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Assessment – Lot 4SP204532**

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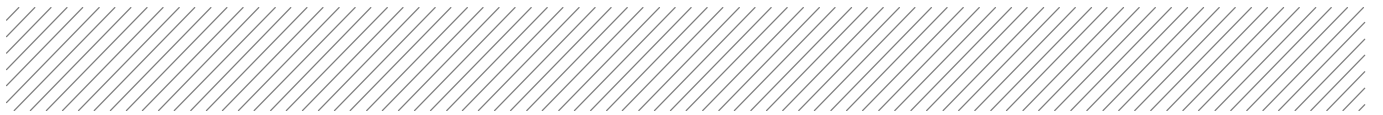
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1 Background

1.1 Project description

Santos Ltd (Santos) has commissioned Aurecon Australia Pty Ltd (Aurecon) to undertake ecological investigations of proposed areas of development for the Roma gas fields.

The Roma gas fields are located near the township of Roma and are characterised by undulating terrain with small elevated areas including the Thomby and Grafton Range. The dominant vegetation types within the Roma gas fields include Eucalypt and/or Brigalow woodlands, Blue grass or Mitchell grass downs, and smaller areas of White Cypress Pine and Mulga (Eddie 2007). The Roma gas fields are located within the Balonne River catchment.

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

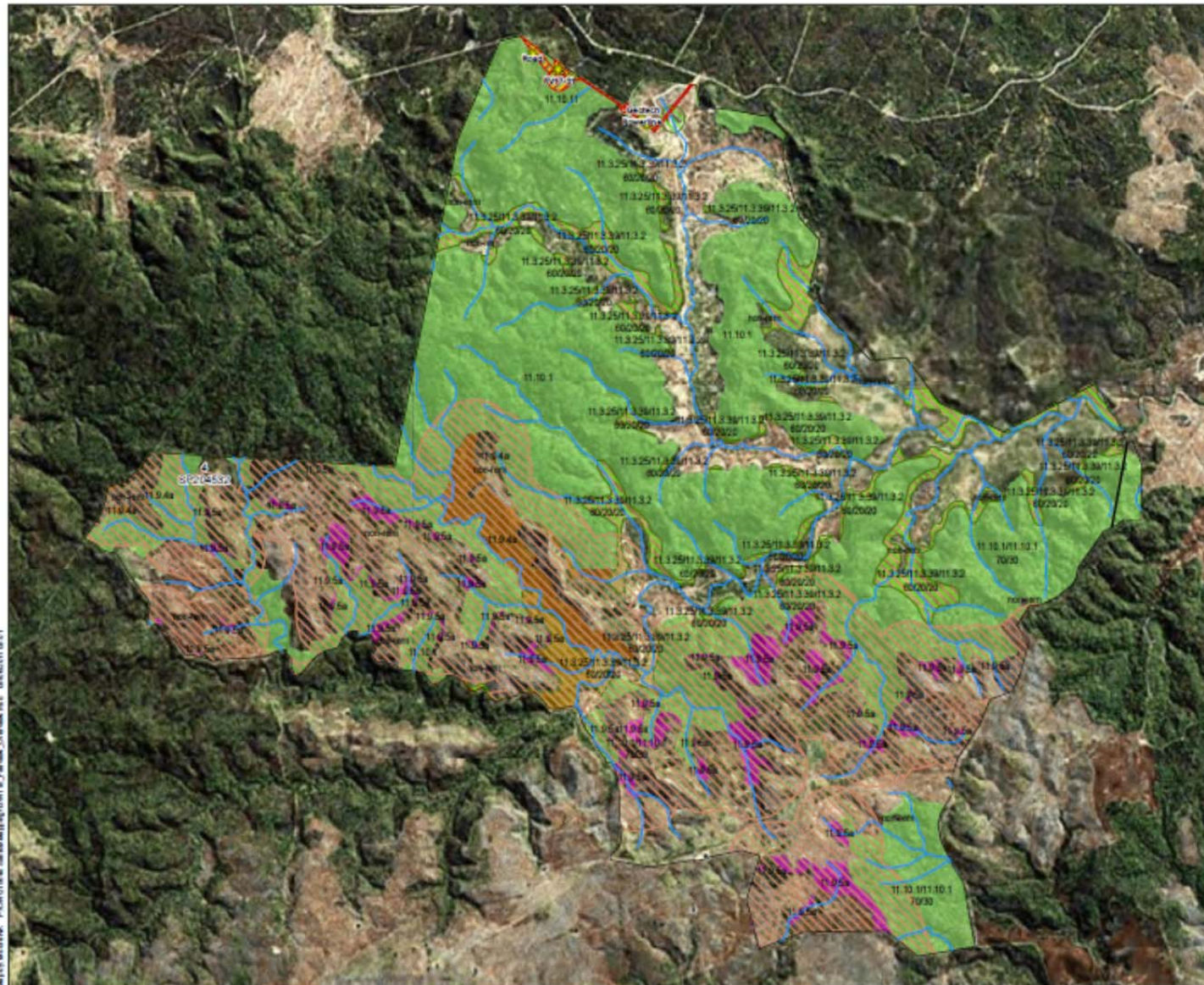
This report is specific to the proposed development areas listed below and shown in Figure 1.1:

- Pipeline corridor F197
- Geotechnical survey locations situated within the above corridor and shown in Figure 1.1
- Road corridor adjacent to pipeline corridor F197
- Powerline easement

These areas are collectively referred to as the 'proposed development area', and are located entirely within Lot 4SP204532. Note that the subject of this report is solely related to Lot 4SP204532. Where survey areas overlap additional properties, these sites will be further addressed in the report relevant to those properties/lots.

