



WHITEHAVEN COAL MINING PTY LTD

ABN: 65 086 426 253

Belmont Coal Project

via Gunnedah

Flora Assessment



Prepared by

**Geoff Cunningham Natural Resource Consultants
Pty Ltd**

August, 2007

**Specialist Consultant Studies Compendium
Part 2**

This page has intentionally been left blank

Flora Assessment

of the

Belmont Coal Project

Prepared for: R.W. Corkery & Co. Pty Limited
PO Box 80
ORANGE NSW 2800

Tel: 02 6362 5411
Fax: 02 6361 3622
Email: mail@rwcorkery.com

On behalf of: Whitehaven Coal Mining Pty Ltd
1/895 Ann Street
PO Box 2440
FORTITUDE VALLEY QLD 4006

Tel: 07 3000 5693
Fax: 07 3000 5699
Email: kross@whitehaven.net.au

Prepared by: Geoff Cunningham Natural Resource Consultants Pty Ltd
9 The Crest
KILLARA NSW 2071

Tel: 02 9416 1995
Fax: 02 9416 6626
Email: geoffcun@bigpond.net.au

August, 2007

COPYRIGHT

© Whitehaven Coal Mining Pty Ltd. 2007

and

© Geoff Cunningham Natural Resource Consultants Pty Ltd 2007

All intellectual property and copyright reserved.

Apart from any fair dealing for the purpose of private study, research, criticism or review, as permitted under the Copyright Act, 1968, no part of this report may be reproduced, transmitted, stored in a retrieval system or adapted in any form or by any means [electronic, mechanical, photocopying, recording or otherwise] without written permission. Enquiries should be addressed to Geoff Cunningham Natural Resource Consultants Pty Ltd.

CONTENTS

	Page
1 INTRODUCTION AND DESCRIPTION OF THE STUDY AREA	2-5
1.1 Introduction	2-5
1.2 Description of Study Area	2-8
2 SURVEY METHODS	2-8
3 VEGETATION OF THE STUDY AREA	2-9
3.1 Previous Botanical Studies	2-9
3.1.1 Soil Conservation Service Technical Manuals	2-9
3.1.1.1 Coverage of the Study Area	2-9
3.1.1.2 Gunnedah District Technical Manual	2-9
3.1.2 Narrabri District Technical Manual	2-11
3.1.3 Department of Land and Water Conservation Mapping	2-11
3.1.3.1 Overview	2-11
3.1.3.2 Community 1b – White Cypress and Ironbark Forests	2-12
3.1.3.3 Community 1c – Slopes Grassy Woodland	2-13
3.1.3.4 Community 1d – Footslopes Woodlands	2-13
3.1.3.5 Community 3g – Black Earth Grasslands	2-14
3.1.3.6 Community 4c - Floodplain Woodlands	2-15
3.1.3.7 Community 5a – Non-native Vegetation	2-15
3.2 The Present Study	2-15
3.2.1 Narrow-leaf Ironbark - Pilliga Grey Box Community	2-16
3.2.2 Pilliga Grey Box - White Cypress Pine Community	2-18
3.2.3 Pilliga Grey Box - White Box - Yellow Box - White Cypress Pine Community	2-18
3.2.4 Brigalow Community	2-19
3.2.5 Cleared Lands - Used for Grazing and / or Cultivation	2-19
3.3 Noxious Weed Considerations	2-32
4 KOALA HABITAT CONSIDERATIONS	2-33
5 THREATENED SPECIES ISSUES	2-34
5.1 Introduction	2-34
5.2 The 'Atlas of NSW Wildlife' Data	2-34
5.3 Commonwealth Environment Protection and Biodiversity Conservation Act [EPBC Act] Online Database Threatened Species Listing	2-37
5.4 Endangered Ecological Communities and Populations	2-37
5.5 Critical Habitat	2-38
6 FIELD SURVEY DATA	2-38
6.1 Threatened Plant Species	2-38
6.2 Endangered Ecological Communities and Populations	2-38
6.3 Critical Habitat	2-39
6.4 Introduced Plant Species	2-39
6.5 Seven - Part Test	2-39
6.6 Threatened Species Overview	2-42

CONTENTS

	Page
7	ASSESSMENT OF PROPOSED DISTURBANCE AND PROPOSED OFFSETS 2-43
7.1	Disturbance within the Project Site..... 2-43
7.2	Clearing Requirements along the Transport Route on Shannon Harbour Road..... 2-43
7.3	Biodiversity Offsets..... 2-44
8	CONCLUSION..... 2-46
9	CUMULATIVE IMPACTS..... 2-47
10	ADDRESSING DIRECTOR-GENERAL'S REQUIREMENTS..... 2-48
11	REFERENCES 2-49

APPENDICES

Appendix 1	Listing of Plant Species Recorded from the Belmont Coal Project Study Area 2-53
Appendix 2	Director-General's Requirements and Requirements of Consulted Government Agencies 2-59

TABLES

Table 1	Tree and Shrub Species Occurring in the Vegetation Communities Within the Belmont Study Area..... 2-20
Table 2a	Ground Cover Species Recorded In Quadrats 1 to 9 Within the Belmont Study Area..... 2-23
Table 2b	Ground Cover Species Recorded In Quadrats 10 to 18 Within the Belmont Study Area..... 2-26
Table 2c	Ground Cover Species Recorded In Quadrats 19 to 27 Within the Belmont Study Area..... 2-28
Table 2d	Ground Cover Species Recorded In Quadrats 28 to 42 Within the Belmont Study Area..... 2-30
Table 2e	Ground Cover Species Recorded In Quadrats 43 to 50 Within the Belmont Study Area..... 2-32
Table 3	Assessment of the Likelihood of Occurrence of Threatened Flora Species at the Belmont Site 2-35
Table 4	Endangered Ecological Communities Likely to Occur Within the Boundaries of the Boggabri 1: 100 000 Map Sheet Area 2-38

FIGURES

Figure 1	Locality Plan 2-6
Figure 2	Project Site Layout and Study Area..... 2-7
Figure 3	Flora Survey Locations..... 2-10
Figure 4	Vegetation Communities of the Project Site and Transport Route 2-17
Figure 5	Biodiversity Offsets and Native Vegetation Rehabilitation..... 2-45

1 INTRODUCTION AND DESCRIPTION OF THE STUDY AREA

1.1 Introduction

This flora study was carried out on behalf of Whitehaven Coal Mining Pty Ltd [WCM], as part of an Environmental Assessment for a proposed open cut coal mine centered on the “Belmont” property [“the Belmont Coal Project” or “the Project”], off Wean Road approximately 25km north of Gunnedah [see **Figure 1**]. The Project Site layout is presented as **Figure 2**.

The Project, if approved, would involve the following activities.

- Coal mining by open cut mining methods over the area defined by the “limit of mining” [114.1ha]. The limit of open cut mining has been defined by drilling and a review of economic, geological and environmental considerations as described in Section 2.3. The area proposed for auger mining is located beyond the western limit of open cut mining and incorporation of this into the mine plan would be determined primarily by economic factors at the time.
- Open cut mining would be by the conventional haulback method involving the sequential removal of soil and overburden / interburden materials above and within the coal seams, coal removal and progressive backfilling and rehabilitation of the mined-out areas. Open cut mining may be supplemented by auger mining, to a distance of 200m beyond the western limit of the open cut.
- Annual ROM coal production would increase from an initial level of approximately 0.75Mtpa to a maximum annual rate of 1.5Mtpa.
- Programmed placement of overburden and interburden materials from the open cut area to a combination of out-of-pit and in-pit overburden emplacements.
- On-site size reduction of the ROM coal using a crushing plant positioned within the Coal Handling and Processing Area.
- Relocation of a section of Wean Road.
- Upgrading sections of Shannon Harbour Road and its intersection with Hoad Lane.
- Transportation of coal from the Project Site to the Whitehaven CHPP for washing and/or despatch to export markets via rail to Port Newcastle. At least 85% of the Project ROM coal would require washing.
- Backloading of coarse and fine reject material from the Whitehaven CHPP for placement in the mined-out areas within the limit of mining.
- Installation of a range of services, structures and transportable buildings.
- Progressive shaping and rehabilitation of the areas of disturbance within the Project Site.

The flora study was completed to document the level of disturbance to local flora that would occur should the Project proceed and to assess the impact of this disturbance on local and regional native vegetation and in particular those species, populations and communities listed as Threatened under NSW and Commonwealth legislation.

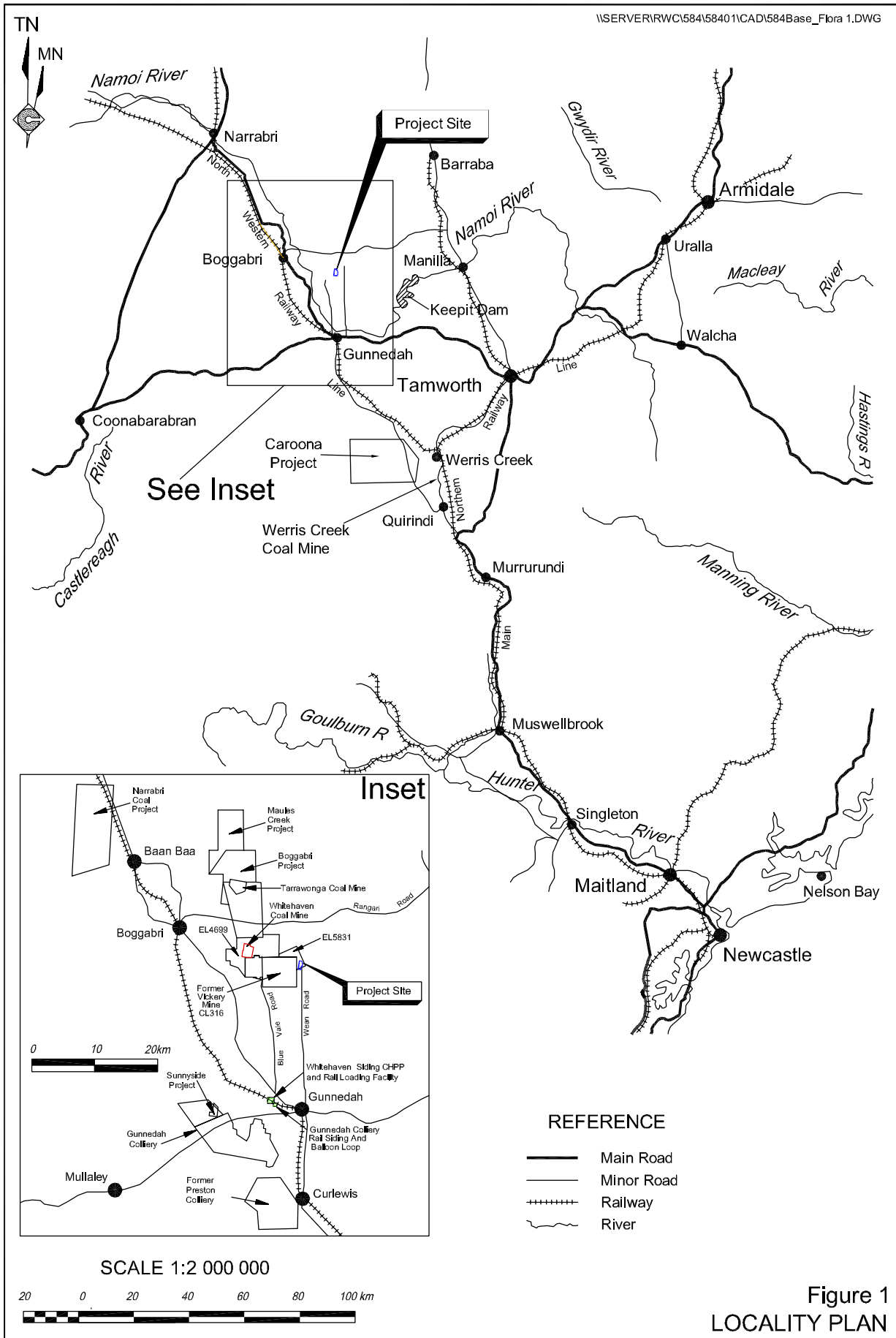
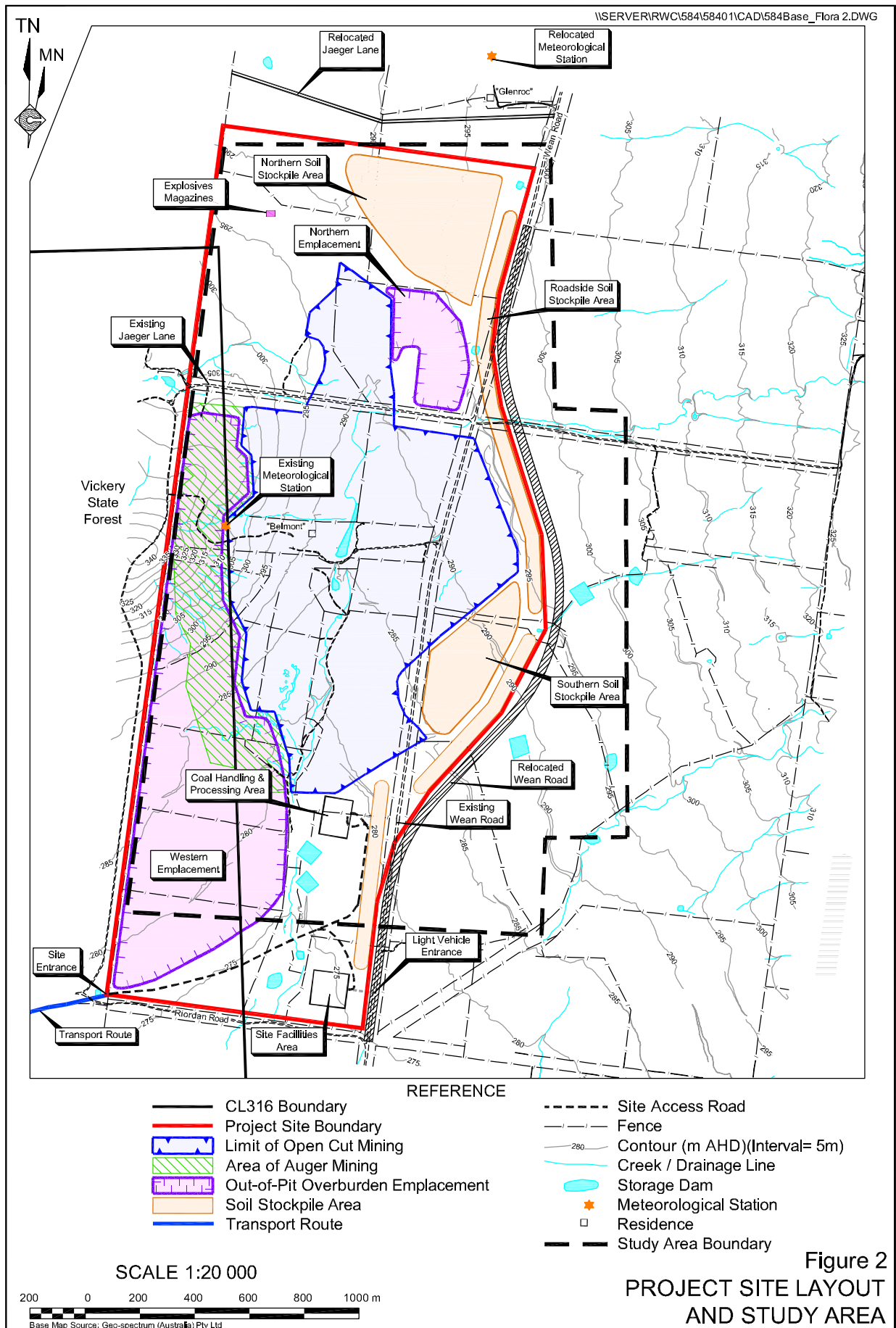


Figure 1
LOCALITY PLAN



Note: A Colour Version of this figure is available on the project CD

1.2 Description of Study Area

The study area comprises those parts of the “Belmont”, “Glenroc” and “Roseberry” properties that would be subject to activities associated with the Belmont Coal Project [“the Project Site”] along with a small sections of the “Brentry” and “Stratford” properties and the section of the Shannon Harbour Road road reserve required for the construction of a road between the Project Site and an established coal haulage route on Hoad Lane, Blue Vale Road and the Kamilaroi Highway [as currently used by coal carry trucks from the Whitehaven and Tarrawonga Coal Mines] [“the transport route”]. The transport route would exit the Project Site from the southwestern corner and cross the western end of Riordan Road. A private section of road would be constructed through the “Brentry” property, along the southern edge of Vickery State Forest [1.1km]. An additional private section of road would be constructed across the “Stratford” property [2.5km] to link the Riordan Road [SR 192] section of the transport route to Shannon Harbour Road [SR 93]. The transport route would then incorporate a 2.5km length of an upgraded Shannon Harbour Road before intersecting with Hoad Lane [SR 95] approximately 200m north of the intersection of Hoad Lane and Blue Vale Road [SR 7].

