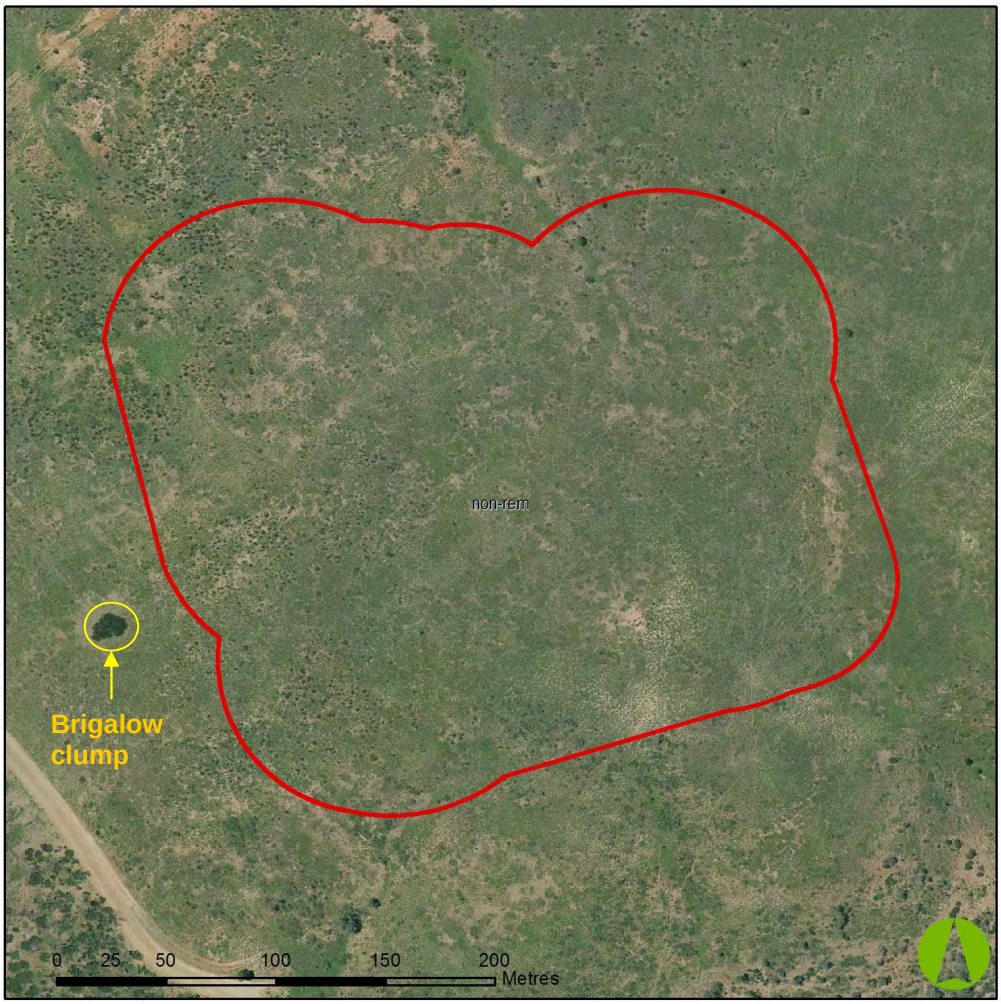

Figure 3-2: Aerial view of Fairview Permanent Camp

Floristics and Habitat Value

The camp site is very low in species richness and mainly consists of Buffel grass and regrowth Brigalow, very few other species occurred at this site with a total of only 22 species observed. Most of the Brigalow regrowth is less than 1.5m tall with the exception of one retained shade clump just outside the disturbance area which was approximately 4m tall (see **Figure 3-3**).