1.2 Purpose of report

The aim of this report is to provide an ecological assessment of the proposed development areas located on Lot 4SP204532 (Figure 1.1), and to identify areas and species of notable ecological or conservation value. This report does not make any recommendations regarding the development in relation to any Santos environmental authorities or other approvals.



Santos Lot 4 on SP204532

Figure 1.1 Overview of ground trothed corridors on lot 4SP204532 with associated RE and ESA mapping, and notable species



2 Methodology

2.1 Desktop methodology

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

2.2 Field methodology

The proposed development areas were assessed by five (5) Aurecon ecologists (Hayley Poole, Vanessa Boettcher, Grant Paterson, Samara Schulz and Aaron Mulcahy) between 21 and 23 June 2011. These assessments were to determine the existing vegetation communities and habitat value of the proposed clearing within the development areas as well as to verify the RE mapping as produced by DERM.

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

The corridors were 100m wide and of varying lengths, and the circular well pad areas had a radius of 175 m. Geotechnical survey locations were also assessed as part of the survey areas (a 50m buffer zone around each survey location was assessed).

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

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

3 Ecological assessment

3.1 Corridor F197 and road corridor, including geotechnical locations TP-F204 and FV17-31

General

Corridor F197 is located near the northern boundary of Lot 4SP204532 (Figure 3.1). There is a test pit (TP-F204) and proposed well lease (FV17-31) (Figure 3.3) located at the southern end of Corridor F197, and a road corridor to the east (Figure 3.2). Both Corridor F197 and the road corridor extend over the southern boundary of Lot 55 FTY1153, however these outlier areas have been captured in the report for Lot 55FTY1153.

The entire area of the road corridor is mapped as remnant 'no concern at present' regional ecosystem 11.10.11. This regional ecosystem also covers the southern half of Corridor F197, while the northern half is mapped as remnant 'no concern at present' regional ecosystem 11.10.9.

No ESAs are mapped on the road corridor or corridor F197 on lot 4SP204532. However, the portions that occur on lot 55FTY1153 to the north are mapped as Category C ESA, due to the area being located on a Forestry Lease within the Hallet State Forest.

No watercourses occur within the proposed development on lot 4SP204532.

A minor track dissects the southern end of the road corridor.