The study area comprises approximately 230 hectares and is shown on **Figure 2**.

The study area is situated in a broad valley between the hilly lands occupied by the Community Conservation Area Zone 2 - Kelvin and Vickery State Forest. It comprises mainly open, cleared level to gently sloping country that is presently farmed and / or grazed with the remainder timbered to varying degrees. The timber cover varies from remnant stands and areas of regeneration to scattered paddock trees.

A drainage line runs through the centre of the study area in a north - south direction. This “central drainage line”, which is aligned through the centre of the proposed open cut mining area, is ephemeral and only flows following periods of heavy or extended rainfall.

It is noted small areas of the upper slopes and crests near the Vickery State Forest boundary have been used as gravel pits in the past.

2 SURVEY METHODS

The study area was subjected to stereoscopic interpretation of 1: 10,000 scale colour airphotos prior to, and during, field surveys to determine vegetation community features and boundaries.

The photographs used were those produced by Geospectrum [Australia] Pty Ltd. The prints used in the stereoscopic interpretation were Run 1, Print Nos. 37 - 41 and Run 2 Nos. 42 - 46, flown on 22nd November, 2001.

The July and August, 2002 and December, 2006 inspections used stereoscopic interpretation of additional airphotos supplied by the Department of Information Technology and Management [Land and Property Information] to supplement the original photography.

These airphotos were Boggabri Run 7 prints 167, 168 and Run 8, prints 142, 143, 144; flown 15th August, 2001.

The different landforms and vegetation communities identified through stereoscopic airphoto interpretation were then sampled in the field to ascertain the variation in species density and composition within these communities.

A field inspection of the area was carried out on 23rd and 24th February, 2002. Traverses were made by four-wheel drive vehicle and, on foot where the timber cover, fencing and topography precluded driving. Further similar inspections were made on 22nd, 23rd, 24th July and 17th and 18th August, 2002 and again on 15th and 16th December, 2006.

Initially [during the February 2002 field surveys], a total of 30 sample sites were described. At each of these sites the species composition data was recorded with the exception of one site that was completely devoid of cover having been recently cultivated.

At these selected sites, quadrats 50m X 50m in area were examined to record the occurrence of all ground cover species present.

A further 20 sites were described as part of the July/August 2002 field surveys [50mx50m quadrats were examined at each site], with the original observations for the initial 30 sites being checked. The December, 2006 inspection was used to detect if any substantial changes in community composition or structure had occurred since the previous inspections.

Figure 3 presents the locations of flora survey undertaken as part of the Belmont Coal Project.

3 VEGETATION OF THE STUDY AREA

3.1 Previous Botanical Studies

3.1.1 Soil Conservation Service Technical Manuals

3.1.1.1 Coverage of the Study Area

The study area lies largely within the area covered by the Gunnedah District Technical Manual published by the former Soil Conservation Service of New South Wales [Anon, 1976].

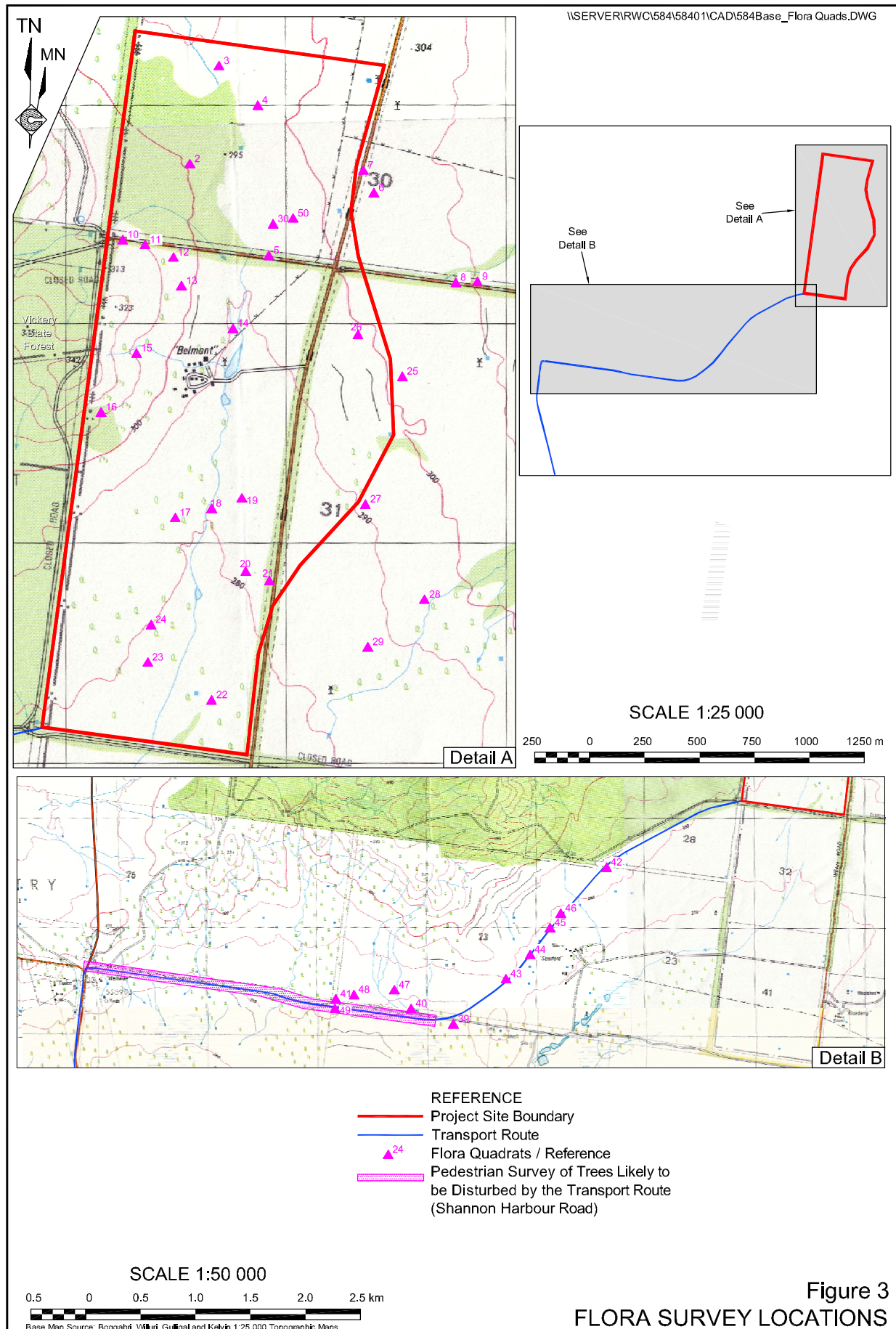
However, because of the scale of the maps included in the Technical Manuals and some boundary discrepancies, part of the study area also appears to lie within the area covered by the Narrabri District Technical Manual [Anon, 1978].

3.1.1.2 Gunnedah District Technical Manual

The Gunnedah Technical Manual indicates that the study area lies within the White Cypress Pine [*Callitris glaucophylla*] Tall Woodland and Shrub Woodland Community.

This community, as described in the Gunnedah Technical Manual, has White Cypress Pine as its dominant species. Subdominant species include:

- Narrow-leaf Ironbark [*Eucalyptus crebra*];
- White Box [*Eucalyptus albens*];
- Yellow Box [*Eucalyptus melliodora*];
- Blakely's Red Gum [*Eucalyptus blakelyi*];
- Tumbledown Gum [*Eucalyptus dealbata*];
- Motherumbah [*Acacia cheelii*];



- Kurrajong [*Brachychiton populneus*]; and
- Belah [*Casuarina cristata*].

No mention is made of the Pilliga Grey Box [*Eucalyptus pilligaensis*] that is common in the study area.

The only information provided about the ground cover species in this Manual is that the

"... grass members of the community include Wire grasses [*Aristida* spp.], spear grasses [*Stipa* spp.], barbed-wire grass [*Cymbopogon refractus*], love grasses [*Eragrostis* spp.] and red grass [*Bothriochloa decipiens*]."

3.1.2 Narrabri District Technical Manual

The section of the Narrabri Technical Manual vegetation map that adjoins the study area is mapped as Cypress Pine - Ironbark - White Box Community.

The dominant species are White Cypress Pine, Narrow-leaf ironbark and White Box. Black Cypress pine [*Callitris endlicheri*] is also present on steeper sites with shallow soils. Other tree species that occur within this community include:

- Blue-leaved Ironbark [*Eucalyptus fibrosa*];
- Blakely's Red Gum [*Eucalyptus blakelyi*];
- Tumbledown Gum [*Eucalyptus dealbata*];
- Rough-barked Apple [*Angophora floribunda*];
- Yellow Box [*Eucalyptus melliodora*]; and
- Kurrajong [*Brachychiton populneus*].

The grass flora within this community is composed mainly of Wire Grasses [*Aristida ramosa*, *Aristida vagans*, *Aristida jerichoensis*], Wallaby Grasses [*Austrodanthonia caespitosa*, *Austrodanthonia setacea*, *Austrodanthonia linkii*, *Austrodanthonia carphoides*, *Austrodanthonia richardsonii*], Windmill Grasses [*Chloris truncata*] and Spear Grasses [*Austrostipa setacea*, *Austrostipa ccaabra*, *Austrostipa verticillata*, *Austrostipa falcata*].

Other grass species noted to occur within this community are Lovegrasses [*Eragrostis* spp.], Red Grass [*Bothriochloa macra*], Tall Chloris [*Chloris ventricosa*], Rat's-tail Grass [*Sporobolus elongatus*], Curly Windmill Grass [*Enteropogon acicularis*], Kangaroo Grass [*Themeda australis*], Pitted Blue Grass [*Bothriochloa decipiens*], Barbed-wire Grass [*Cymbopogon refractus*], Tussock Grass [*Poa labillardieri*], Small Burr Grass [*Tragus australianus*] and Nigger Heads [*Enneapogon nigricans*].

3.1.3 Department of Land and Water Conservation Mapping

3.1.3.1 Overview

In 2003, the Department of Land and Water Conservation published a vegetation survey report and map [Cannon et al, 2003] covering the Bellata, Gravesend, Horton and Boggabri 1:100 000 scale map sheet areas.

This report covers the present study area, albeit at the rather broad scale of 1:100 000, and identifies a number of vegetation communities within the Project Site and transport route.

Within the Project Site, four vegetation communities are identified. These are:

- **Community 1c** – Slopes Grassy Woodland;
- **Community 1d** – Foothills Woodlands;
- **Community 3g** – Black Earth Grasslands; and
- **Community 5a** – Non native vegetation.

A fifth community occurs mainly in Vickery State Forest and is shown to border the study area. This is **Community 1b** – White Cypress and Ironbark Forests.

A sixth vegetation community, **Community 4c** - Floodplain Woodlands, is identified along the road reserve of the Shannon Harbour Road section that forms part of the transport route.

The following sub-sections describe the dominant and sub-dominant species within each of these vegetation communities.

3.1.3.2 Community 1b – White Cypress and Ironbark Forests

The dominant trees are White Cypress Pine [*Callitris glaucophylla*] and Narrow-leaf Ironbark [*Eucalyptus crebra*] with sub-dominant tree species including White Box [*Eucalyptus albens*], Silver-leaf Ironbark [*Eucalyptus melanophloia*], Tumbledown Gum [*Eucalyptus dealbata*] and Kurrajong [*Brachychiton populneus*].

Understorey species include Native Olive [*Notelaea microcarpa*], Wilga [*Geijera parviflora*], Motherumbah [*Acacia cheelii*], *Acacia leiocalyx*, Red Ash [*Alphitonia excelsa*] and Butterbush [*Pittosporum angustifolium*].

Common shrubs include Sticky Wallaby-bush [*Beyeria viscosa*], *Pimelea neo-anglica*, Box-leaf Wattle [*Acacia buxifolia*], *Leucopogon muticus*, Sticky Daisy-bush [*Olearia elliptica*], Cough Bush [*Cassinia laevis*], Broad-leaf Hopbush [*Dodonaea viscosa* subsp. *spatulata*], *Melichrus urceolatus* and *Hibbertia obtusifolia*. The vines, Gargaloo [*Parsonsia eucalyptophylla*] and Inland Wonga Vine [*Pandorea pandorana*], also occur.

The main groundcover species are grasses including Rough Speargrass [*Austrostipa scabra*], Wallaby Grass [*Austrodanthonia racemosa*], Barbed Wire Grass [*Cymbopogon refractus*], Slender Panic [*Paspalidium gracile*], Wiregrass [*Aristida gracilipes*], Short-haired Plume-grass [*Dichelachne micrantha*], Purple Wiregrass [*Aristida ramosa*], Slender Bottlewashers [*Enneapogon gracilis*], Pitted Bluegrass [*Bothriochloa decipiens*], Fine-leaf Tussock-grass [*Notodanthonia longifolia*, *Leptochloa ciliolata* and *Poa sieberiana*].

Herb species include Matrush [*Lomandra filiformis*], [*Cyperus gracilis*], Large Tick-trefoil [*Desmodium brachypodium*], Slender Tick-trefoil [*Desmodium varians*], Kidney Weed [*Dichondra* sp. A], Variable Glycine [*Glycine tabacina*], Pink Tongues [*Rostellularia adscendens*], *Oxalis perennans*, Fuzzweed [*Vittadinia muelleri*], *Vittadinia dissecta*, Tah Vine [*Boerhavia dominii*], Yellow Burr-daisy [*Calotis lappulacea*], Blue Trumpets [*Brunoniella australis*], Western Stackhousia [*Stackhousia muricata*], *Phyllanthus virgatus*, Tufted Bluebell [*Wahlenbergia communis*], Cobbler's Tack [*Glossogyne tannensis*], Corrugated Sida [*Sida corrugata*], *Scutellaria humilis*, Shade Plantain [*Plantago debilis*], Rock Fern [*Cheilanthes sieberi*] and Bristly Cloak-fern [*Cheilanthes distans*].