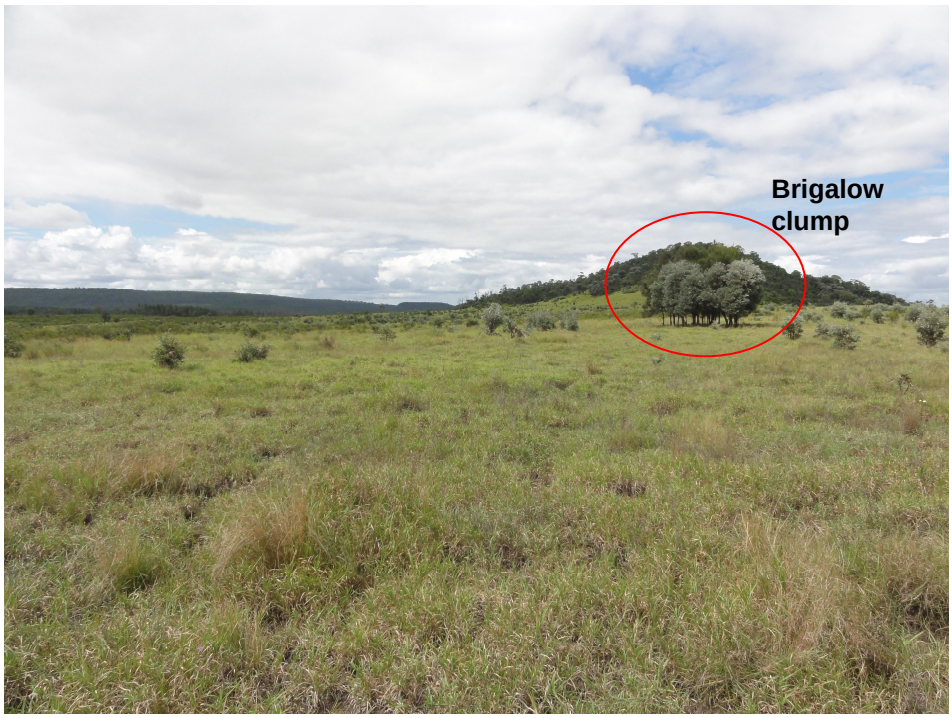

Figure 3-3: Typical vegetation at Fairview Permanent Camp

No species of conservation significance under the EPBC Act or the NC Act were observed at the site.

The area is cleared land is not located near any significant ecological features such as watercourses, cliffs/rock outcrops or remnant vegetation and as such has a relatively low habitat value. There was very little woody debris on the ground and there were no observed fauna species using the site other than grazing cattle. The area may be used sporadically for temporary foraging by macropods however it is not primary foraging or nesting habitat.

3.3 Off Site Contractor Yard and Camp

General

The development areas known as the off-site contractor yard and off-site camp are located together approximately 3.4km from the main compressor site complex (see **Figure 1-1** and **Figure 3-4**).

The off-site contractor yard and camp are located in cleared land which has been used for cattle grazing. The nearest watercourse is a stream order 1 watercourse located approximately 200 metres to the south-east.

The areas of disturbance are mapped as non-remnant vegetation on the RE mapping. The areas of disturbance for the offsite contractor yard is located immediately adjacent to mapped 'of concern' remnant vegetation RE11.3.2/11.3.25 (see **Figure 3-4**). This remnant vegetation is incorrectly mapped as 'of concern' vegetation and is discussed further below. Due to the mapped 'of concern' remnant vegetation, the area is also adjacent to a 'Category C' ESA, however this is not correct due to the incorrect RE mapping which is discussed below.