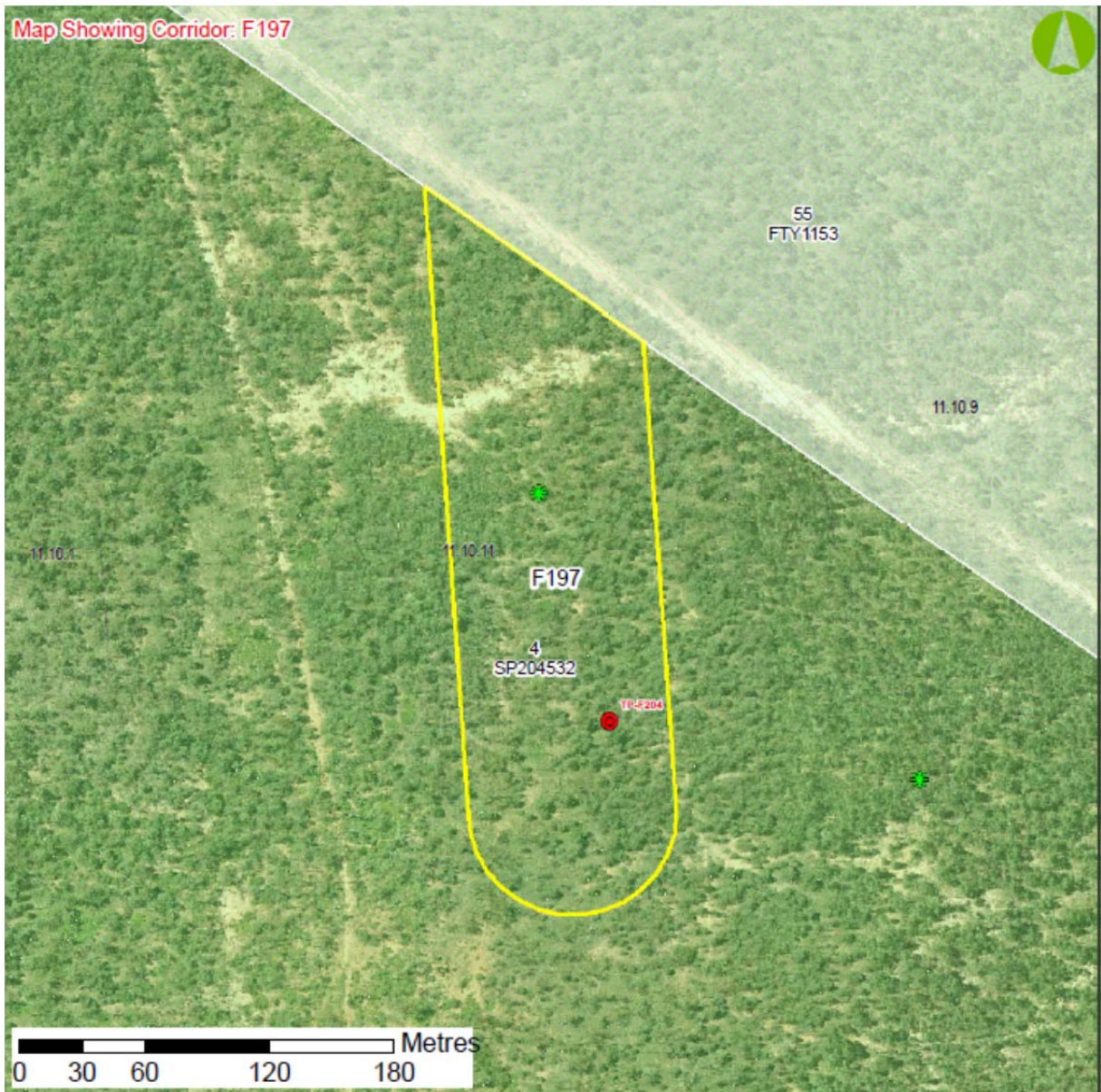


Figure 3.1 Aerial photograph of the proposed corridor F197 with overlaid ESA and RE mapping

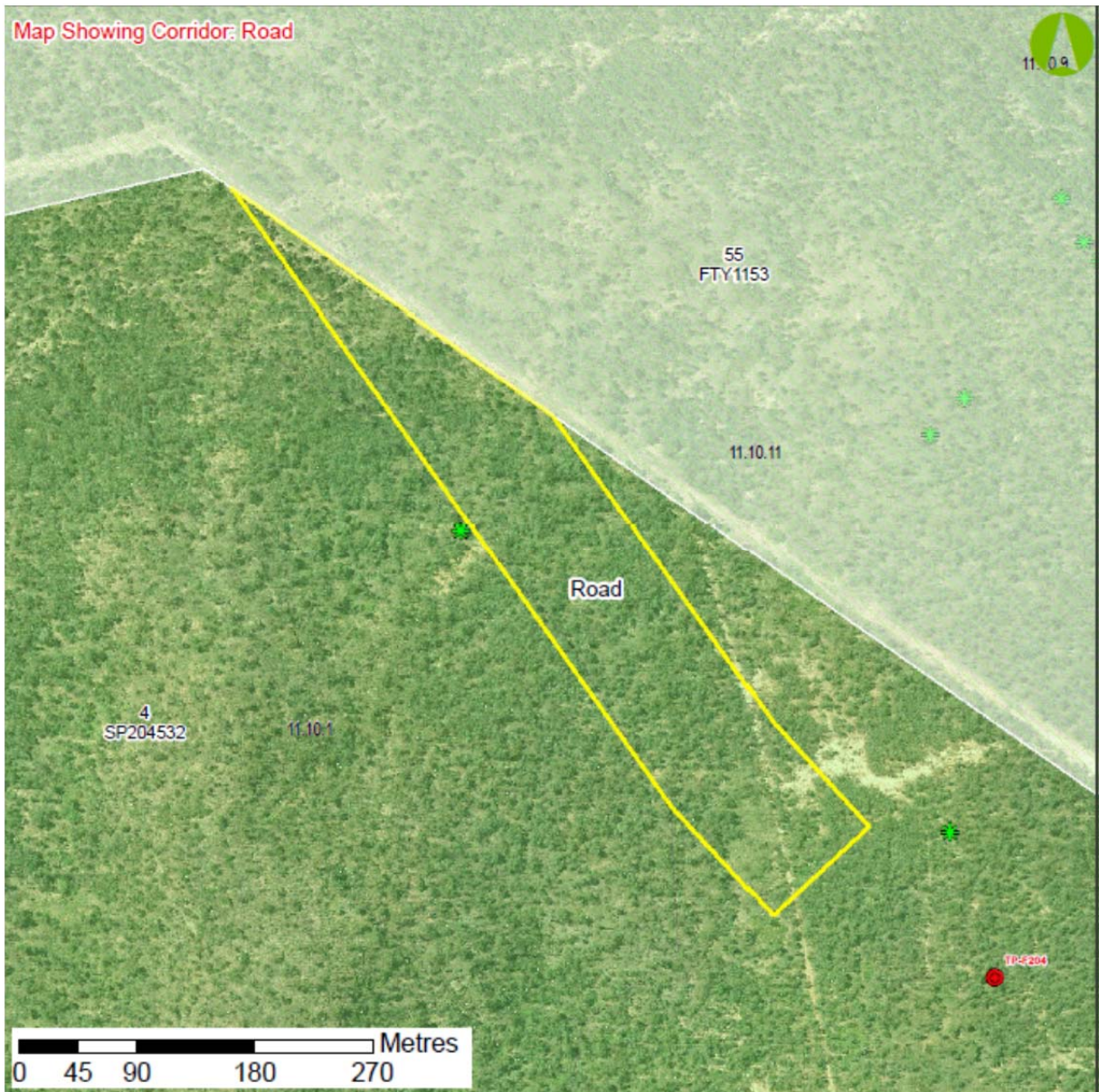
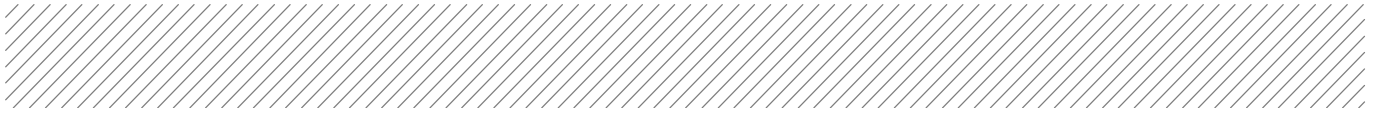