3.1.3.3 Community 1c – Slopes Grassy Woodland

The dominant trees are White Cypress Pine [*Callitris glaucophylla*] and Narrow-leaf Ironbark [*Eucalyptus crebra*] with White Box [*Eucalyptus albens*], Silver-leaf Ironbark [*Eucalyptus melanophloia*], Tumbledown Gum [*Eucalyptus dealbata*], Blakely's Red Gum [*Eucalyptus blakelyi*], Rough-barked Apple [*Angophora floribunda*] and Kurrajong [*Brachychiton populneus*] also present.

Understorey species include Native Olive [*Notelaea microcarpa*] while common shrubs include Sticky Daisy-bush [*Olearia elliptica*], *Pimelea neo-anglica*, Broad-leaf Hopbush *Dodonaea viscosa* subsp. *spatulata*], *Cassinia quinquefaria* and *Melichrus urceolatus*.

The main groundcover species are grasses including Rough Speargrass [*Austrostipa scabra*], Slender Bamboo Grass [*Austrostipa verticillata*], *Austrodanthonia racemosa*, Red Grass [*Bothriochloa macra*], Barbed Wire Grass [*Cymbopogon refractus*], Curly Windmill Grass [*Enteropogon acicularis*], *Enteropogon ramosus*, Windmill Grass [*Chloris truncata*], Tall Windmill-grass [*Chloris ventricosa*], Hairy Panic [*Panicum effusum*], Slender Panic [*Paspalidium gracile*], Short-haired Plume-grass [*Dichelachne micrantha*], Purple Wiregrass [*Aristida ramosa*], *Dichanthium sericeum* [Queensland Bluegrass], *Sporobolus creber* [Western Rat's-tail Grass], Common Wheatgrass [*Elymus scaber*], *Eragrostis leptostachya*, Slender Bottlewashers [*Enneapogon gracilis*], Pitted Bluegrass [*Bothriochloa decipiens*], *Leptochloa ciliolata* and Fine-leaf Tussock-grass [*Poa sieberiana*].

Herb species include Matrush [*Lomandra multiflora*], *Scleria mackaviensis*, *Cyperus gracilis*, Large Tick-trefoil [*Desmodium brachypodum*], Slender Tick-trefoil [*Desmodium varians*], Kidney Weed [*Dichondra* sp. A], Variable Glycine [*Glycine tabacina*], Pink Tongues [*Rostellularia adscendens*], Yellow Burr-daisy [*Calotis lappulacea*], Blue Trumpet [*Brunoniella australis*], Tufted Bluebell [*Wahlenbergia communis*], Cobbler's Tack [*Glossogyne tannensis*], Rock Fern [*Cheilanthes sieberi*] and Bristly Cloak-fern [*Cheilanthes distans*].

3.1.3.4 Community 1d – Foothills Woodlands

The dominant trees are Yellow Box [*Eucalyptus melliodora*], Blakely's Red Gum [*Eucalyptus blakelyi*] and Rough-barked Apple [*Angophora floribunda*] with White Box [*Eucalyptus albens*], White Cypress Pine [*Callitris glaucophylla*] and occasionally Grey Box, [*Eucalyptus moluccana*] Fuzzy Box [*Eucalyptus conica*] and / or Bimble Box [*Eucalyptus populnea* subsp. *bimbi*] present.

Shrub cover is sparse and species include *Pimelea neo-anglica*, Sticky Daisy-bush [*Olearia elliptica*], Cough Bush [*Cassinia laevis*] and *Melichrus urceolatus*] Vines recorded include Headache Vine [*Clematis glycinoides*], Wombat Berry [*Eustrephus latifolius*], Inland Wonga Vine [*Pandorea pandorana*] and *Jasminum suavissimum*].

The main grass species include Weeping Grass [*Microlaena stipoides*], Rough Speargrass [*Austrostipa scabra*], Slender Bamboo Grass [*Austrostipa verticillata*], Red Grass [*Bothriochloa macra*], Pitted Bluegrass [*Bothriochloa decipiens*], *Echinopogon ovatus*, *Austrodanthonia racemosa*, Barbed Wire Grass [*Cymbopogon refractus*] Fine-leaf Tussock-grass [*Poa sieberiana*], Queensland Bluegrass [*Dichanthium sericeum*], Western Rat's-tail Grass [*Sporobolus creber*], Slender Panic [*Paspalidium gracile*], Curly Windmill Grass [*Enteropogon acicularis*], *Enteropogon ramosus*, Windmill Grass [*Chloris truncata*], Tall Windmill-grass [*Chloris ventricosa*], Purple Wiregrass [*Aristida ramosa*], *Eragrostis leptostachya*, Couch Grass [*Cynodon dactylon**], Liverseed Grass [*Urochloa panicoides**], Paspalum [*Paspalum dilatatum**] and *Opismenus aemulus*.

Herb species include Spiny-headed Matrush [*Lomandra longifolia*], *Cyperus gracilis*, *Carex inversa*, *Carex incomitata*, Large Tick-trefoil [*Desmodium brachypodum*], Twining Glycine [*Glycine clandestina*], Kidney Weed [*Dichondra repens*], Slender Tick-trefoil [*Desmodium varians*], Kidney Weed [*Dichondra* sp. A], *Scutellaria humilis*, Variable Glycine [*Glycine tabacina*], *Phyllanthus subcrenulatus*, *Hydrocotyle laxiflora*, Scrub Nettle [*Urtica incisa*], Climbing Saltbush [*Einadia nutans*], Smooth Darling Pea [*Swainsona galegifolia*], *Einadia trigonos* Wild Stattice [*Verbena bonariensis**], Flaxleaf Fleabane [*Conyza bonariensis**], Flatweed [*Hypochaeris radicata**], Common Sowthistle [*Sonchus oleraceus**] and Spear Thistle [*Cirsium vulgare**].

3.1.3.5 Community 3g – Black Earth Grasslands

These grasslands may be natural or derived following the clearing of trees and shrubs. The overall appearance is one of a grassland but there may be scattered trees and shrubs present. Tree species include White Box [*Eucalyptus albens*], Bimble Box [*Eucalyptus populnea* subsp. *bimbi*], Rosewood [*Alectryon oleifolius*], Myall [*Acacia pendula*], Whitewood [*Atalaya hemiglauca*], Belah [*Casuarina cristata*], Supplejack [*Ventilago viminalis*], Cooba [*Acacia salicina*], Wilga [*Geijera parviflora*], Wild Orange [*Capparis mitchellii*] and Native Olive [*Notelaea microcarpa*].

Shrubs recorded in the community include Black Roly-poly [*Sclerolaena muricata*], Galvanised Burr [*Sclerolaena birchii*], Ruby Saltbush [*Enchylaena tomentosa*] and Eastern Cottonbush [*Maireana microphylla*] and the vine, Nepine [*Capparis lasiantha*].

Dominant grasses are Plains Grass [*Austrostipa aristiglumis*] and White Wiregrass [*Aristida leptopoda*]. Other grasses include Slender Bamboo Grass [*Austrostipa verticillata*], Rough Speargrass [*Austrostipa scabra*], Wallaby Grass [*Austrodanthonia bipartita*], Box Grass [*Paspalidium constrictum*], Tall Cupgrass [*Eriochloa crebra*], Early Spring Grass [*Eriochloa pseudoacrotricha*], Curly Windmill Grass [*Enteropogon acicularis*], Tall Curly Windmill Grass [*Enteropogon ramosus*], Fairy Grass [*Sporobolus caroli*], Western Rat'stail Grass [*Sporobolus creber*], Queensland Bluegrass [*Dichanthium sericeum*], Native Panic [*Panicum buncei*], Liverseed Grass [*Urochloa panicoides**], Purple Wiregrass [*Aristida ramosa*], Pitted Bluegrass [*Bothriochloa decipiens*], *Eragrostis leptostachya*, Tall Chloris [*Chloris ventricosa*] and a Canegrass [*Leptochloa divaricatissima*].

Sedges and herbs recorded include Downs Nutgrass [*Cyperus bifax*], *Cyperus gracilis*, Knob Sedge [*Carex inversa*], Tah Vine [*Boehavia dominii*], Australian Bibweed [*Convolvulus erubescens*], *Oxalis perennans*, Quena [*Solanum esuriale*], Munyeroo [*Portulaca oleracea*], Malvastrum [*Malvastrum americanum**], Straggly Lantern-bush [*Abutilon oxycarpum*], *Lepidium pseudohyssopifolium*, Variegated Thistle [*Silybum marianum**], Turnip Weed [*Rapistrum rugosum**], Ridge Sida [*Sida cunninghamii*], *Sida spinosa*, *Einadia polygonoides*, Climbing Saltbush [*Einadia nutans*], Lesser Joyweed [*Alternanthera denticulata*], Sensitive Plant [*Neptunia gracilis*], Slender Dock [*Rumex brownii*], Yellow Vine [*Tribulus micrococcus*] and Cutleaf Medic [*Medicago laciniata**].

* Denotes an introduced species

3.1.3.6 Community 4c - Floodplain Woodlands

These are woodlands dominated by Bimble Box [*Eucalyptus populnea* subsp. *bimbil*]. Other tree species recorded are Pilliga Grey Box [*Eucalyptus pilligaensis*], Yellow Box [*Eucalyptus melliodora*], River Red Gum [*Eucalyptus camaldulensis*], Grey Box [*Eucalyptus moluccana*], Silver-leaf Ironbark [*Eucalyptus melanophloia*], White Box [*Eucalyptus albens*], Belah [*Casuarina cristata*], White Cypress Pine [*Callitris glaucophylla*], Wilga [*Geijera parviflora*], Wild Orange [*Capparis mitchellii*], Brigalow [*Acacia harpophylla*], Rosewood [*Alectryon oleifolius*], Native Olive [*Notelaea microcarpa*] and Whitewood [*Atalaya hemiglauca*].

Shrub species include Budda [*Eremopila mitchellii*], Mimosa Bush [*Acacia farnesiana*], Western Boobialla [*Myoporum montanum*], Ellangowan Poison Bush [*Eremophila deserti*], African Boxthorn [*Lycium ferrocissimum**], Ruby Saltbush [*Enchylaena tomentosa*], Spiny Saltbush [*Rhagodia spinescens*], Galvanised Burr [*Sclerolaena birchii*], and Pink Pavonia [*Pavonia hastata**].

Vines are uncommon but Native Jasmine [*Jasminum lineare*], Gargaloo [*Parsonsia eucalyptophylla*], Nepine [*Capparis lasiantha*] and Small-leaf Clematis [*Clematis microphylla*] occur.

Grasses recorded include Pitted Bluegrass [*Bothriochloa decipiens*], Wallaby Grass [*Austrodanthonia bipartita*], Windmill Grass [*Chloris truncata*], Tall Chloris [*Chloris ventricosa*], Rough Speargrass [*Austrostipa scabra*], Corkscrew Grass [*Austrostipa setacea*], Slender Bamboo Grass [*Austrostipa verticillata*], Purple Wiregrass [*Aristida ramosa*], Curly Windmill Grass [*Enteropogon acicularis*], Tall Curly Windmill Grass [*Enteropogon ramosus*], Barbed-wire Grass [*Cymbopogon refractus*], Fairy Grass [*Sporobolus caroli*], Western Rat'stail Grass [*Sporobolus creber*], Native Panic [*Paspalidium gracile*], Queensland Bluegrass [*Leptochloa ciliolata*], Dichanthium sericeum, *Homopholus belsonii*, Slender Bottlewashers [*Enneapogon gracilis*] and Spreading Umbrella Grass [*Digitaria divaricatissima*].

Sedges and herbs recorded include Knob Sedge [*Cyperus gracilis*], *Carex inversa*, Climbing Saltbush [*Einadia nutans*], *Oxalis chnoodes*, Turnip Weed [*Rapistrum rigidum**], Fuzzweed [*Vittadinia cuneata*], *Solanum parvifolium*, Straggly Lantern-bush [*Abutilon oxycarpum*], *Wahlenbergia fluminalis*, Tall Bluebell [*Wahlenbergia stricta*], Woolly Plover-daisy [*Ixiolaena tomentosa*], *Lepidium pseudohyssopifolium*, Silky Goodenia [*Goodenia fascicularis*], Burr Medic [*Medicago polymorpha**], Sowthistle [*Sonchus oleraceus**], Yellow Burr-daisy [*Calotis lappulacea*], *Pycnosorus globosus*, Rough Bedstraw [*Galium gaudichaudii*], Blue Trumpets [*Brunoniella australis*], Purple Burr-daisy [*Calotis cuneifolia*] and London Rocket [*Symbrium irio**].

3.1.3.7 Community 5a – Non-native Vegetation

Land that has been cleared and or cultivated and which supports a vegetative cover dominated by non-native species including grain and fibre crops and introduced pasture species.

3.2 The Present Study

Table 1 presents a summary of the major tree and shrub species and **Tables 2a – 2e** present the ground cover species identified within the 50 quadrats examined within the study area. Based on the species identified, a total of eight separate vegetation communities are considered to be present within the study area.

* Denotes an introduced species

These are:

- **Community 1** - Narrow-leaf Ironbark - Pilliga Grey Box Community;
- **Community 2** - Pilliga Grey Box - White Cypress Pine Community;
- **Community 3** - Pilliga Grey Box - White Box - Yellow Box - White Cypress Pine Community;
- **Community 4**¹ - Pilliga Grey Box - Belah - Bull Oak Community;
- **Community 5**¹ - Bimble Box Community;
- **Community 6** - Brigalow Community;
- **Community 7**¹ - Regenerating White Cypress Pine; and
- **Community 8** - Cleared Lands - Used for Grazing and / or Cultivation.

The following sub-sections provide a description of the species identified within each community that falls within the Project Site or proposed alignment of the transport route [see **Figure 4**].

3.2.1 **Narrow-leaf Ironbark - Pilliga Grey Box Community** [Quadrats 1,10,11,42,43]

The main tree species within this community are Narrow-leaf Ironbark [*Eucalyptus crebra*], Pilliga Grey Box [*Eucalyptus pilligaensis*] and White Cypress Pine [*Callitris glaucophylla*] spaced from 1 to 10 metres apart. Other tree species occurring in this community include Rosewood [*Alectryon oleifolius*], Wilga [*Geijera parviflora*], Black Cypress Pine [*Callitris endlicheri*] and Butterbush [*Pittosporum phillyraeoides*].

Shrubs are spaced from <1 to 2 metres apart or may be scattered. Species include Western Boobialla [*Myoporum montanum*], Western Golden Wattle [*Acacia decora*], Broad-leaf Hopbush [*Dodonaea viscosa* subsp. *spatulata*], Sticky Wallaby-bush [*Beyeria viscosa*], Shrubby Riceflower [*Pimelea microcephala*], Cough Bush [*Cassinia laevis*] and Silver Wattle [*Acacia dealbata*].