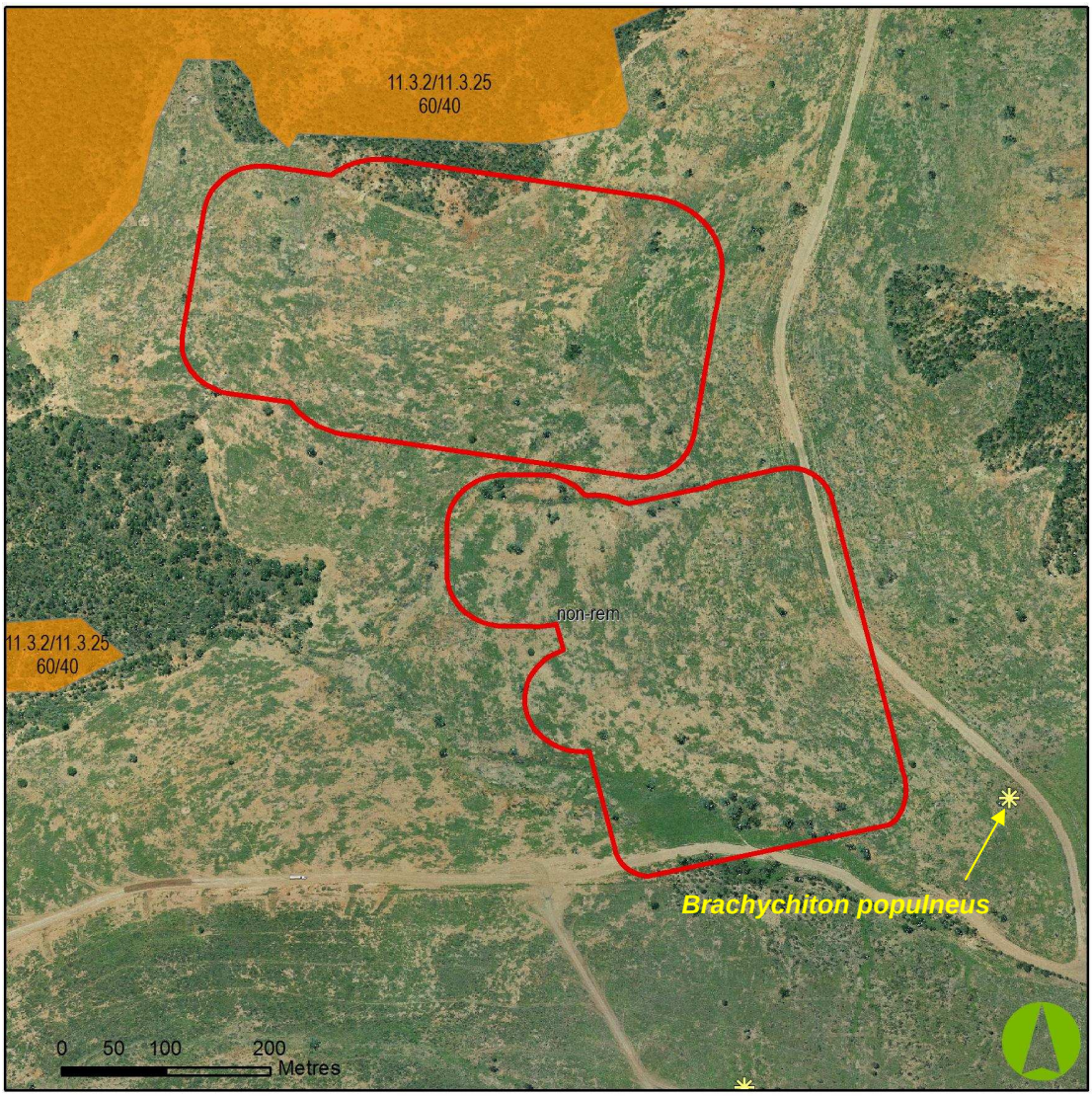

Figure 3-4: Aerial view of Offsite Contractor Yard and Camp overlaid with RE mapping

Floristics and Habitat Value

The areas contain regrowth vegetation mainly consisting of Poplar Box (*Eucalyptus populnea*), Silver Leaf Ironbark (*Eucalyptus melanophloia*) and False Sandalwood (*Eremophila mitchellii*). The ground layer was dominated by Buffel grass (*Pennisetum ciliare*) and other non-native species.

No species of conservation significance under the NC Act or EPBC Act were observed within the development footprints for the offsite contractor yard and camp. It should be noted that a single *Brachychiton populneus*, which is a Type A restricted plant, was observed adjacent to the main access road leading to the development areas, however is not in the development footprints depicted in **Figure 3-4**

The remnant vegetation to the north of the off-site contractor yard is incorrectly mapped as RE 11.3.2/11.3.25. Both of these RE's are landzone 3 ecosystems which are situated on alluvial plains. The area immediately north of the offsite contractor yard is not an alluvial plain as it is the toe slope of a hill. Based on the geology, soils and position in the landscape, the area is actually a landzone 10 area. Therefore both RE descriptions for this region are incorrect.