Figure 3.2 Aerial photograph of proposed road corridor with overlaid ESA and RE mapping

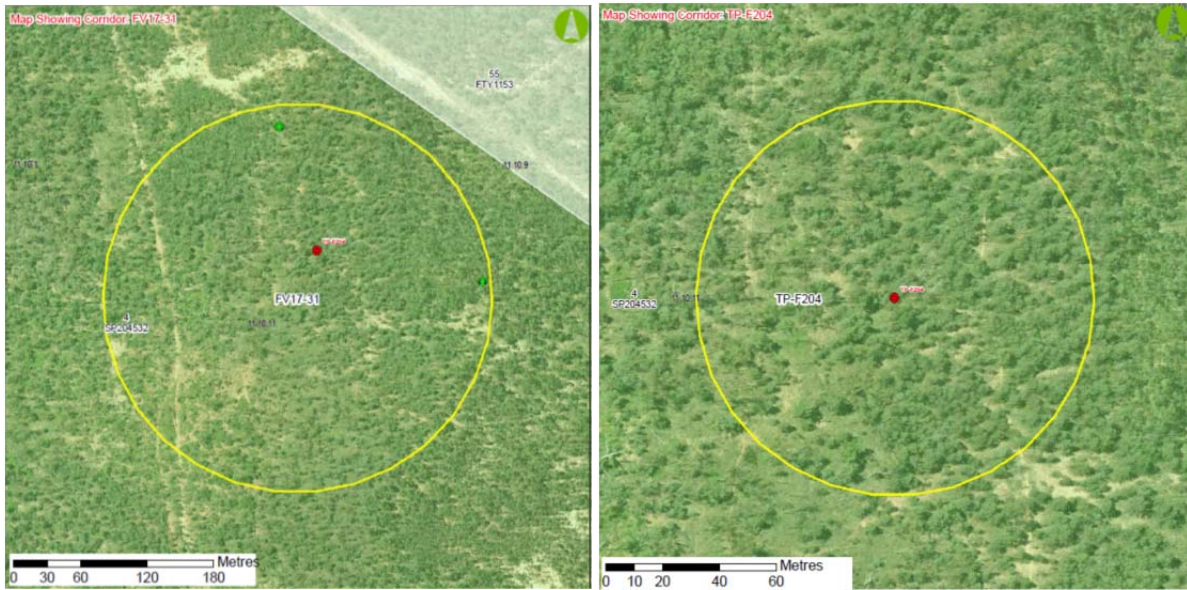


Figure 3.3 Aerial photograph of proposed well lease FV17-31 and test pit TP-F204

Floristics

The proposed development area is located within a *Callitris glaucophylla* (White cypress pine) dominated woodland with associated *Eucalyptus melanophloia* (Silver-leaved ironbark) and *Eucalyptus populnea* (Poplar box). Some scattered *Angophora floribunda* (Rough barked apple), *Corymbia clarksoniana* (Clarkson's bloodwood) and *Corymbia tessellaris* (Moreton bay ash) were also present. The ground cover was dense and dominated by native grasses such as *Heteropogon contortus* (Black speargrass), *Chloris sp.* (Windmill grasses) and *Aristida sp.* (Wiregrasses). The vegetation present in the proposed development area matches the descriptions of RE 11.10.11 and 11.10.9, therefore the RE mapping is correct.



Figure 3.4 An example of the vegetation present within Corridor F197

Two *Brachychiton populneus* (Kurrajong) were observed within the proposed development area, as well as a *Cymbidium canaliculatum* (Black orchid). These species are classed as Type A restricted plants under the NC Act. The location of these species is outlined in Table 3.1 below.


Table 3.1 Location of Type A Restricted Plants (*Nature Conservation Act 1992*) within the proposed road corridor and corridor F197

Species	Easting (GDA 94, MGA Zone 55)	Northing (GDA 94, MGA Zone 55)
<i>Brachychiton populneus</i>	702402	7142624
<i>Brachychiton populneus</i>	702775	7142393
<i>Cymbidium canaliculatum</i>	702958	7142255

No other species of conservation significance under the NC Act or EPBC Act were observed within the proposed development area.

Habitat value

The habitat value of the proposed development area was high. Although the vegetation has been subjected to historical selective logging, the canopy layer was relatively intact and there was varying stratum containing a diversity of species of different age classes.