The main ground cover species include No. 9 Wiregrass [*Aristida jerichoensis* var. *subspinulifera*], Barbed-wire Grass [*Cymbopogon refractus*], Kidney Weed [*Dichondra repens*], Rough Speargrass [*Austrostipa scabra*], Cotton Panic [*Digitaria brownii*], Spiny Potato-bush [*Solanum ferocissimum*], Fuzzweed [*Vittadinia muelleri*] and Prickly Pear [*Opuntia* sp].

Parts of this area have previously been used as gravel pits and are regenerating. A complete listing of the species recorded in this community is contained in **Tables 1** and **2a** to **2e**.

¹ These communities were identified during the field surveys, however, following the relocation of the transport route, will not be significantly disturbed by the Project and are not further considered in this report.

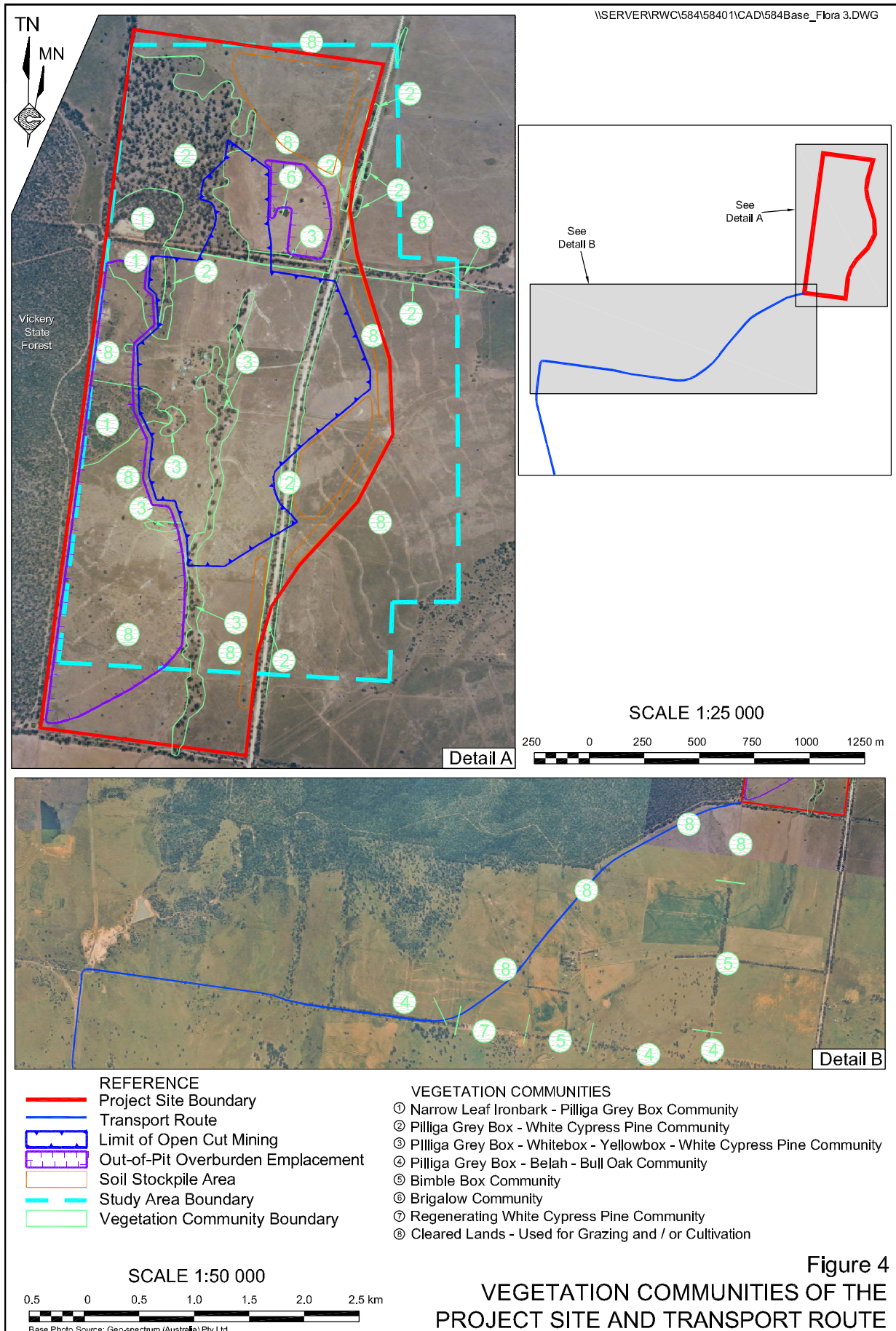


Figure 4
VEGETATION COMMUNITIES OF THE
PROJECT SITE AND TRANSPORT ROUTE

3.2.2 Pilliga Grey Box - White Cypress Pine Community [Quadrats 2,7,8,10,12,21]

Trees are spaced from <2 to 15 metres apart. The main tree species are Pilliga Grey Box [*Eucalyptus pilligaensis*] and White Cypress Pine [*Callitris glaucophylla*]. Other tree species include Narrow-leaf Ironbark [*Eucalyptus crebra*], White Box [*Eucalyptus albens*], Rosewood [*Alectryon oleifolius*], Wilga [*Geijera parviflora*], Wild Orange [*Capparis mitchellii*], Bull Oak [*Allocasuarina luehmannii*] and occasional Belah [*Casuarina cristata*], Bimble Box [including seedlings] [*Eucalyptus populnea* subsp. *bimbi*] and Yellow Box [*Eucalyptus melliodora*].

Shrubs are spaced from <1 to 15 metres apart or may be widely scattered. The main species is Eastern Cottonbush [*Maireana microphylla*], Gargaloo [*Parsonsia eucalyptophylla*], Budda [*Eremophila mitchellii*], Miljee [*Acacia oswaldii*], Western Boobialla [*Myoporum montanum*] and Native Olive [*Notelaea microcarpa* var. *microcarpa*].

Occasional dead plants of African Boxthorn [*Lycium ferocissimum**] were noted in roadside locations.

The main ground cover species are Purple Wiregrass [*Aristida ramosa*], No. 9 Wiregrass [*Aristida jerichoensis* var. *subspinulifera*], Slender Bamboo Grass [*Austrostipa verticillata*], Climbing Saltbush [*Einadia nutans*], Curly Windmill Grass [*Enteropogon acicularis*], Galvanised Burr [*Sclerolaena birchii*], Paddy's Lucerne [*Sida rhombifolia**] and Rough Speargrass [*Austrostipa scabra*].

A complete listing of the species recorded in this community is contained in **Tables 1** and **2a** to **2e**.

3.2.3 Pilliga Grey Box - White Box - Yellow Box - White Cypress Pine Community [Quadrats 5,9,14,18,28]

This community is largely restricted to roadside remnants and occurrences along the central drainage line through the study area.

Trees are spaced from 2 to 30 metres apart. The main tree species are Pilliga Grey Box [*Eucalyptus pilligaensis*], White Box [*Eucalyptus albens*], White Cypress Pine [*Callitris glaucophylla*], Yellow Box [*Eucalyptus melliodora*] and Bull Oak [*Allocasuarina luehmannii*].

Other tree species include Narrow-leaf Ironbark [*Eucalyptus crebra*], Wilga [*Geijera parviflora*], Rosewood [*Alectryon oleifolius*], Butterbush [*Pittosporum angustifolium*] and Silver-leaf Ironbark [*Eucalyptus melanophloia*]. Tumbledown Gum [*Eucalyptus dealbata*] occurs within this community in some midslope areas.

Shrub cover varies from relatively dense [<1 to 10 metre spacings] to scattered. The main species is Eastern Cottonbush [*Maireana microphylla*] with some Miljee [*Acacia oswaldii*], Silver Wattle [*Acacia dealbata*] and Broad-leaf Hopbush [*Dodonaea viscosa* subsp. *spatulata*].

Ground cover species include PurpleWiregrass [*Aristida ramosa*], No. 9 Wiregrass [*Aristida jerichoensis* var. *subspinulifera*], Rough Speargrass [*Austrostipa scabra*], Slender Bamboo Grass [*Austrostipa verticillata*], Saffron Thistle [*Carthamus lanatus**], Windmill Grass [*Chloris truncata*], Cotton Panic [*Digitaria brownii*], Climbing Saltbush [*Einadia nutans*], Curly Windmill Grass [*Enteropogon acicularis*], Granite Lovegrass [*Eragrostis molybdea*], Galvanised Burr [*Sclerolaena birchii*] and Fuzzweed [*Vittadinia* sp].

* Denotes an introduced species

A complete listing of the species recorded in this community is contained in **Tables 1** and **2a** to **2e**.

3.2.4 Brigalow Community [Quadrat 50]

The Brigalow community is represented by a single isolated remnant of about 55 stems of Brigalow [*Acacia harpophylla*]. Some trees may be multi-stemmed so the number of individual trees present is undoubtedly somewhat less

The remnant is located in the centre of a cultivated paddock that regularly produces crops.

Eastern Cottonbush [*Maireana microphylla*] shrubs are spaced from <1 to 3m apart and some African Boxthorn [*Lycium ferocissimum**] plants are present.

The community was heavily grazed and the only recognisable ground cover species was Slender Bamboo Grass [*Austrostipa verticillata*].

A complete listing of the species recorded in this community is contained in **Tables 1** and **2a** to **2e**.

3.2.5 Cleared Lands - Used for Grazing and / or Cultivation [Quadrats 3,4,6,13,17,19,20,22,23,24,25,26,27,29,30,44,45,46,47,48,49]

This community is basically treeless although some shade trees remain in most paddocks.

Species present as scattered trees within the paddocks or around boundaries include Pilliga Grey Box [*Eucalyptus pilligaensis*], Kurrajong [*Brachychiton populneus*], Wilga [*Geijera parviflora*], White Cypress Pine [*Callitris glaucophylla*], Bull Oak [*Allocasuarina luehmannii*], Yellow Box [*Eucalyptus melliodora*], Rosewood [*Alectryon oleifolius*] and occasional Narrow-leaf Ironbark [*Eucalyptus crebra*].

Eastern Cottonbush [*Maireana microphylla*] is basically the only shrub present and its spacing varies from 5 to 30 metre through a scattered distribution to complete absence on recently cultivated land.

The main ground cover species are Purple Wiregrass [*Aristida ramosa*], No. 9 Wiregrass [*Aristida jerichoensis* var. *subspinulifera*], Rough Speargrass [*Austrostipa scabra*], Red Grass [*Bothriochloa macra*], Saffron Thistle [*Carthamus lanatus**], Galvanised Burr [*Sclerolaena birchii*], Slender Bamboo Grass [*Austrostipa verticillata*], Centaury [*Centaureum tenuiflorum*], Windmill Grass [*Chloris truncata*] and Skeleton Weed [*Chondrilla juncea**].

A complete listing of the species recorded in this community is contained in **Tables 1** and **2a** to **2e**.

* Denotes an introduced species

Table 1
Tree and Shrub Species Occurring in the Vegetation Communities Within the Belmont Study Area

Page 1 of 3

QUADRAT	EASTING	NORTHING	SPECIES RECORDED
1	238660E	6594919N	Trees: T5 - 10. Pilliga Grey Box [<i>Eucalyptus pilligaensis</i>], White Cypress Pine [<i>Callitris glaucophylla</i>], Rosewood [<i>Alectryon oleifolius</i>], Wilga [<i>Geijera parviflora</i>]. Shrubs: scattered. Western Boobialla [<i>Myoporum montanum</i>], Western Golden Wattle [<i>Acacia decora</i>] and Shrubby Rice-flower [<i>Pimelea microcephala</i>]
2	238660E	6594919N	Trees: T2 - 15 Pilliga Grey Box, Rosewood, White Cypress Pine, Belah [<i>Casuarina cristata</i>] [occasional], Bull Oak [<i>Allocasuarina luehmannii</i>], Bimble Box [<i>Eucalyptus populnea</i> ssp. <i>bimbi</i>] [occasional], Wild Orange [<i>Capparis mitchellii</i>] Shrubs: S2 - 5. Eastern Cottonbush [<i>Maireana microphylla</i>], Miljee [<i>Acacia oswaldii</i>], Budda [<i>Eremophila mitchellii</i>], Native Olive [<i>Notelaea microcarpa</i> var. <i>microcarpa</i>], Silver Wattle [<i>Acacia dealbata</i>] Vines: Gargaloo [<i>Parsonsia eucalyptophylla</i>],
3	238793E	6595366N	Trees: scattered Kurrajong [<i>Brachychiton populneus</i>] and Wilga Shrubs: S<1-10 Eastern Cottonbush
4	238970E	6595185N	Trees: scattered Wilga. Shrubs: absent
5	239020E	6594497N	Trees: T5-10. Pilliga Grey Box, Narrow-leaf Ironbark [<i>Eucalyptus crebra</i>] [occasional], Bull Oak. Shrubs: S<1 - 10. Silver Wattle, Eastern Cottonbush.
6	239499E	6594787N	Trees: absent. Shrubs: S15-20. Eastern Cottonbush.
7	239451E	6594890N	Trees: T<1-15. Pilliga Grey Box, White Cypress Pine, Narrow-leaf Ironbark, Rosewood, Wilga, Bimble Box seedlings. Shrubs: S<1-15. Eastern Cottonbush, Silver Wattle, dead African Boxthorn [<i>Lycium ferocissimum</i>]*.
8	239872E	6594379N	Trees: T5-10. White Box [<i>Eucalyptus albens</i>], Wild Orange, Wilga, Narrow-leaf Ironbark and White Cypress Pine occur closer to the main road]. Shrubs: S2-10. Budda, Western Boobialla, Eastern Cottonbush Vines: Gargaloo
9	239934E	6594419N	Trees: T5-15. White Box, Tumbledown Gum [<i>Eucalyptus dealbata</i>]. Shrubs: S<1-5. Eastern Cottonbush.
10	238358E	6594568N	Trees: T<1-5; Narrow-leaf Ironbark, Black Cypress Pine [<i>Callitris endlicheri</i>], Wilga, Butterbush [<i>Pittosporum angustifolium</i>], Rosewood; Shrubs: S<1-2; Sticky Wallaby-bush [<i>Beyeria viscosa</i>] , Broad-leaf Hopbush [<i>Dodonaea viscosa</i> subsp. <i>spatulata</i>], Boobialla, Shrubby Rice-flower, Cough Bush [<i>Cassinia laevis</i>], Silver Wattle
NOTE – numbers after the symbols 'S' and 'T' denote the spacings [in metres] of shrubs and trees respectively at each site.			
Data for field survey quadrats 31-38 [inclusive] have been omitted from the Table as they were located along an alternative transport route that is now not relevant to the proposal. The remaining quadrats retain their original numbers.			
* Denotes an introduced species			

Table 1 [Cont'd]
Tree and Shrub Species Occurring in the Vegetation Communities Within the Belmont Study Area