The area is vegetated predominantly with Cypress Pine (*Callitris glaucophylla*) and Silver Leaved Ironbark (*Eucalyptus melanophloia*) with a sparse understorey and a ground layer dominated by native grasses and forbs. Based on the vegetation present, landzone and position in the landscape, the most likely RE for this area is 11.10.7 which is a 'no concern at present' RE. Therefore, the area is also not located adjacent to any ESA areas.

The areas had relatively low habitat value due to the cleared nature of the sites and the high prevalence of non-native species. The area did contain relatively dense ground cover with a minor amount of woody debris which could provide habitat for small native reptiles, however no significant native fauna is expected to utilise the site. No native fauna were observed during the inspection.

3.4 Camp 1

General

Camp 1 is located between the main compressor site complex and the brine ponds (see **Figure 1-1**). The area will include camp accommodation and associated sewerage treatment facilities. The total development area for Camp 2 is approximately 9.4ha.

The area is cleared land and is presently used for grazing cattle. Camp1 is mapped as non-remnant vegetation on the RE mapping and is not located in or within 500 metres of any ESA's. A low order (stream order 1) watercourse traverses the south-eastern corner of the Camp 2 site. This watercourse was evident during the field inspection as a minor drainage depression which did not contain any mature riparian vegetation and was heavily invaded by Noogoora Burr (*Xanthium occidentale*). The watercourse has also been damned further to the north from where it crosses the Camp 2 site (see **Figure 3-5**).