The mature trees in the area contained some hollows, which provided nesting opportunities for arboreal fauna. There was an abundance of logs and woody debris on the ground which could provide habitat for reptiles and other terrestrial fauna.

The call of Noisy Miners (*Manorina melanocephala*) was heard within the proposed development area. Willy Wagtails (*Rhipidura leucophrys*) and Double Barred Finches (*Taeniopygia bichenovii*) were observed during the field inspection of the area.

No evidence of EVNT fauna under the NC Act or the EPBC Act was observed within the proposed development areas.

3.2 Power line corridor

General

The proposed power line corridor adjoins the southern boundary of lot 55FTY1153 (Figure 3.5). One geotechnical location is located adjacent to the State Forest boundary (Figure 3.6).

The western end of the corridor passes through remnant vegetation mapped as 'no concern at present' RE 11.10.9/11.10.11. The eastern portion of the proposed development occurs in non-remnant vegetation, with extensive clearing in evidence.

One category C ESA is mapped on the eastern arm of the proposed power line corridor. This is mapped as a referable wetland. The eastern end of the proposed development also occurs immediately adjacent to a category C ESA, due to the area being located on a Forestry Lease within the Hallet State Forest.

The corridor runs parallel to a minor track along the western portion, and traverses a further minor track in the eastern section.

The corridor traverses two minor watercourses of stream order 1.

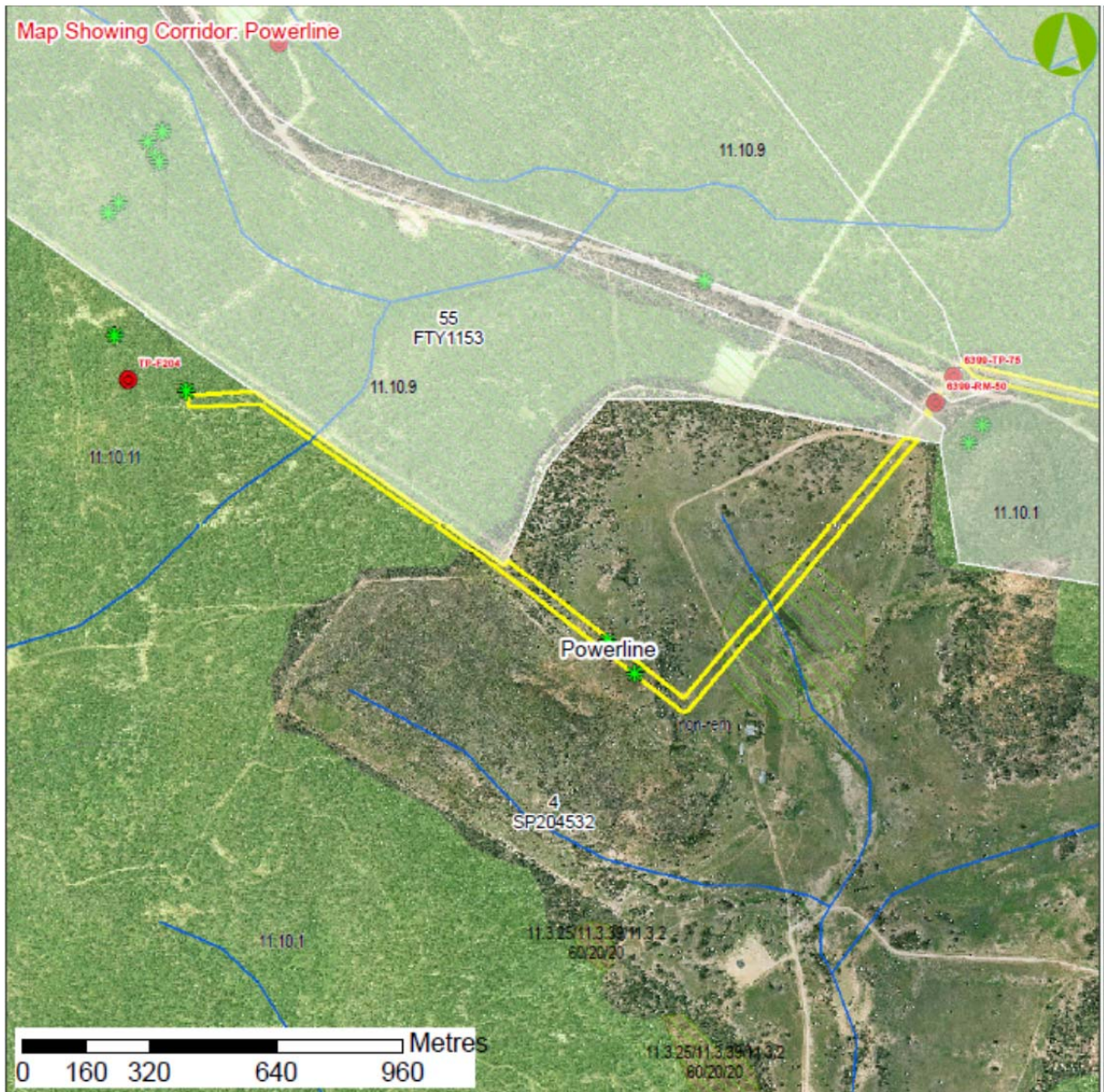


Figure 3.5 Aerial photograph of proposed power line corridor with overlaid ESA and RE mapping