Page 2 of 3

QUADRAT	EASTING	NORTHING	SPECIES RECORDED
11	238456E	6594543N	Trees: T<1-10. Black Cypress pine and eucalypt seedlings [probably Narrow-leaf Ironbark]. Shrubs: Very scattered Cough Bush.
12	238584E	6594486N	Trees: T<1-10. Narrow-leaf Ironbark, Wilga, White Cypress Pine, Bull Oak. Shrubs: S<1-10. Eastern Cottonbush
13	238623E	6594360N	Trees: Basically treeless; scattered White Cypress Pine, Bull Oak. Shrubs: S>50. Eastern Cottonbush
14	238857E	6594163N	Trees: T2-30. Pilliga Grey Box, White Cypress Pine, White Box [occasional], patches of Wilga. Shrubs: S<1-5. Eastern Cottonbush. Miljee [occasional]
15	238417E	6594055N	Trees: T1-4-10-20 regenerating White Cypress Pine. Many small plants. Shrubs: absent
16	238257E	6593783N	Trees: T<1-5. White Cypress Pine; Shrubs: scattered. Shrubby Rice-flower, Hill Indigo [<i>Indigofera australis</i>]
17	238597E	6593310N	Trees: Scattered Bull Oak: White Box in drainage line to east. Shrubs: scattered Eastern Cottonbush.
18	238757E	6593348N	Trees: T10-30. Pilliga Grey Box, White Cypress Pine. White Box and Rosewood [occasional]. Shrubs: scattered Eastern Cottonbush. Miljee [occasional]
19	238877E	6593419N	Trees: absent. Shrubs: S5-50 Eastern Cottonbush.
20	238910E	6593063N	Trees: one Kurrajong in vicinity. Shrubs: S<1-10. Eastern Cottonbush
21	239023E	6593017N	Trees: T2-10. Pilliga Grey Box, Narrow-leaf Ironbark, Yellow Box [<i>Eucalyptus melliodora</i>], Wilga, White Cypress Pine. Shrubs: scattered. Miljee Vines: Gargaloo
22	Not recorded		Trees: absent Shrubs: S<1-5. Eastern Cottonbush. [Drainage line to the west with T10-30 Pilliga Grey Box. Yellow Box and Bull Oak [occasional]]
23	238473E	6592646N	Trees: occasional Rosewood. Shrubs: S<1-10. Eastern Cottonbush
24	238480E	6592816N	Trees: T>100. Pilliga Grey Box, Wilga, Rosewood. Much fallen timber. Shrubs: S5-10. Eastern Cottonbush
NOTE - numbers after the symbols 'S' and 'T' denote the spacings [in metres] of shrubs and trees respectively at each site.			
Data for field survey quadrats 31-38 [inclusive] have been omitted from the Table as they were located along an alternative transport route that is now not relevant to the proposal. The remaining quadrats retain their original numbers.			
* Denotes an introduced species			

Table 1 [Cont'd]
Tree and Shrub Species Occurring in the Vegetation Communities Within the Belmont Study Area

Page 3 of 3

QUADRAT	EASTING	NORTHING	SPECIES RECORDED
25	239630E	6593948N	Trees: occasional Rosewood nearby. Shrubs: S20-30. Eastern Cottonbush
26	239425E	6594139N	Trees: absent, some regenerating seedlings / saplings of White Cypress Pine Shrubs: absent
27	239461E	6593372N	Trees: scattered White Cypress Pine, Pilliga Grey Box and Narrow-leaf Ironbark in the paddock. Shrubs: S5-20. Eastern Cottonbush
28	239726E	6592931N	Trees: T2-20. Mainly White Cypress Pine with Narrow-leaf Ironbark, Wilga, Rosewood, Butterbush and Silver-leaf Ironbark [<i>Eucalyptus melanophloia</i>]. Shrubs: scattered Eastern Cottonbush, Broad-leaf Hopbush
29	239473E	6592714N	Trees: absent Shrubs: absent
30	239040E	6594645N	Trees: absent Shrubs: absent
39	235360E	6590323N	Trees: T5-15; Pilliga Grey Box, Bull Oak, Wilga, Butterbush
40	234973E	6590397N	Trees: T5-20; Pilliga Grey Box, Bull Oak
41	234287E	6590466N	Trees: T5-15 Pilliga Grey Box, Bull Oak; White Box coming in as proceed upslope; Wild orange and Rosewood
42	236696E	6591788N	Trees: Scattered Narrow-leaf Ironbark
43	235549E	6591129N	Trees: T2-20-40 White Cypress Pine saplings, occasional White Box, Narrow-leaf Ironbark further east
44	Not recorded		Trees: Treeless except for some White Cypress Pine regeneration spreading from Vickery State Forest in parts
45	236033E	6591394N	Trees: absent
46	236128E	6591523N	Trees: absent; Shrubs: S<1 – 10-15 Eastern Cottonbush
47	234862E	6590631N	Trees: Treeless mainly; occasional patches of White Cypress Pine saplings at <1-5m spacings; Shrubs: occasional Eastern Cottonbush
48	234456E	6590587N	Trees: Treeless; some T10-40 White Cypress Pine regeneration
49	234282E	6590463N	Trees: T2-5-20; Pilliga Grey Box, Wild Orange, Rosewood with some Butterbush, Bull Oak and White Cypress Pine
50	239115E	6594685N	Trees: T<1-2-5; Brigalow; Shrubs: S<1-3 Eastern Cottonbush, African Boxthorn [<i>Lycium ferocissimum</i> *] [Noxious Weed]
NOTE - numbers after the symbols 'S' and 'T' denote the spacings [in metres] of shrubs and trees respectively at each site.			
Data for field survey quadrats 31-38 [inclusive] have been omitted from the Table as they were located along an alternative transport route that is now not relevant to the proposal. The remaining quadrats retain their original numbers.			
* Denotes an introduced species			

Table 2a
Ground Cover Species Recorded In Quadrats 1 to 9 Within the Belmont Study Area

Page 1 of 2

SPECIES	1	2	3	4	5	6	7	8	9
<i>Alternanthera pungens</i> * [Khaki Weed]	-	-	-	P	-	P	-	-	P
<i>Amaranthus</i> sp.* [Amaranth]	-	-	-	-	-	-	-	-	P
Purple Wiregrass [<i>Aristida ramosa</i> var. <i>speciosa</i>]	P	-	P	-	-	P	P	-	P
<i>Atriplex spinebractea</i> [Spiny-fruit Saltbush]	-	-	-	-	-	-	-	P	-
<i>Austrodanthonia setacea</i> [Small-flowered Wallaby Grass]	P	-	-	-	-	-	P	P	-
<i>Austrostipa aristiglumis</i> [Plains Grass]	-	-	-	-	-	-	P	P	-
<i>Austrostipa scabra</i> [Rough Speargrass]	P	-	p	-	P	-	P	-	-
<i>Austrostipa verticillata</i> [Slender Bamboo Grass]	-	p	-	-	P	P	P	P	P
<i>Boerhavia dominii</i> [Tah Vine]	-	-	-	-	P	-	P	-	-
<i>Bothriochloa macra</i> [Red Grass]	-	-	-	P	-	P	P	-	-
<i>Bracteantha bracteata</i> [Golden Everlastings]	-	-	-	-	-	-	P	P	-
<i>Brunoniella australis</i> [Blue Trumpets]	P	-	-	-	-	-	-	-	-
<i>Calotis lappulacea</i> [Yellow Burr-daisy]	-	-	-	-	-	-	P	-	-
<i>Carthamus lanatus</i> * [Saffron Thistle]	-	-	P	P	-	P	P	-	P
<i>Centaureum tenuiflorum</i> * [Centaury]	-	-	-	-	-	P	-	-	-
<i>Chamaesyce drummondii</i> [Caustic Weed]	-	-	P	-	-	P	-	-	-
<i>Cheilanthes seeberi</i> [Rock Fern]	-	-	-	-	-	-	-	-	-
<i>Chloris truncata</i> [Windmill Grass]	-	P	-	P	P	P	-	-	P
<i>Chloris ventricosa</i> [Tall Chloris]	-	-	-	-	-	-	-	P	-
<i>Chondrilla juncea</i> * [Skeleton Weed]	-	-	P	-	-	P	P	-	-
<i>Chrysocephalum apiculatum</i> [Yellow Buttons]	-	-	-	-	-	-	P	-	-
<i>Convolvulus erubescens</i> [Australian Bindweed]	-	-	-	-	-	-	P	-	-
<i>Cuscuta</i> sp. [Dodder]	-	-	-	-	-	-	-	-	-
<i>Cymbopogon refractus</i> [Barbed Wire Grass]	P	-	-	-	-	-	-	-	-
<i>Cynodon dactylon</i> * [Couch Grass]	-	-	P	-	-	-	P	-	-
<i>Desmodium brachypodum</i> [Large Tick-trefoil]	-	-	-	-	-	-	-	-	-
<i>Dichanthium sericeum</i> [Queensland Bluegrass]	-	-	-	-	-	-	-	-	-
<i>Dichondra repens</i> [Kidney Weed]	P	-	-	-	-	-	-	-	-
<i>Digitaria brownii</i> [Cotton Panic]	P	-	-	-	P	-	P	-	-
<i>Digitaria divaricatissima</i> [Spreading Umbrella Grass]	-	-	-	-	-	-	P	-	-
<i>Dittrichia graveolens</i> * [Stinkwort]	-	-	-	-	-	-	-	P	P
<i>Echium plantagineum</i> * [Paterson's Curse]	-	-	-	-	-	-	P	-	-
<i>Einadia nutans</i> [Climbing Saltbush]	-	-	-	-	P	-	P	P	P
<i>Elymus scaber</i> [Common Wheatgrass]	-	-	-	-	-	-	-	P	-
<i>Enneapogon gracilis</i> [Slender Bottlewashers]	-	-	-	-	-	-	-	-	-
<i>Enteropogon acicularis</i> [Curly Windmill Grass]	-	P	-	-	P	-	P	P	-
<i>Eragrostis cilianensis</i> * [Stinking Lovegrass]	-	-	-	-	-	P	-	-	-

Data for field survey quadrats 31-38 [inclusive] have been omitted from the Table as they were located along an alternative transport route that is now not relevant to the proposal. The remaining quadrats retain their original numbers.

* Denotes an introduced species

Table 2a [Cont'd]
Ground Cover Species Recorded In Quadrats 1 to 9 Within the Belmont Study Area

Page 2 of 2

SPECIES	1	2	3	4	5	6	7	8	9
<i>Eragrostis lacunaria</i> [Purple Lovegrass]	-	-	-	-	P	-	-	-	-
<i>Eragrostis megalosperma</i>	-	-	-	-	-	-	-	-	-
<i>Eragrostis macrocarpa</i> [Dainty Lovegrass]	-	-	-	-	P	-	P	-	-
<i>Eriochloa pseudoacrotricha</i> [Early Spring Grass]	-	-	-	-	-	-	-	P	-
<i>Glycine</i> sp. [Glycine]	-	-	-	-	-	-	-	-	-
<i>Juncus</i> sp. [Rush]	-	P	-	-	-	-	-	-	-
<i>Lactuca serriola</i> * [Prickly Lettuce]	-	-	-	-	-	-	P	-	-
<i>Lepidium africanum</i> * [Peppergrass]	-	-	-	P	P	P	P	-	P
<i>Lomandra bracteata</i>	P	-	-	-	-	-	P	-	-
<i>Ludwigia peploides</i> ssp. <i>montevidensis</i> [Water Primrose]	-	-	-	-	-	-	-	-	-
<i>Malvastrum americanum</i> * [Malvastrum]	-	-	-	-	-	-	-	P	-
<i>Marrubium vulgare</i> * [Horehound]	-	-	-	-	-	-	P	-	-
<i>Medicago sativa</i> * [Lucerne]	-	-	P	-	-	P	-	-	-
<i>Opuntia</i> sp.* [Prickly Pear]	P	-	-	-	-	-	-	P	P
<i>Oxalis</i> ? <i>perennans</i> [Wood Sorrel]	-	-	-	-	-	-	-	-	-
<i>Paspalidium constrictum</i> [Box Grass]	-	-	-	-	P	-	P	P	-
<i>Petrorhagia nanteuillii</i> * [Proliferous Pink]	-	-	-	-	-	P	P	-	-
<i>Portulaca oleracea</i> [Munyeroo]	-	-	-	-	-	-	-	P	-
<i>Rostellularia adscendens</i> [Pink Tongues]	P	-	P	-	-	-	-	-	-
<i>Salsola kali</i> [Buckbush]	-	-	-	-	P	-	P	P	-
<i>Scirpus</i> sp.	P	-	-	-	-	-	-	-	-
<i>Sclerolaena birchii</i> [Galvanised Burr]	-	P	P	P	P	P	P	-	P
<i>Sclerolaena muricata</i> [Black Roly-poly]	-	P	-	-	-	-	-	P	P
<i>Senna barclayana</i> [Pepper-leaf Senna]	-	-	-	-	-	-	-	P	-
<i>Sida corrugata</i> [Corrugated Sida]	-	P	-	-	P	-	P	-	-
<i>Sida cunninghamii</i> [Ridge Sida]	-	-	-	-	-	-	P	-	-
<i>Sida rhombifolia</i> * [Paddy's Lucerne]	-	-	-	-	-	P	P	P	-
<i>Sida subspicata</i> [Spiked Sida]	-	-	P	-	P	P	P	P	-
<i>Solanum esuriale</i> [Quena]	-	-	-	-	-	-	-	P	P
<i>Solanum ferocissimum</i> [Spiny Potato-bush]	P	-	-	-	-	-	-	-	-
<i>Sporobolus caroli</i> [Fairy Grass]	-	P	-	-	-	-	-	P	P
<i>Sporobolus creber</i> [Western Rat'stail Grass]	-	-	-	-	-	-	-	-	-
<i>Swainsona galegifolia</i> [Smooth Darling Pea]	P	-	-	-	-	-	-	-	-
<i>Swainsona monticola</i>	-	-	-	-	-	-	P	-	-
<i>Tribulus terrestris</i> [Cathead]	-	-	-	-	-	P	-	P	-
<i>Trifolium glomeratum</i> * [Cluster Clover]	-	-	P	-	-	-	-	-	-
<i>Urochloa advena</i> *	-	-	-	-	-	P	-	P	-
<i>Vittadinia cuneata</i> var. <i>cuneata</i> forma <i>minor</i> [Fuzzweed]	P	P	-	P	P	-	P	-	-
<i>Vittadinia muelleri</i> [Fuzzweed]	-	-	-	-	-	-	-	-	-
<i>Wahlenbergia communis</i> [Tufted Bluebell]	-	-	P	-	-	-	-	-	-
<i>Xanthium spinosum</i> * [Bathurst Burr]	-	-	-	-	-	-	-	-	-

Data for field survey quadrats 31-38 [inclusive] have been omitted from the Table as they were located along an alternative transport route that is now not relevant to the proposal. The remaining quadrats retain their original numbers.