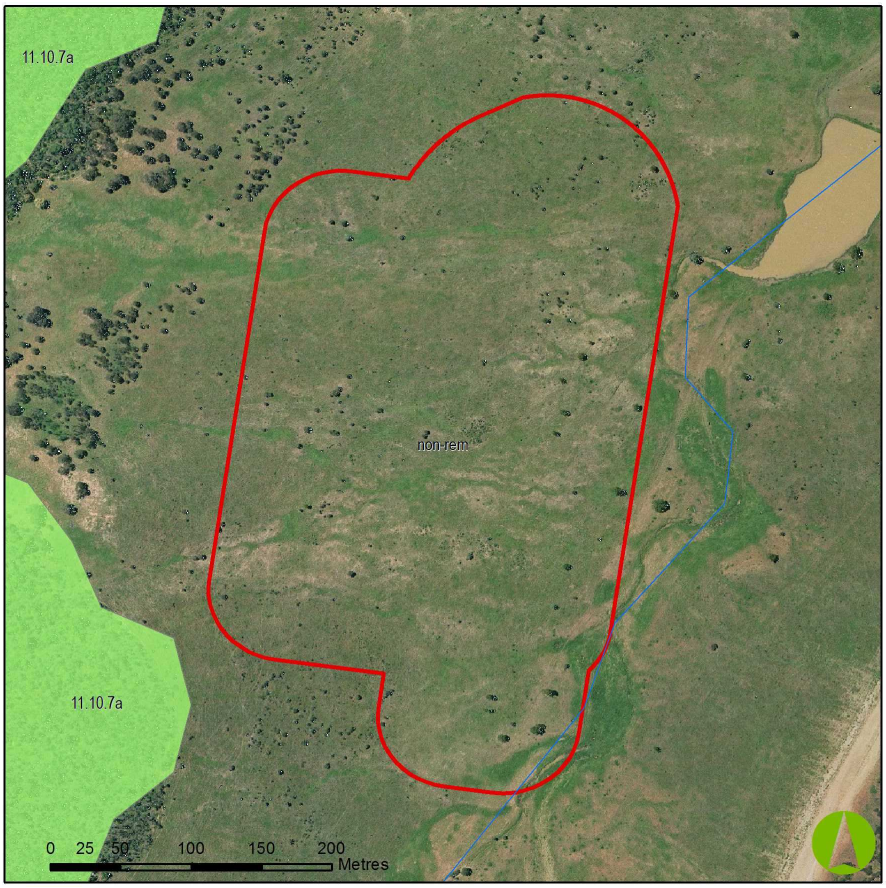

Figure 3-5: Aerial view of Camp 2 overlaid with RE mapping

Floristics and Habitat Value

The area was cleared land with predominantly regrowth Brigalow (*Acacia harpophylla*) and Poplar Box (*Eucalyptus populnea*) regrowth less than 3 metres tall. The ground cover was dominated by Buffel grass and other exotic species. No species protected under the NC Act or EPBC Act were observed at the site.

The habitat value of the site is relatively low due to the highly grazed state of the area and dominance of non-native species. The area contained very little woody debris and the only fauna observed were cattle and a single Pied Butcherbird (*Cracticus nigrogularis*).

3.5 Brine Ponds

General

The Brine Pond areas are located approximately 900 metres south-west of the main compressor site complex (see **Figure 1-1**) and cover an area of approximatley100 ha. The Brine Ponds are situated predominantly in mapped non-remnant vegetation on the RE mapping except for a small linear area mapped as 'no concern at present' regional ecosystems 11.10.1 and 11.10.7 (see **Figure 3-6**). This area is incorrectly mapped as the area has been cleared previously and is currently non-remnant vegetation.

The Brine Ponds are not located in or within 1km of any ESA areas.

The Brine Ponds occur on the top of a ridge and a steep descent/drop off occurs on the western edge of the ponds. The development footprint occurs partially over this descent. Two watercourses occur adjacent to the brine ponds however they are both greater than 100 metres from the development area.

The area is currently used for grazing cattle.