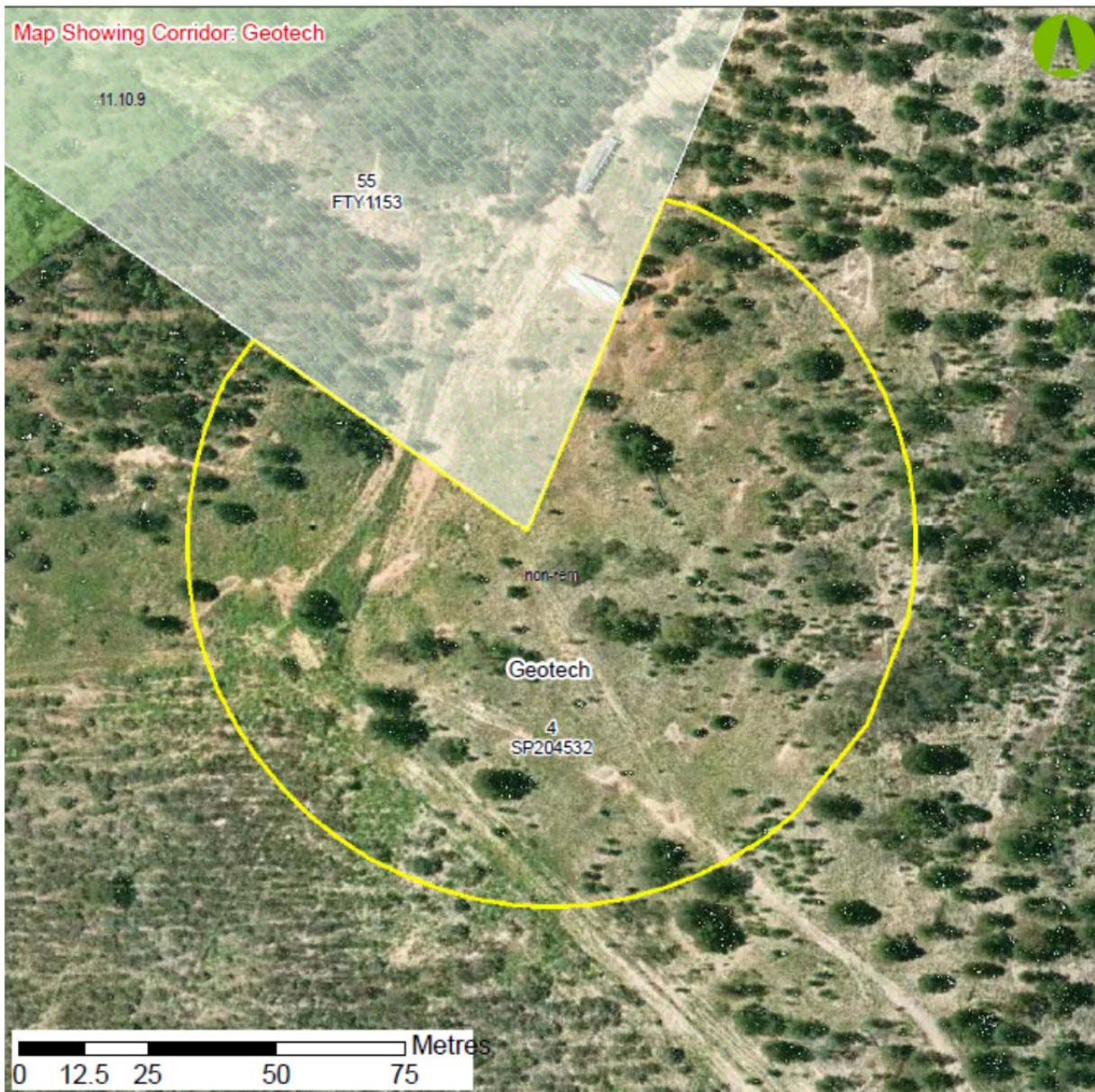


Figure 3.6 Aerial photograph of unnamed geotechnical location on the proposed power line corridor, with overlaid RE and ESA mapping

Floristics

The western end of the power line corridor traverses non-remnant vegetation, and is mapped as 'no concern at present' RE 11.10.11/11.10.9.

Floristic components consist of *Callitris glaucophylla* (White Cypress Pine) dominated woodland with associated *Eucalyptus melanophloia* (Silver-leaved Ironbark) and *Eucalyptus populnea* (Poplar Box). The ground cover is dense and dominated by native grasses such as *Heteropogon contortus* (Black Speargrass), *Chloris sp.* (Windmill grasses) and *Aristida sp.* (Wiregrasses). The vegetation present in the proposed development is contiguous with that described in the road corridor of section 3.1, and is consistent with descriptions for REs 11.10.11 and 11.10.9, therefore the RE mapping is correct.

The eastern end of the power line corridor has been cleared and is mapped as non-remnant. Vegetation in this section consists of scattered trees and shrubs of *E. populnea*, and *Acacia decora*

(Pretty Wattle), with an understorey dominated by the exotic pasture, *Pennisetum ciliare* (Buffel Grass). The RE mapping is also correct in this section.