* Denotes an introduced species

Table 2b
Ground Cover Species Recorded In Quadrats 10 to 18 Within the Belmont Study Area

Page 1 of 2

SPECIES	10	11	12	13	14	15	10	17	18
<i>Alternanthera pungens</i> * [Khaki Weed]	-	-	-	-	-	-	-	-	-
<i>Amaranthus</i> sp.* [Amaranth]	-	-	-	-	-	-	-	-	-
<i>Aristida ramosa</i> var. <i>speciosa</i> [Wiregrass]	P	P	P	P	P	P	P	P	-
<i>Atriplex spinebractea</i>	-	-	-	-	P	P	-	-	-
<i>Austrodanthonia setacea</i> [Small-flowered Wallaby Grass]	-	-	-	-	P	P	-	-	-
<i>Austrostipa aristiglumis</i> [Plains Grass]	-	-	-	-	-	-	-	-	-
<i>Austrostipa scabra</i> [Rough Speargrass]	P	-	-	P	P	P	P	-	-
<i>Austrostipa verticillata</i> [Slender Bamboo Grass]	P	-	P	-	P	P	P	P	P
<i>Boerhavia dominii</i> [Tah Vine]	-	-	-	-	-	-	-	-	-
<i>Bothriochloa macra</i> [Red Grass]	-	P	-	P	P	P	-	-	-
<i>Bracteantha bracteata</i> [Golden Everlastings]	-	-	-	-	-	-	-	-	-
<i>Brunoniella australis</i> [Blue Trumpets]	-	-	-	-	-	-	-	-	-
<i>Calotis lappulacea</i> [Yellow Burr-daisy]	-	-	-	-	-	-	-	-	-
<i>Carthamus lanatus</i> * [Saffron Thistle]	-	P	P	P	P	P	-	P	P
<i>Centaurium tenuiflorum</i> * [Centaury]	-	-	-	P	-	P	-	-	-
<i>Chamaesyce drummondii</i> [Caustic Weed]	P	P	-	-	-	-	P	-	-
<i>Cheilanthes sieberi</i> [Rock Fern]	-	P	-	-	-	P	-	-	-
<i>Chloris truncata</i> [Windmill Grass]	-	-	-	-	P	P	-	-	P
<i>Chloris ventricosa</i> [Tall Chloris]	-	-	-	-	-	-	-	-	-
<i>Chondrilla juncea</i> * [Skeleton Weed]	-	-	-	-	-	P	-	-	-
<i>Chrysocephalum apiculatum</i> [Yellow Buttons]	-	-	-	-	-	-	-	-	-
<i>Convolvulus erubescens</i> [Australian Bindweed]	-	P	-	-	-	-	-	-	-
<i>Cuscuta</i> sp. [Dodder]	P	-	-	-	-	-	P	-	-
<i>Cymbopogon refractus</i> [Barbed Wire Grass]	-	P	-	-	-	-	-	P	-
<i>Cynodon dactylon</i> [Couch Grass]	-	-	-	-	-	-	-	-	-
<i>Desmodium brachypodum</i> [Large Tick-trefoil]	P	-	-	-	-	-	P	-	-
<i>Dichanthium sericeum</i> [Queensland Bluegrass]	-	P	-	P	-	-	-	P	-
<i>Dichondra repens</i> [Kidney Weed]	-	-	-	-	-	-	-	-	-
<i>Digitaria brownii</i> [Cotton Panic]	P	-	-	P	P	P	P	-	-
<i>Digitaria divaricatissima</i> [Spreading Umbrella Grass]	-	P	-	-	-	-	-	-	-
<i>Dittrichia graveolens</i> * [Stinkwort]	-	-	-	-	-	-	-	-	-
<i>Echium plantagineum</i> * [Paterson's Curse]	-	-	-	-	-	-	-	-	-
<i>Einadia nutans</i> [Climbing Saltbush]	P	-	P	-	P	P	P	-	-
<i>Elymus scaber</i> [Common Wheatgrass]	-	-	-	-	-	-	-	-	-
<i>Enneapogon gracilis</i> [Slender Bottlewashers]	-	P	-	-	-	-	-	-	-
<i>Enteropogon acicularis</i> [Curly Windmill Grass]	-	-	-	P	P	P	-	-	-
Data for field survey quadrats 31-38 [inclusive] have been omitted from the Table as they were located along an alternative transport route that is now not relevant to the proposal. The remaining quadrats retain their original numbers.									
* Denotes an introduced species									

Table 2b [Cont'd]
Ground Cover Species Recorded In Quadrats 10 to 18 Within the Belmont Study Area

Page 2 of 2

SPECIES	10	11	12	13	14	15	10	17	18
<i>Eragrostis cilianensis</i> * [Stinking Lovegrass]	-	-	-	-	-	-	-	-	-
<i>Eragrostis lacunaria</i> [Purple Lovegrass]	-	-	-	-	-	-	-	-	-
<i>Eragrostis megalosperma</i>	-	P	-	-	-	-	-	-	-
<i>Eragrostis microcarpa</i> [Dainty Lovegrass]	-	P	-	-	P	P	-	-	-
<i>Eriochloa pseudoacrotricha</i> [Early Spring Grass]	-	-	-	-	P	P	-	-	-
<i>Glycine</i> sp. [Glycine]	-	P	-	-	-	-	-	-	P
<i>Juncus</i> sp. [Rush]	-	-	-	-	P	P	-	-	-
<i>Lactuca serriola</i> * [Prickly Lettuce]	-	-	-	-	-	-	-	-	-
<i>Lepidium africanum</i> * [Peppergrass]	-	-	-	-	-	-	-	P	-
<i>Lomandra bracteata</i>	-	-	-	-	P	P	-	-	-
<i>Ludwigia peploides</i> ssp. <i>montevicensis</i> [Water Primrose]	-	-	-	-	P	P	-	-	-
<i>Malvastrum americanum</i> * [Malvastrum]	-	-	-	-	-	-	-	-	-
<i>Marrubium vulgare</i> * [Horehound]	-	-	-	-	-	-	-	-	-
<i>Medicago sativa</i> * [Lucerne]	-	-	-	-	-	-	-	-	-
<i>Opuntia</i> sp.* [Prickly Pear]	P	P	-	-	P	P	P	P	-
<i>Oxalis perennans</i> [Wood Sorrel]	-	-	-	-	-	P	-	-	-
<i>Paspalidium constrictum</i> [Box Grass]	-	-	-	-	-	-	-	-	-
<i>Petrorhagia nanteuillii</i> * [Proliferous Pink]	-	P	-	P	-	-	-	-	-
<i>Portulaca oleracea</i> [Munyeroo]	-	-	-	-	-	-	-	-	-
<i>Rostellularia adscendens</i> [Pink Tongues]	P	P	-	-	-	-	P	-	-
<i>Salsola kali</i> [Buckbush]	-	-	-	-	-	-	-	-	-
<i>Scirpus</i> sp.	P	-	-	-	-	-	P	-	-
<i>Sclerolaena birchii</i> [Galvanised Burr]	-	-	P	-	P	P	-	-	-
<i>Sclerolaena muricata</i> [Black Roly-poly]	-	-	-	P	P	P	-	-	-
<i>Senna barclayana</i> [Pepper-leaf Senna]	-	-	-	-	-	-	-	-	-
<i>Sida corrugata</i> [Corrugated Sida]	-	P	-	-	-	P	-	-	-
<i>Sida cunninghamii</i> [Ridge Sida]	-	-	-	-	P	P	-	P	P
<i>Sida rhombifolia</i> * [Paddy's Lucerne]	P	-	-	-	P	P	P	P	P
<i>Sida subspicata</i> [Spiked Sida]	-	P	-	-	-	-	-	-	-
<i>Solanum esuriale</i> [Quena]	-	-	-	-	P	P	-	-	-
<i>Solanum ferocissimum</i> [Spiny Potato-bush]	-	-	P	-	-	-	-	-	-
<i>Sporobolus caroli</i> [Fairy Grass]	-	-	-	-	-	-	-	-	-
<i>Sporobolus creber</i> [Western Rat'stail Grass]	-	-	P	-	-	-	-	-	-
<i>Swainsona galegifolia</i> [Smooth Darling Pea]	-	-	-	-	-	-	-	-	-
<i>Swainsona monticola</i>	-	-	-	-	-	-	-	-	P
<i>Tribulus terrestris</i> [Cathead]	-	-	-	-	-	-	-	-	-
<i>Trifolium glomeratum</i> * [Cluster Clover]	-	-	-	P	-	-	-	-	-
<i>Urochloa advena</i> *	-	-	-	-	-	-	-	-	-
<i>Vittadinia cuneata</i> var. <i>cuneata</i> forma <i>minor</i> [Fuzzweed]	-	-	-	-	P	P	-	-	-
<i>Vittadinia muelleri</i> [Fuzzweed]	-	P	-	-	-	-	-	-	-
<i>Wahlenbergia communis</i> [Tufted Bluebell]	-	P	-	-	-	P	-	-	-
<i>Xanthium spinosum</i> * [Bathurst Burr]	-	-	-	-	P	P	-	-	-

Data for field survey quadrats 31-38 [inclusive] have been omitted from the Table as they were located along an alternative transport route that is now not relevant to the proposal. The remaining quadrats retain their original numbers.

* Denotes an introduced species

Table 2c
Ground Cover Species Recorded In Quadrats 19 to 27 Within the Belmont Study Area

Page 1 of 2

SPECIES	19	20	21	22	23	24	25	26	27
<i>Alternanthera pungens</i> * [Khaki Weed]	-	-	-	-	-	-	-	-	-
<i>Amaranthus</i> sp.* [Amaranth]	-	-	-	-	-	-	-	-	-
<i>Aristida ramosa</i> var. <i>speciosa</i> [Wiregrass]	P	P	-	P	P	P	P	P	P
<i>Atriplex spinebractea</i>	-	-	-	-	-	-	-	-	-
<i>Austrodanthonia setacea</i> [Small-flowered Wallaby Grass]	-	-	-	-	-	-	-	-	-
<i>Austrostipa aristiglumis</i> [Plains Grass]	-	-	-	-	-	-	-	-	-
<i>Austrostipa scabra</i> [Rough Speargrass]	-	-	P	P	-	-	-	-	-
<i>Austrostipa verticillata</i> [Slender Bamboo Grass]	-	-	P	-	-	P	-	-	-
<i>Boerhavia dominii</i> [Tah Vine]	-	-	-	-	-	-	-	-	-
<i>Bothriochloa macra</i> [Red Grass]	P	-	-	-	-	-	P	P	-
<i>Bracteantha bracteata</i> [Golden Everlastings]	-	-	-	-	-	-	-	-	-
<i>Brunoniella australis</i> [Blue Trumpets]	-	-	-	-	-	-	-	-	-
<i>Calotis lappulacea</i> [Yellow Burr-daisy]	-	-	-	-	-	-	-	-	-
<i>Carthamus lanatus</i> * [Saffron Thistle]	P	P	-	P	-	P	P	P	P
<i>Centaureum tenuiflorum</i> * [Centaury]	P	-	-	-	-	-	P	P	-
<i>Chamaesyce drummondii</i> [Caustic Weed]	-	-	-	-	-	-	-	-	-
<i>Cheilanthes sieberi</i> [Rock Fern]	-	-	-	-	-	P	-	-	-
<i>Chloris truncata</i> [Windmill Grass]	P	P	-	P	P	P	P	-	P
<i>Chloris ventricosa</i> [Tall Chloris]	-	-	-	-	-	-	-	-	-
<i>Chondrilla juncea</i> * [Skeleton Weed]	P	-	-	-	P	-	-	P	P
<i>Chrysocephalum apiculatum</i> [Yellow Buttons]	-	-	-	-	-	-	-	-	-
<i>Citrullus lanatus</i> * [Camel Melon]	-	-	-	P	-	-	-	-	-
<i>Convolvulus erubescens</i> [Australian Bindweed]	-	-	-	-	-	-	-	-	-
<i>Conyza bonariensis</i> * [Flax-leaf Fleabane]	-	-	-	-	-	-	-	-	-
<i>Cuscuta</i> sp. [Dodder]	-	-	-	-	-	-	-	-	-
<i>Cymbopogon refractus</i> [Barbed Wire Grass]	-	-	-	-	-	-	-	-	-
<i>Cynodon dactylon</i> [Couch Grass]	-	-	-	-	-	-	-	-	-
<i>Desmodium brachypodium</i> [Large Tick-trefoil]	-	-	-	-	-	-	-	-	-
<i>Dichanthium sericeum</i> [Queensland Bluegrass]	-	-	-	-	-	-	-	-	-
<i>Dichondra repens</i> [Kidney Weed]	-	-	-	-	-	-	-	-	-
<i>Digitaria brownii</i> [Cotton Panic]	-	-	-	-	-	-	-	-	-
<i>Digitaria divaricatissima</i> [Spreading Umbrella Grass]	-	-	-	-	-	-	-	-	-
<i>Dittrichia graveolens</i> * [Stinkwort]	-	-	-	-	-	-	-	-	-
<i>Echium plantagineum</i> * [Paterson's Curse]	-	-	-	-	-	-	-	-	-
<i>Einadia nutans</i> [Climbing Saltbush]	-	-	-	-	-	-	-	-	-
<i>Elymus scaber</i> [Common Wheatgrass]	-	-	-	-	-	-	-	-	-
<i>Enneapogon gracilis</i> [Slender Bottlewashers]	-	-	-	-	-	-	-	-	-
<i>Enteropogon acicularis</i> [Curly Windmill Grass]	-	-	P	-	-	-	-	P	-
<i>Eragrostis cilianensis</i> * [Stinking Lovegrass]	-	-	-	-	-	-	-	-	-

Data for field survey quadrats 31-38 [inclusive] have been omitted from the Table as they were located along an alternative transport route that is now not relevant to the proposal. The remaining quadrats retain their original numbers.

* Denotes an introduced species

Table 2c [Cont'd]
Ground Cover Species Recorded In Quadrats 19 to 27 Within the Belmont Study Area