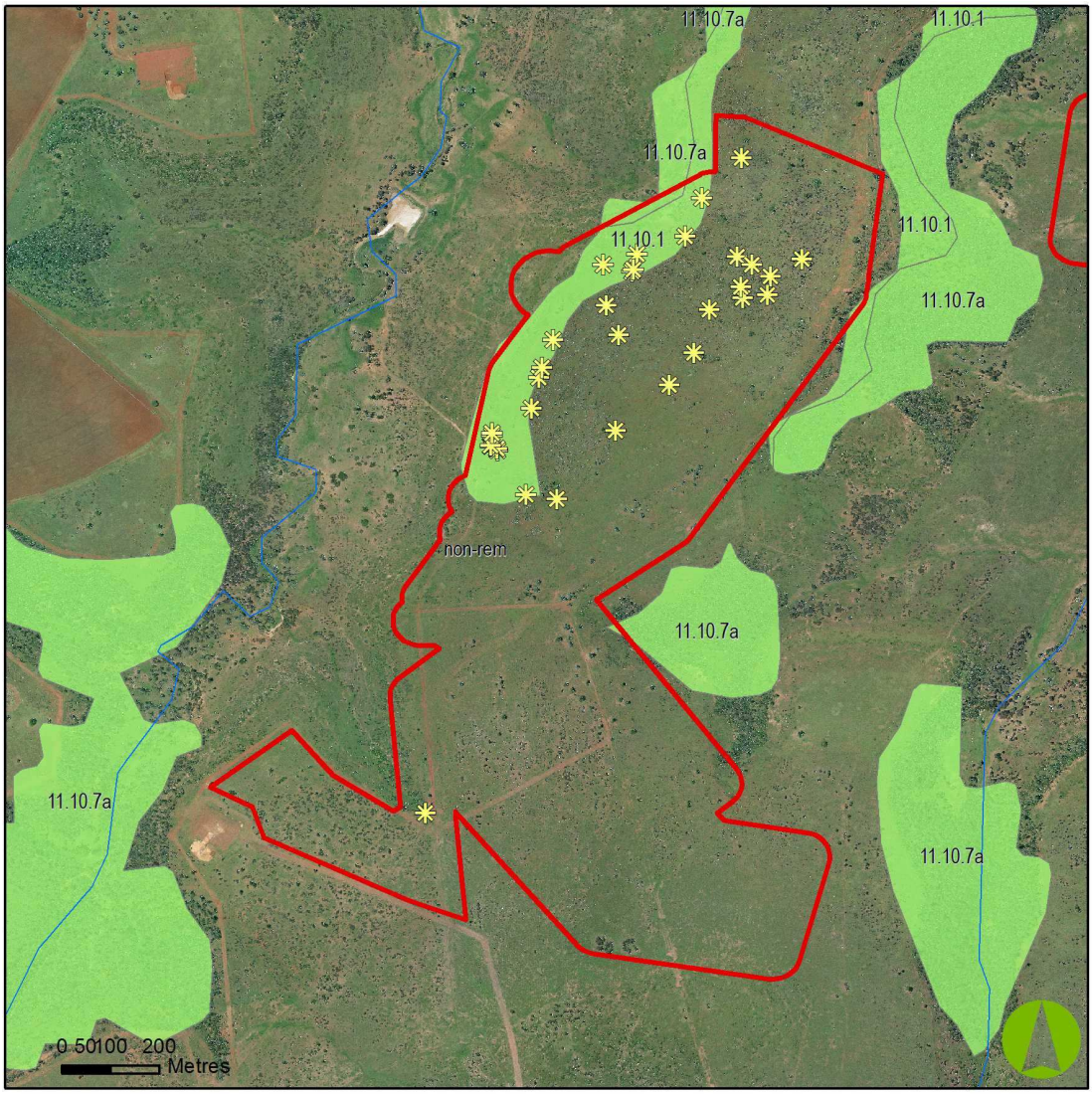

Figure 3-6: Aerial view of the Brine Ponds overlaid with RE mapping

Floristics and Habitat Value

The southern brine pond was extensively cleared recently and is currently dominated by dense Buffel grass with some minor Brigalow regrowth. The majority of the northern brine pond has also been cleared but did exhibit a higher density and average height of regrowth vegetation indicating that it had not been cleared as recently as the southern brine pond. The northern brine pond also contained many mature Brachychiton species which are Type A Restricted Plants under the NC Act. **Table 3-1** below outlines the approximate locations of these species. It is important to note that this list may not include every Brachychiton plant in the Brine Ponds due to the likelihood of juvenile specimens occurring which may not have been observed as a result of their limited size.

Table 3-1: Type A Species within the Brine Ponds development footprint

Species	Easting (GDA 94, Zone 55J)	Northing (GDA 94, Zone 55J)
Brachychiton rupestris	707679	7151464
Brachychiton rupestris	707742	7151484
Brachychiton rupestris	707863	7151596
Brachychiton rupestris	707937	7151676
Brachychiton rupestris	707335	7150353
Brachychiton rupestris	707477	7151093
Brachychiton rupestris	707466	7151099
Brachychiton rupestris	707469	7151125
Brachychiton rupestris	707557	7151235
Brachychiton rupestris	707563	7151255
Brachychiton rupestris	707585	7151312
Brachychiton populneus	707705	7151320
Brachychiton rupestris	707684	7151381
Brachychiton rupestris	707735	7151453
Brachychiton populneus	707831	7151519
Brachychiton populneus	707926	7151476
Brachychiton populneus	707953	7151459
Brachychiton australis	707987	7151435
Brachychiton populneus	708046	7151469
Brachychiton populneus	707980	7151397
Brachychiton populneus	707935	7151391
Brachychiton populneus	707932	7151415
Brachychiton rupestris	707873	7151368
Brachychiton rupestris	707843	7151281
Brachychiton rupestris	707797	7151217
Brachychiton rupestris	707697	7151125
Brachychiton rupestris	707587	7150988
Brachychiton rupestris	707530	7150997
Brachychiton rupestris	707543	7151173

The habitat value of the southern brine pond area is very low due to the low species richness, dominance of Buffel grass and lack of mature vegetation. There was very little woody debris on the ground. However, Eastern Grey Kangaroos (*Macropus giganteus*) were observed in the area. Macropod species such as Eastern Grey Kangaroos can utilise a range of habitat types and it is unlikely that the southern brine pond area would be important habitat for these species other than for temporary foraging. No other native fauna were observed.