Two *Brachychiton populneus* (Kurrajong) were observed within the proposed development area. This species is listed as a Type A restricted plant under the NC Act. Their location is given in Table 3.2 below.

Table 3.2 Location of Type A Restricted Plants (*Nature Conservation Act 1992*) within the proposed power line corridor

Species	Easting (GDA 94, MGA Zone 55)	Northing (GDA 94, MGA Zone 55)
<i>Brachychiton populneus</i>	702024	7141617
<i>Brachychiton populneus</i>	704091	7141536

No other species of conservation significance under the NC Act or EPBC Act were observed within the proposed development area.

Habitat value

The non-remnant vegetation within the proposed power line corridor contains low quality habitat, as the understorey is dominated by Buffel Grass, with scattered mature native trees and shrubs. The remnant vegetation has moderate to high quality habitat value with mature, hollow-bearing trees, minimal weed infestation, a shrubby understorey, and high structural complexity of all vegetation layers. A small stream containing water and intact riparian vegetation is present. Native floristic diversity within the remnant vegetation is moderate to high.

Incidental fauna sightings include Double-barred finches (*Taeniopygia bichenovii*), Grey Fantail (*Rhipidura fuliginosa*) and Apostlebirds (*Struthidea cinerea*).

No evidence of EVNT fauna under the NC Act or the EPBC Act was observed within the proposed development areas.



4 Conclusion

The proposed development occurs predominantly in remnant vegetation of RE 11.10.9 and 11.10.11, which are listed as 'no concern at present', and one area of cleared, non-remnant vegetation. RE mapping was confirmed as correct during these investigations. Several individuals of conservation significance occur in multiple corridors (ie Type A restricted plants).

Multiple watercourses occur within, or in close proximity to, development areas. Where the watercourses occur within remnant REs, riparian vegetation is intact, with high habitat value. In cleared areas, fringing vegetation provides low to moderate ecological and habitat value.

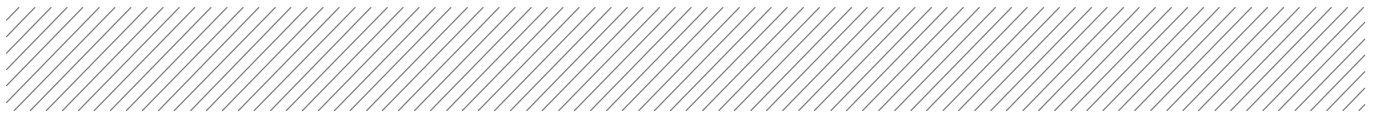
No species protected under the provisions of the EPBC Act were observed within the proposed development areas during these investigations.



5 References

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

Regional Ecosystem Mapping, Version 6.0, Queensland Government Department of Environment and Resource Management (DERM).



Appendix A

Flora Species List

Appendix A

Botanical species observed on Lot 4 SP204532.

Yellow shaded species are declared weeds under the *Land Protection (Pest and Stock Route Management) Act 2002*

Green shaded species are Type A restricted plants under the *Nature Conservation Act 1992*.

Scientific Name	Common Name	F197 & road	Power line
<i>Abutilon malvifolium</i>	Chinese Lantern		
<i>Abutilon leucopetalum</i>	Abutilon		
<i>Acacia complanata</i>	Velvet Wattle		
<i>Acacia decora</i>	Pretty Wattle		
<i>Acacia excelsa</i>	Iron wood		
<i>Achyranthes aspera</i>	two spine burr		
<i>Acroptilon maculosa</i>	Knap Weed		
<i>Alectryon diversifolius</i>	Scrub Boonaree		
<i>Alloteropsis semialata</i>	Cockatoo Grass		
<i>Alphitonia excelsa</i>	Red Ash		
<i>Alternanthera nodiflora</i>	Common Joy Weed		
<i>Alternanthera pungens</i>	Kaki Burr		
<i>Ancistrachne uncinulata</i>	Giant Spear Grass		
<i>Angophora leiocarpa</i>	Smooth-barked Apple		
<i>Aristida leptopoda</i>	Wire Grass		
<i>Aristida muricata</i>	Wire Grass		
<i>Aristida personata</i>	Spear Grass		
<i>Aristida queenslandica var. dissimilis</i>	Wire Grass		
<i>Aristida ramosa</i>	Wire Grass		
<i>Backhousia angustifolia</i>	Grey Myrtle		
<i>Bidens pilosa</i>	Cobblers Pegs		
<i>Bothriochloa bladhii subsp. bladhii</i>	Forest Blue Grass		
<i>Brachychiton populneus</i>	Kurrajong		