Page 2 of 2

SPECIES	19	20	21	22	23	24	25	26	27
<i>Eragrostis lacunaria</i> [Purple Lovegrass]	-	-	-	-	-	-	-	-	-
<i>Eragrostis megalosperma</i>	-	-	-	-	-	-	-	-	-
<i>Eragrostis microcarpa</i> [Dainty Lovegrass]	-	-	-	-	-	-	-	-	-
<i>Eriochloa pseudoacrotricha</i> [Early Spring Grass]	-	-	-	-	-	-	-	-	-
<i>Glycine</i> sp. [Glycine]	-	-	-	-	-	-	-	-	-
<i>Juncus</i> sp. [Rush]	-	-	-	-	-	P	-	P	-
<i>Lactuca serriola</i> * [Prickly Lettuce]	-	-	-	-	-	-	-	-	-
<i>Lepidium africanum</i> * [Peppergrass]	-	-	P	-	-	-	-	-	-
<i>Lomandra bracteata</i>	-	-	-	-	-	-	-	-	-
<i>Ludwigia peploides</i> ssp. <i>montevidensis</i> [Water Primrose]	-	-	-	-	-	-	-	-	-
<i>Malvastrum americanum</i> * [Malvastrum]	-	-	-	-	-	-	-	-	-
<i>Marrubium vulgare</i> * [Horehound]	-	-	P	-	-	-	-	-	-
<i>Medicago polymorpha</i> * [Burr Medic]	-	-	-	-	-	-	-	-	-
<i>Medicago sativa</i> * [Lucerne]	-	-	-	-	-	-	-	-	-
<i>Opuntia</i> sp.* [Prickly Pear]	-	-	-	-	-	-	-	-	-
<i>Oxalis</i> ? <i>perennans</i> [Wood Sorrel]	-	-	-	-	-	-	-	-	-
<i>Paspalidium constrictum</i> [Box Grass]	-	-	-	-	-	-	-	-	-
<i>Petrorhagia nanteuillii</i> * [Proliferous Pink]	-	-	-	-	-	-	P	-	-
<i>Portulaca oleracea</i> [Munyeroo]	P	-	-	-	-	-	-	-	-
<i>Rostellularia adscendens</i> [Pink Tongues]	-	-	-	-	-	-	-	-	-
<i>Rumex brownii</i> [Slender Dock]	-	-	-	-	-	-	-	P	-
<i>Salsola kali</i> [Buckbush]	-	-	-	-	-	-	-	-	-
<i>Scirpus</i> sp.	-	-	-	-	-	-	-	-	-
<i>Sclerolaena birchii</i> [Galvanised Burr]	P	P	P	P	P	P	P	-	P
<i>Sclerolaena muricata</i> [Black Roly-poly]	-	P	-	-	-	-	-	-	-
<i>Senna barclayana</i> [Pepper-leaf Senna]	-	-	-	-	-	-	-	-	-
<i>Sida corrugata</i> [Corrugated Sida]	-	-	-	-	-	-	-	-	-
<i>Sida cunninghamii</i> [Ridge Sida]	-	-	-	-	-	-	-	-	-
<i>Sida rhombifolia</i> * [Paddy's Lucerne]	-	-	-	-	-	-	-	-	-
<i>Sida subspicata</i> [Spiked Sida]	-	P	P	-	-	-	-	-	-
<i>Silybum marianum</i> * [Variegated Thistle]	-	-	-	-	-	-	-	-	P
<i>Solanum esuriale</i> [Quena]	-	-	-	-	-	-	P	-	-
<i>Solanum ferocissimum</i> [Spiny Potato-bush]	-	-	-	-	-	-	-	-	-
<i>Sporobolus caroli</i> [Fairy Grass]	-	-	-	-	-	-	-	-	-
<i>Sporobolus creber</i> [Western Rat'stail Grass]	-	-	-	-	-	-	-	-	-
<i>Swainsona galegifolia</i> [Smooth Darling Pea]	-	-	-	-	-	-	-	-	-
<i>Tribulus terrestris</i> [Cathead]	-	-	-	-	-	-	-	-	-
<i>Trifolium glomeratum</i> * [Cluster Clover]	-	-	-	-	-	-	-	-	-
<i>Urochloa advena</i> *	-	-	-	-	-	-	-	-	-
<i>Urtica incisa</i> [Scrub nettle]	-	-	-	-	-	-	-	-	-
<i>Urtica urens</i> * [Small Nettle]	-	-	-	-	-	-	-	-	-
<i>Vittadinia cuneata</i> var. <i>cuneata</i> forma <i>minor</i> [Fuzzweed]	-	-	-	-	-	-	-	-	-
<i>Vittadinia muelleri</i> [Fuzzweed]	-	-	-	-	-	-	-	-	-
<i>Wahlenbergia communis</i> [Tufted Bluebell]	-	-	-	-	-	-	P	P	P
<i>Xanthium spinosum</i> * [Bathurst Burr]	-	-	-	P	-	-	-	-	-
Data for field survey quadrats 31-38 [inclusive] have been omitted from the Table as they were located along an alternative transport route that is now not relevant to the proposal. The remaining quadrats retain their original numbers.									
* Denotes an introduced species									

Table 2d
Ground Cover Species Recorded In Quadrats 28 to 42 Within the Belmont Study Area

Page 1 of 2

SPECIES	28	29	30	39	40	41	42
<i>Alternanthera pungens</i> * [Khaki Weed]	-	P	-	-	-	-	-
<i>Amaranthus</i> sp.* [Amaranth]	-	-	-	-	-	-	-
<i>Aristida ramosa</i> var. <i>speciosa</i> [Wiregrass]	P	P	-	P	P	-	P
<i>Atriplex spinebractea</i> Spiny-fruit Saltbush]	-	-	-	-	-	-	-
<i>Austrodanthonia setacea</i> [Small-flowered Wallaby Grass]	-	-	-	-	-	-	-
<i>Austrostipa aristiglumis</i> [Plains Grass]	-	-	-	-	-	-	-
<i>Austrostipa scabra</i> [Rough Speargrass]	P	-	-	-	P	-	P
<i>Austrostipa verticillata</i> [Slender Bamboo Grass]	P	-	-	-	P	-	-
<i>Boerhavia dominii</i> [Tah Vine]	-	P	-	-	-	-	-
<i>Bothriochloa macra</i> [Red Grass]	-	P	-	-	-	-	P
<i>Bracteantha bracteata</i> [Golden Everlastings]	-	-	-	-	-	-	-
<i>Brunoniella australis</i> [Blue Trumpets]	-	-	-	-	-	-	-
<i>Calotis lappulacea</i> [Yellow Burr-daisy]	-	-	-	-	-	-	-
<i>Carthamus lanatus</i> * [Saffron Thistle]	P	P	-	-	-	-	p
<i>Centaurium tenuiflorum</i> * [Centaury]	-	-	-	-	-	-	-
<i>Chamaesyce drummondii</i> [Caustic Weed]	-	-	-	-	-	-	-
<i>Cheilanthes sieberi</i> [Rock Fern]	-	-	-	-	-	-	-
<i>Chloris truncata</i> [Windmill Grass]	-	P	-	-	-	-	-
<i>Chloris ventricosa</i> [Tall Chloris]	-	-	-	-	-	-	-
<i>Chondrilla juncea</i> * [Skeleton Weed]	P	P	-	-	-	-	-
<i>Chrysocephalum apiculatum</i> [Yellow Buttons]	-	-	-	-	-	-	-
<i>Citrullus lanatus</i> * [Camel Melon]	-	-	-	-	-	-	-
<i>Convolvulus erubescens</i> [Australian Bindweed]	-	-	-	-	-	-	-
<i>Conyza bonariensis</i> * [Flax-leaf Fleabane]	-	-	-	-	-	-	-
<i>Cuscuta</i> sp. [Dodder]	-	-	-	-	-	-	-
<i>Cymbopogon refractus</i> [Barbed Wire Grass]	-	-	-	-	-	-	P
<i>Cynodon dactylon</i> [Couch Grass]	-	-	-	-	-	-	-
<i>Desmodium brachypodium</i> [Large Tick-trefoil]	-	-	-	-	-	-	-
<i>Dichanthium sericeum</i> [Queensland Bluegrass]	-	-	-	-	-	-	-
<i>Dichondra repens</i> [Kidney Weed]	-	-	-	-	-	-	-
<i>Digitaria brownii</i> [Cotton Panic]	-	-	-	-	-	-	-
<i>Digitaria divaricatissima</i> [Spreading Umbrella Grass]	-	-	-	-	-	-	-
<i>Dittrichia graveolens</i> * [Stinkwort]	-	-	-	-	-	-	-
<i>Echium plantagineum</i> * [Paterson's Curse]	-	-	-	-	-	-	-
<i>Einadia nutans</i> [Climbing Saltbush]	-	-	-	-	-	-	-
<i>Elymus scaber</i> [Common Wheatgrass]	-	-	-	-	-	-	-
<i>Enneapogon gracilis</i> [Slender Bottlewashers]	-	-	-	-	-	-	-
<i>Enteropogon acicularis</i> [Curly Windmill Grass]	-	-	-	-	-	-	-
<i>Eragrostis cilianensis</i> * [Stinking Lovegrass]	-	-	-	-	-	-	-

Data for field survey quadrats 31-38 [inclusive] have been omitted from the Table as they were located along an alternative transport route that is now not relevant to the proposal. The remaining quadrats retain their original numbers.

* Denotes an introduced species

Table 2d [Cont'd]
Ground Cover Species Recorded In Quadrats 28 to 42 Within the Belmont Study Area

Page 2 of 2

SPECIES	28	29	30	39	40	41	42
<i>Eragrostis lacunaria</i> [Purple Lovegrass]	-	-	-	-	-	-	-
<i>Eragrostis megalosperma</i>	-	-	-	-	-	-	-
<i>Eragrostis microcarpa</i> [Dainty Lovegrass]	-	-	-	-	-	-	-
<i>Eriochloa pseudoacrotricha</i> [Early Spring Grass]	-	-	-	-	-	-	-
<i>Glycine</i> sp. [Glycine]	P	-	-	-	-	-	-
<i>Juncus</i> sp. [Rush]	-	-	-	-	-	-	-
<i>Lactuca serriola</i> * [Prickly Lettuce]	-	-	-	-	-	-	-
<i>Lepidium africanum</i> * [Peppercress]	-	P	-	-	-	-	-
<i>Lomandra bracteata</i>	-	-	-	-	-	-	-
<i>Ludwigia peploides</i> ssp. <i>montevidensis</i> [Water Primrose]	-	-	-	-	-	-	-
<i>Malvastrum americanum</i> * [Malvastrum]	-	-	-	-	-	-	-
<i>Marrubium vulgare</i> * [Horehound]	-	-	-	-	-	-	-
<i>Medicago polymorpha</i> * [Burr Medic]	P	-	-	-	-	-	-
<i>Medicago sativa</i> * [Lucerne]	-	-	-	-	-	-	-
<i>Opuntia</i> sp.* [Prickly Pear]	-	-	-	-	-	P	-
<i>Oxalis ? perennans</i> [Wood Sorrel]	-	-	-	-	-	-	-
<i>Paspalidium constrictum</i> [Box Grass]	-	-	-	-	-	-	-
<i>Petrorhagia nanteuillii</i> * [Proliferous Pink]	-	-	-	-	-	-	-
<i>Portulaca oleracea</i> [Munyeroo]	-	-	-	-	-	-	-
<i>Rostellularia adscendens</i> [Pink Tongues]	-	-	-	-	-	-	-
<i>Rumex brownii</i> [Slender Dock]	-	-	-	-	-	-	-
<i>Salsola kali</i> [Buckbush]	-	-	-	-	-	-	-
<i>Scirpus</i> sp.	-	-	-	-	-	-	-
<i>Sclerolaena birchii</i> [Galvanised Burr]	-	P	-	P	-	-	-
<i>Sclerolaena muricata</i> [Black Roly-poly]	-	-	-	-	-	-	-
<i>Senna barclayana</i> [Pepper-leaf Senna]	-	-	-	-	-	-	-
<i>Sida corrugata</i> [Corrugated Sida]	-	-	-	-	-	-	-
<i>Sida cunninghamii</i> [Ridge Sida]	-	-	-	-	-	-	-
<i>Sida rhombifolia</i> * [Paddy's Lucerne]	P	-	-	-	-	-	-
<i>Sida subspicata</i> [Spiked Sida]	-	-	-	-	-	-	-
<i>Silybum marianum</i> * [Variegated Thistle]	-	-	-	-	-	-	-
<i>Solanum esuriale</i> [Quena]	-	-	-	-	-	-	-
<i>Solanum ferocissimum</i> [Spiny Potato-bush]	-	-	-	-	-	-	-
<i>Sporobolus caroli</i> [Fairy Grass]	-	-	-	-	-	-	-
<i>Sporobolus creber</i> [Western Rat's tail Grass]	-	-	-	-	-	-	-
<i>Swainsona galegifolia</i> [Smooth Darling Pea]	P	-	-	-	-	-	-
<i>Tribulus terrestris</i> [Cathead]	-	-	-	-	-	-	-
<i>Trifolium glomeratum</i> * [Cluster Clover]	-	-	-	-	-	-	-
<i>Urochloa advena</i> *	-	-	-	-	-	-	-
<i>Urtica incisa</i> [Scrub nettle]	-	-	-	-	-	-	-
<i>Urtica urens</i> * [Small Nettle]	P	-	-	-	-	-	-
<i>Vittadinia cuneata</i> var. <i>cuneata</i> forma <i>minor</i> [Fuzzweed]	-	P	-	-	-	-	-
<i>Vittadinia muelleri</i> [Fuzzweed]	-	-	-	-	-	-	-
<i>Wahlenbergia communis</i> [Tufted Bluebell]	-	-	-	-	-	-	-
<i>Xanthium spinosum</i> * [Bathurst Burr]	-	-	-	-	-	-	-

Data for field survey quadrats 31-38 [inclusive] have been omitted from the Table as they were located along an alternative transport route that is now not relevant to the proposal. The remaining quadrats retain their original numbers.

* Denotes an introduced species

Table 2e
Ground Cover Species Recorded In Quadrats 43 to 50 Within the Belmont Study Area

Page 1 of 2

SPECIES	43	44	45	46	47	48	49	50
<i>Alternanthera pungens</i> * [Khaki Weed]	-	-	-	-	-	-	-	-
<i>Amaranthus</i> sp.* [Amaranth]	-	-	-	-	-	-	-	-
<i>Aristida ramosa</i> var. <i>speciosa</i> [Wiregrass]	P	-	P	P	P	P	P	-
<i>Atriplex spinebractea</i> [Spiny-fruit Saltbush]	-	-	-	-	-	-	-	-
<i>Austrodanthonia setacea</i> [Small-flowered Wallaby Grass]	-	-	-	-	-	-	-	-
<i>Austrostipa aristiglumis</i> [Plains Grass]	-	-	-	-	-	-	-	-
<i>Austrostipa scabra</i> [Rough Speargrass]	-	-	-	-	-	-	P	-
<i>Austrostipa verticillata</i> [Slender Bamboo Grass]	-	-	-	-	-	-	P	P
<i>Boerhavia dominii</i> [Tah Vine]	-	-	-	-	-	-	-	-
<i>Bothriochloa macra</i> [Red Grass]	-	-	-	-	-	P	-	-
<i>Bracteantha bracteata</i> [Golden Everlastings]	-	-	-	-	-	-	-	-
<i>Brunoniella australis</i> [Blue Trumpets]	-	-	-	-	-	-	-	-
<i>Calotis lappulacea</i> [Yellow Burr-daisy]	-	-	-	-	-	-	-	-
<i>Carthamus lanatus</i> * [Saffron Thistle]	-	-	-	-	-	P	-	-
<i>Centaureum tenuiflorum</i> * [Centaury]	-	-	-	-	-	-	-	-
<i>Chamaesyce drummondii</i> [Caustic Weed]	-	-	-	-	-	-	-	-
<i>Cheilanthes sieberi</i> [Rock Fern]	-	-	-	-	-	-	-	-
<i>Chloris truncata</i> [Windmill Grass]	P	-	P	P	-	-	-	-
<i>Chloris ventricosa</i> [Tall Chloris]	-	-	-	-	-	-	-	-
<i>Chondrilla juncea</i> * [Skeleton Weed]	-	-	-	-	-	-	-	-
<i>Chrysocephalum apiculatum</i> [Yellow Buttons]	-	-	-	-	-	-	-	-
<i>Citrullus lanatus</i> * [Camel Melon]	-	-	-	-	-	-	-	-
<i>Convolvulus erubescens</i> [Australian Bindweed]	-	-	-	-	-	-	-	-
<i>Conyza bonariensis</i> * [Flax-leaf Fleabane]	-	-	-	-	-	-	-	-
<i>Cuscuta</i> sp. [Dodder]	-	-	-	-	-	-	-	-
<i>Cymbopogon refractus</i> [Barbed Wire Grass]	P	-	P	P	P	-	-	-
<i>Cynodon dactylon</i> [Couch Grass]	-	-	-	-	-	-	-	-
<i>Desmodium brachypodum</i> [Large Tick-trefoil]	-	-	-	-	-	-	-	-
<i>Dichanthium sericeum</i> [Queensland Bluegrass]	-	-	-	-	-	-	-	-
<i>Dichondra repens</i> [Kidney Weed]	-	-	-	-	-	-	-	-
<i>Digitaria brownii</i> [Cotton Panic]	-	-	-	-	-	-	-	-
<i>Digitaria divaricatissima</i> [Spreading Umbrella Grass]	-	-	-	-	-	-	-	-
<i>Dittrichia graveolens</i> * [Stinkwort]	-	-	-	-	-	-	-	-
<i>Echium plantagineum</i> * [Paterson's Curse]	-	-	-	-	-	-	-	-
<i>Einadia nutans</i> [Climbing Saltbush]	-	-	-	-	-	-	-	-
<i>Elymus scaber</i> [Common Wheatgrass]	-	-	-	-	-	-	-	-
<i>Enneapogon gracilis</i> [Slender Bottlewashers]	-	-	-	-	-	-	-	-
<i>Enteropogon acicularis</i> [Curly Windmill Grass]	-	-	-	-	-	-	-	-
<i>Eragrostis cilianensis</i> * [Stinking Lovegrass]	-	-	-	-	-	-	-	-
<i>Eragrostis lacunaria</i> [Purple Lovegrass]	-	-	-	-	-	-	-	-
<i>Eragrostis megalosperma</i>	-	-	-	-	-	-	-	-
<i>Eragrostis microcarpa</i> [Dainty Lovegrass]	-	-	-	-	-	-	-	-
<i>Eriochloa pseudoacrotricha</i> [Early Spring Grass]	-	-	-	-	-	-	-	-
<i>Glycine</i> sp. [Glycine]	-	-	-	-	-	-	-	-
<i>Juncus</i> sp. [Rush]	-	-	-	-	-	-	-	-
<i>Lactuca serriola</i> * [Prickly Lettuce]	-	-	-	-	-	-	-	-
<i>Lepidium africanum</i> * [Peppergrass]	-	-	-	-	-	-	-	-

Data for field survey quadrats 31-38 [inclusive] have been omitted from the Table as they were located along an alternative transport route that is now not relevant to the proposal. The remaining quadrats retain their original numbers.