The habitat value of the northern brine pond is higher than the southern brine pond due to the higher density and age of regrowth vegetation and scattered mature trees. More woody debris and fallen

timber was observed at this site which could provide suitable habitat for native reptiles although none were observed when traversing the site including investigating hollow logs. It is not likely that the area is suitable habitat for any threatened native fauna.

4. Conclusion

The HCS-04 hub and associated infrastructure has been located primarily in previously disturbed agricultural land. The development is located mostly in mapped non-remnant vegetation which was verified during the field inspection.

A small linear area of mapped 'no concern at present' remnant vegetation occurs in the northern Brine Pond which was observed during the field to be incorrectly mapped and is non-remnant vegetation. A small area of 'of concern' remnant vegetation is mapped in the north-eastern corner of the main compressor site and this was observed to be correctly mapped as remnant however the regional ecosystem classification is incorrect.

Two low order watercourses traverse the development areas and the Dawson River occurs in close proximity to main compressor complex. The watercourses within the development footprints have limited fringing riparian vegetation which contains low to moderate ecological and habitat value. The Dawson River in close proximity to the main compressor complex has high ecological and habitat value.

Multiple Type A restricted plant species were observed within development areas.

The vulnerable fauna species *Geophaps scripta scripta* (Squatter Pigeons) were observed at two locations in the main compressor site complex.

5. References

Eddie, C. (2007). *Field Guide to Trees and Shrubs of Eastern Queensland Oil and Gas Fields*, Santos House, Adelaide.

Regional Ecosystem Mapping, Version 6, Department of Environment and Resource Management

Species Profile and Threats Database, http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl

Appendix A
Botanical Species List

Appendix A

Grey shaded boxes indicated species present in each area.

Exotic species are denoted with an asterix (*)

Scientific Name	Common Name	Brine Ponds	Camp 2	Main Compressor Site	Fairview Permanent Camp	Off-site Contractor Yard and Camp
Acacia decora	Pretty Wattle					
Acacia fasciculifera	Scrub Ironbark					
Acacia harpophylla	Brigalow					
Alectryon diversifolius	Scrub Boonaree					
Alectryon oleifolius	Boonaree					
Allocasuarina leuhmannii	Bull Oak					
Alloteropsis semialata	Cockatoo Grass					
Alphitonia excelsa	Red Ash					
Alstonia constricta	Bitter Bark					
Aristida queenslandicus	White Spear Grass					
Atalaya hemiglauca	Whitewood					
Austrostipa verticillata	Slender Bamboo Grass					
*Bidens pilosa**	Cobblers Pegs*					
Brachychiton populneus	Kurrajong					
Brachychiton rupestris	Narrow Leaved Bottle Tree					
Brachyscome dentata	Lobe-seed Daisy					
Bracteantha bracteata	Everlasting Daisy					
Breynia oblongifolia	Breynia					
Bursaria spinosa	Prickly Pine					
Callitris glaucophylla	White Cypress Pine					
Calotis cuneifolia	Yellow Burr Daisy					
Capparis lasiantha	Nipan					

Scientific Name	Common Name	Brine Ponds	Camp 2	Main Compressor Site	Fairview Permanent Camp	Off-site Contractor Yard and Camp
Capparis spinosa	Capparis midsize	■	■			
Carissa ovata	Currant Bush	■				
Casuarina cristata	Belah	■			■	
Chamaesyce drummondii	Caustic weed			■		
Cheilanthes sieberi	Mulga Fern	■	■	■		
*Chloris gayana**	Rhodes Grass*		■	■		
*Chloris inflata**	Purple Top Rhodes*					
Chloris ventricosa	Tall Chloris				■	
Chrysocephalum apiculatum	Yellow Buttons		■	■		
*Cirsium vulgare**	Spear Thistle*		■	■		
Cissus opaca	Native Grape	■	■			
*Conyza bonariensis**	Fleabane*		■		■	■
Cymbopogon bombycinus	Lemon Grass	■				
Cymbopogon refractus	Barbwire Grass	■				
Cyperus difformis	Dirty Dora			■		
Cyperus polystachyos	Bunchy Sedge		■			
*Dactyloctenium radulans**	Button Grass*			■		■
Dianella caerulea	Dianella	■				
Dianella longifolia	Dianella	■				
Dichanthium sericeum	Queensland Blue Grass	■	■	■	■	■
Dodonaea triangularis	Duck foot hop bush		■			
Dodonaea vestita	Hopbush					
Dodonaea viscosa	Sticky Hopbush				■	■
*Echinochloa colona**	Awnless Barnyard Grass*		■			