<i>Bulbine bulbosa</i>	Buttercup		
<i>Callitris glaucophylla</i>	White Cypress Pine		
<i>Calocephalus platycephalus</i>	Billy Buttons		
<i>Calotis cuneifolia</i>	Purple Burr Daisy		
<i>Calotis hispidula</i>	Bogan Flea		
<i>Calotis lappulacea</i>	Yellow Burr Daisy		
<i>Canthium oleifolium</i>	Hat stand, Wild Lemon		
<i>Capparis loranthifolia</i>	Nipan, Wait a while		
<i>Carex inversa</i>	Nut Sedge		
<i>Carissa ovata</i>	Currant Bush		
<i>Cassinia laevis</i>	Cough Bush		
<i>Cheilanthes sieberi</i>	Mulga Fern		
<i>Chenopodium carinatum</i>	Keeled Goosefoot		
<i>Chloris gayana</i>	Rhodes Grass		
<i>Chrysocephalum apiculatum</i>	Yellow Buttons		
<i>Cirsium vulgare</i>	Spear Thistle, Black Thistle		
<i>Commelina diffusa</i>	Wandering jew		
<i>Conyza bonariensis</i>	Fleabane		
<i>Corymbia tessellaris</i>	Moreton Bay Ash		
<i>Crotalaria dissitiflora</i>	Grey Rattlepod		
<i>Crotalaria dissitiflora</i>	Grey Rattlepod		
<i>Cymbidium canaliculatum</i>	Black Orchid		
<i>Cymbopogon refractus</i>	Barbwire Grass		
<i>Cynodon dactylon</i>	Green Couch		
<i>Cyperus gracilis</i>	Bunchy Sedge		
<i>Dianella caerulea</i>	Blue Flax-lily		
<i>Dianella longifolia</i>	Dianella		
<i>Digitaria ammophila</i>	Digitaria		
<i>Digitaria brownii</i>	Tall Digitaria		
<i>Dodonaea viscosa</i>	Sticky Hopbush		
<i>Dodonaea viscosa subsp. spatulata</i>	Sticky Hopbush		
<i>Enteropogon acicularis</i>	Curly Windmill Grass		
<i>Enteropogon ramosus</i>	Twirly Windmill Grass		
<i>Eragrostis brownii</i>	Browns Lovegrass		

<i>Eragrostis eriopoda</i>	Woolly Butt		
<i>Eucalyptus chloroclada</i>	Dirty Gum		
<i>Eucalyptus populnea</i>	Poplar Box		
<i>Eulalia fulva</i>	Silky Brown Top Grass		
<i>Eustrephus latifolia</i>	Wombat Berry		
<i>Fimbristylis dichotoma</i>	Fimbristylis		
<i>Fimbristylis nutans</i>	Star sedge		
<i>Gahnia aspera</i>	Gahnia		
<i>Gahnia sieberiana</i>	Sword Grass		
<i>Geijera parviflora</i>	Wilga		
<i>Glycine falcata</i>	Glycine		
<i>Gomphocarpus physocarpus</i>	Balloon Cotton Bush		
<i>Gomphrena celosioides</i>	Gomphrena Weed		
<i>Gonocarpus micranthus subsp. ramosissimus</i>	Gonocarpus		
<i>Goodenia fascicularis</i>	Goodenia		
<i>Grewia latifolia</i>	Dysentery Plant		
<i>Heteropogon contortus</i>	Black Spear Grass		
<i>Hydrocotyle sp.</i>	Pennywort		
<i>Imperata cylindrica</i>	Blady Grass		
<i>Ixiolaena brevicompta</i>	Yellow Daisy		
<i>Juncus polyanthemos</i>	Sharp Rush		
<i>Juncus usitatus</i>	Juncus		
<i>Laxmannia gracilis</i>	Slender Wire Lily		
<i>Lomandra longifolia</i>	Lomandra		
<i>Lomandra multiflora</i>	Lomandra		
<i>Macroptilium lathyroides</i>	Phasey bean		
<i>Megathurus maximus var maximus</i>	Green Panic		
<i>Melinis repens</i>	Red Natal		
<i>Opuntia stricta</i>	Prickly Pear		
<i>Owenia acidula</i>	Emu Apple		
<i>Panicum laevinode</i>	Panic grass		
<i>Pennisetum ciliare</i>	Buffel Grass		
<i>Perotis rara</i>	Comet Grass		

<i>Petalostigma pubescens</i>	Quinine		
<i>Pomax umbellata</i>			
<i>Portulaca oleracea</i>	Pig Weed		
<i>Pterocaulon sphacelatum</i>	Apple Bush		
<i>Richardia brasiliensis</i>	Mexican clover		
<i>Rumex brownii</i>	Swamp Dock		
<i>Rumex crispus</i>	Curled Dock		
<i>Santalum lanceolatum</i>	Sandalwood		
<i>Sclerolaena birchii</i>	Galvanised Burr		
<i>Senecio lautus</i>	Fire Weed		
<i>Senna artemisioides</i>	Senna		
<i>Setaria australiensis</i>	Pigeon Grass		
<i>Sida cordifolia</i>	Flannel weed		
<i>Sida subspicata</i>	Queensland Hemp		
<i>Solanum nigrum</i>	Black nightshade		
<i>Sonchus oleraceus</i>	Sow Thistle		
<i>Sporobolus creber</i>	Western Rats Tail Grass		
<i>Tagetes minuta</i>	Stinking Rodger		
<i>Themeda triandra</i>	Kangaroo Grass		
<i>Verbena tenuisecta</i>	Mayne's Curse		
<i>Wahlenbergia gracilis</i>	Sprawling Bluebell		
<i>Xanthium occidentale</i>	Noogoora Burr		



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