Scientific Name	Common Name	Brine Ponds	Camp 2	Main Compressor Site	Fairview Permanent Camp	Off-site Contractor Yard and Camp
Enteropogon acicularis	Curly Windmill Grass					
Eragrostis brownii	Browns Love Grass					
Eremophila mitchellii	False Sandalwood					
Erythroxylum australe	Turkey Bush					
Eucalyptus melanophloia	Silver Leaved Ironbark					
Eucalyptus populnea	Poplar Box					
Eucalyptus tenuipes	Narrow Leaved White Mahogany					
Evolvulus alsinoides	Speed Well					
Fimbristylis dichotoma	Fimbristylis					
Froelichia floridana	Cotton Tails					
Gahnia aspera	Gahnia					
Geijera parviflora	Wilga					
Grewia latifolia	Dysentry Plant					
Haloragis glauca	Grey Raspwort					
Heteropogon contortus	Black Spear Grass					
Hovea lorata	Hovea					
Indigofera colutea	Sticky Indigo					
Jasminum didymum	Native Jasmine					
Lindernia alsinoides	False Pimpernell					
Malvastrum americanum	Spiny Malvastrum					
Maytenus cunninghamii	Yellow Berry Bush					
Neptunia gracilis	Native Sensitive Weed					
Opuntia tomentosa	Velvet Tree Pear					
Oxalis stricta	Yellow Wood Sorrel					
Panicum decompositum	Hairy Panic					
Panicum effusum	Inquisitive Grass					

Scientific Name	Common Name	Brine Ponds	Camp 2	Main Compressor Site	Fairview Permanent Camp	Off-site Contractor Yard and Camp
Parsonsia australis	Monkey rope					
Parsonsia lanceolata	Monkey rope					
*Pennisetum ciliare**	Buffel Grass*					
Perotis rara	Comet Grass					
Pittosporum undulatum	pittosporum					
Psydrax oderata	Canthium					
Pterocaulon sphacelatum	Apple Bush					
Rhynchosia minima	Rhynchosia					
*Richardia brasiliensis**	Mexican Clover*					
Sclerolaena birchii	Galvanised Burr					
Sesbania cannabina	Sesbania Pea					
Setaria australiensis	Pigeon Grass					
Sida acuta	Sida					
Sida subspicata	Queensland Hemp					
Solanum chippendalei	Chippendale's Solanum					
Solanum parviflora						
Sorghum plumosum	Sorghum					
Spartothamnella puberula	Spiky bush					
Sporobolus creber	Western Rats Tail Grass					
*Tagetes minuta**	Stinking Rodger*					
Themeda triandra	Kangaroo Grass					
Thysanotus spathulistipus	White Fringed Lily					
Ventilago viminalis	Vine Tree					
*Verbena officinalis**	Common Verbena*					
*Verbena tenuisecta**	Mayne's Curse*					
*Vicia sativa**	Vigna*					

Scientific Name	Common Name	Brine Ponds	Camp 2	Main Compressor Site	Fairview Permanent Camp	Off-site Contractor Yard and Camp
Wahlenbergia communis	Large Bluebells					
Wahlenbergia gracilis	Sprawling Bluebell					
*Xanthium occidentale**	Noogoora Burr*					
*Zinnia multiflora**	Zinnia*					