* Denotes an introduced species

Table 2e [Cont'd]
Ground Cover Species Recorded In Quadrats 43 to 50 Within the Belmont Study Area

Page 2 of 2

SPECIES	43	44	45	46	47	48	49	50
<i>Lomandra bracteata</i>	-	-	-	-	-	-	-	-
<i>Ludwigia peploides</i> ssp. <i>montevidensis</i> [Water Primrose]	-	-	-	-	-	-	-	-
<i>Malvastrum americanum</i> * [Malvastrum]	-	-	-	-	-	-	-	-
<i>Marrubium vulgare</i> * [Horehound]	-	-	-	-	-	-	-	-
<i>Medicago polymorpha</i> * [Burr Medic]	-	-	-	-	-	-	-	-
<i>Medicago sativa</i> * [Lucerne]	-	-	-	-	-	-	-	-
<i>Opuntia</i> sp.* [Prickly Pear]	-	-	-	-	-	-	P	-
<i>Oxalis</i> ? <i>perennans</i> [Wood Sorrel]	-	-	-	-	-	-	-	-
<i>Paspalidium constrictum</i> [Box Grass]	-	-	-	-	-	-	-	-
<i>Petrohragia nanteuillii</i> * [Proliferous Pink]	-	-	-	-	-	-	-	-
<i>Portulaca oleracea</i> [Munyeroo]	-	-	-	-	-	-	-	-
<i>Rostellularia adscendens</i> [Pink Tongues]	-	-	-	-	-	-	-	-
<i>Rumex brownii</i> [Slender Dock]	-	-	-	-	-	-	-	-
<i>Salsola kali</i> [Buckbush]	-	-	-	-	-	-	-	-
<i>Scirpus</i> sp.	-	-	-	-	-	-	-	-
<i>Sclerolaena birchii</i> [Galvanised Burr]	P	-	P	-	-	-	P	-
<i>Sclerolaena muricata</i> [Black Roly-poly]	-	-	-	-	-	-	-	-
<i>Senna barclayana</i> [Pepper-leaf Senna]	-	-	-	-	-	-	-	-
<i>Sida corrugata</i> [Corrugated Sida]	-	-	-	-	-	-	-	-
<i>Sida cunninghamii</i> [Ridge Sida]	-	-	-	-	-	-	-	-
<i>Sida rhombifolia</i> * [Paddy's Lucerne]	-	-	-	-	-	-	-	-
<i>Sida subspicata</i> [Spiked Sida]	-	-	-	-	-	-	-	-
<i>Silybum marianum</i> * [Variegated Thistle]	-	-	-	-	-	-	-	-
<i>Solanum esuriale</i> [Quena]	-	-	-	-	-	-	-	-
<i>Solanum ferocissimum</i> [Spiny Potato-bush]	-	-	-	-	-	-	-	-
<i>Sporobolus caroli</i> [Fairy Grass]	-	-	-	-	-	-	-	-
<i>Sporobolus creber</i> [Western Rat'stail Grass]	-	-	-	-	-	-	-	-
<i>Swainsona galegifolia</i> [Smooth Darling Pea]	-	-	-	-	-	-	-	-
<i>Tribulus terrestris</i> [Cathead]	-	-	-	-	-	-	-	-
<i>Trifolium glomeratum</i> * [Cluster Clover]	-	-	-	-	-	-	-	-
<i>Urochloa advena</i> *	-	-	-	-	-	-	-	-
<i>Urtica incisa</i> [Scrub nettle]	-	-	-	-	-	-	-	-
<i>Urtica urens</i> * [Small Nettle]	-	-	-	-	-	-	-	-
<i>Vittadinia cuneata</i> var. <i>cuneata</i> forma <i>minor</i> [Fuzzweed]	-	-	-	-	-	-	-	-
<i>Vittadinia muelleri</i> [Fuzzweed]	-	-	-	-	-	-	-	-
<i>Wahlenbergia communis</i> [Tufted Bluebell]	-	-	-	-	-	-	-	-
<i>Xanthium spinosum</i> * [Bathurst Burr]	-	-	-	-	-	-	-	-

Data for field survey quadrats 31-38 [inclusive] have been omitted from the Table as they were located along an alternative transport route that is now not relevant to the proposal. The remaining quadrats retain their original numbers.

* Denotes an introduced species

3.3 Noxious Weed Considerations

The study area is relatively heavily invaded by weed species that are listed as being NOXIOUS for Gunnedah Shire on the NSW Department of Primary Industries [Agriculture] Website. [search date 5th February, 2007].

These are:

- *Echium plantagineum** [Paterson's Curse];
- *Lycium ferrocissimum** [African Boxthorn];
- *Opuntia* sp.* [Prickly Pear];
- *Sclerolaena birchii* [Galvanised Burr]; and
- *Xanthium spinosum** [Bathurst Burr].

Of these, Galvanised Burr is the most prevalent, having invaded much of the study area. Prickly Pear is also common within most communities although its density is generally light.

All of these species require controlling.

4 KOALA HABITAT CONSIDERATIONS

Circular B35 issued to Councils by the Department of Urban Affairs and Planning provides information on State Environmental Planning Policy No 44 - Koala Habitat Protection [SEPP 44].

The study area is situated within Gunnedah Shire and Schedule 1 of the Policy lists the Gunnedah Shire as a local government area to which the Policy applies.

SEPP 44 requires the identification of any "potential koala habitat" within the study area.

However in section 1.5 of the 'Explanation of the Policy' it is noted that ... "In relation to affected DAs it is the intention of the policy that investigations for 'potential' and 'core' koala habitats be limited to those areas in which it is proposed to disturb habitat.

Potential koala habitat is an area "...of native vegetation where trees of the types listed in Schedule 2 [of SEPP 44] constitute at least 15% of the total number of trees in the upper and lower components of the tree component."

Two of the species listed in Schedule 2 of SEPP 44 is found within the study area. These are White Box [*Eucalyptus albens*] and Bimble Box [*Eucalyptus populnea* ssp. *bimbil*].

The Bimble Box trees are generally scattered in their distribution and few are present within the study area proper and along the transport route. Some seedlings of this species were noted.

White Box [*Eucalyptus albens*] trees occur in two different communities within the Project Site study area. These are:

- Pilliga Grey Box - White Cypress Pine Community; and
- Pilliga Grey Box - White Box - Yellow Box - White Cypress Pine Community.

White Box does not constitute a large proportion of the tree cover over the entire Project Site study area.

* Denotes an introduced species

Because of the low proportion of 'koala feed trees' [ie less than 15%] present on the study area it is doubtful if the area could be regarded as 'potential koala habitat' as described in SEPP 44, although there may be small areas on the western side of the study area near Vickery State Forest that may approach this status.

5 THREATENED SPECIES ISSUES

5.1 Introduction

Prior to the field survey, requests were made to the NSW National Parks and Wildlife Service 'Atlas of NSW Wildlife' database for details of occurrences of any Threatened Species of plants listed in Schedules 1 and 2 of the *Threatened Species Conservation Act 1995*.

5.2 The 'Atlas of NSW Wildlife' Data

The database was searched for records of threatened flora species within a 20km x 20km square centred on the study area as well as any records from within the area covered by the Boggabri 1: 100 000 map sheet. [date of searches 7th February, 2007].

The searches revealed that there were no records of threatened flora species within the 20km x 20km square centred on the study area. The search of the Boggabri 1:100 000 map sheet indicated that the only records were four records of *Hakea pulvinifera* all from Charcoal Bend [Namoi River], downstream of Keepit Dam wall. The likelihood of occurrence of this species at the study area is discussed in **Table 3**.

In addition, the Department of Environment and Conservation has provided a list of threatened flora species predicted to occur within the boundaries of the Boggabri 1: 100 000 map sheet area using the BIOCLIM model.

These are:

- *Bothriochloa biloba*;
- *Cadellia pentastylis*;
- *Calotis glandulosa*;
- *Goodenia macbarronii*;
- *Dichanthium setosum*;
- *Philothea ericifolia*;
- *Hakea pulvinifera*;
- *Swainsona murrayana*; and
- *Thesium australe*.

The likelihood of the occurrence of these species, with the exception of *Bothriochloa biloba*², is assessed, in **Table 3**.

² Note that *Bothriochloa biloba* has been removed from the Schedules of the TSC Act but the 'Atlas of NSW Wildlife' apparently still contains records of the species.

Table 3
Assessment of the Likelihood of Occurrence of Threatened Flora Species at the Belmont Site

Page 1 of 3

Species	Assessment
<i>Cadellia pentastylis</i>	A possible occurrence in the region [EPBC Act database]. A small tree to 10m high that grows in thickets, west from Tenterfield and north from Terry Hie Hie [Harden, 1991]. Forms closed or open canopied communities in which it may dominate or mix with <i>Eucalyptus albens</i> , <i>Eucalyptus chloroclada</i> , <i>Eucalyptus pilligaensis</i> and <i>Callitris glaucophylla</i> . Recorded from Turkey Ridge, Deriah State Forest and Eulah Creek east of Narrabri, Terry Hie Hie, Gravesend: 'Tara', Warialda: 'Taronga', Mole River: 'Tenterfield Creek'. [Benson, 1993]. Conserved in Gamilaraay Nature Reserve near Terry Hie Hie and Scrub Myrtle Flora Reserve in Deriah State Forest. The species is distinctive in appearance and was not recorded during field inspection even though suitable habitat possibly occurs within the study area. There are no previous records within the study area. IT IS CONCLUDED THAT THIS SPECIES IS NOT PRESENT AT THE SITE.
<i>Calotis glandulosa</i>	This species is an erect or ascending branched herb to 35cm high. Harden [1992] notes that it grows in grasslands and sclerophyll forest at higher altitudes, from Eden to the Dubbo area. A possible occurrence at the study area as suitable general habitat is present. The species was not recorded during field inspection, there are no previous records within the study area and it would be outside its normal range. IT IS CONCLUDED THAT THIS SPECIES IS NOT PRESENT AT THE STUDY AREA.
<i>Dichanthium setosum</i>	Predicted to occur in the region. Occurs chiefly in woodlands and grasslands on the Northern Tablelands and more rarely on the North-western Slopes and Plains and Central Western Slopes [Vickery, 1981; Harden, 1993]. Suitable habitat occurs within the study area. A possible occurrence at the study area but was not recorded during field inspection and there are no previous records of its occurrence at the site. IT IS CONCLUDED THAT THIS SPECIES IS NOT PRESENT AT THE SITE.
<i>Digitaria porrecta</i>	A possible occurrence in the region [EPBC Act database]. A loosely caespitose, erect or geniculate-ascending greyish pubescent perennial grass that grows in grassland on better soils [Harden, 1993]. Suitable habitat occurs within the study area. A possible occurrence at the study area but was not recorded during field inspection and there are no previous records of its occurrence at the site. IT IS CONCLUDED THAT THIS SPECIES IS NOT PRESENT AT THE SITE.
<i>Diuris tricolor</i> [sheaffiana]	This species was listed on the Schedules of the <i>Threatened Species Conservation Act 1995</i> as <i>Diuris sheaffiana</i> but further taxonomic research indicates that the original species is really <i>Diuris tricolor</i> – a widespread orchid that occurs throughout the western slopes from Narrandera north. Its preferred habitat is sandy soils in <i>Callitris</i> communities [Bishop, 1996]. Suitable habitat is not present at the study area. The species was not recorded during field inspection and there are no previous records of its occurrence at the site. IT IS CONCLUDED THAT THIS SPECIES IS NOT PRESENT AT THE SITE.

Table 3 [Cont'd]
Assessment of the Likelihood of Occurrence of Threatened Flora Species at the Belmont Site

Page 2 of 3

Species	Assessment
<i>Euphrasia arguta</i>	Recorded from the Central Western Slopes Botanical Subdivision. Not collected since about 1911. The species that has been recorded in grassy areas near rivers, from Bathurst to Walcha area and is possibly extinct [Harden, 1992; Elliott and Jones, 1986]. Suitable habitat is not present at the study area. The species was not recorded during field inspection and there are no previous records of its occurrence at the site. IT IS CONCLUDED THAT THIS SPECIES IS NOT PRESENT AT THE SITE.
<i>Goodenia macbarronii</i>	Harden [1992] notes that this species is recorded from the Central Western Slopes Botanical Subdivision. It grows in damp sandy soils south from the Guyra and Inverell districts. Suitable habitat is not present within the study area. The species was not recorded during field inspection and there are no previous records of its occurrence at the site. IT IS CONCLUDED THAT THIS SPECIES IS NOT PRESENT AT THE SITE.
<i>Hakea pulvinifera</i>	A root suckering shrub to about 4 m high with thick tessellated bark and hairy young branches. Confined to a single population on a hard rocky hillside below Keepit Dam near Gunnedah. [Harden, 1991]. The species is distinctive and not known away from the Keepit Dam site. It was not recorded during field inspection and there are no previous records of its occurrence at the site. IT IS CONCLUDED THAT THIS SPECIES IS NOT PRESENT AT THE SITE.
<i>Homopholis belsonii</i>	Perennial grass to 50cm high. Recorded north from the Warialda district and into Queensland, Grows in dry woodland on poor soils [NSWTS Website, 2007]. The species was not recorded during field inspection and there are no previous records of its occurrence at the site. IT IS CONCLUDED THAT THIS SPECIES IS NOT PRESENT AT THE SITE.
<i>Philothea ericifolia</i>	Grows chiefly in dry sclerophyll forest and heath on damp sandy flats and gullies, in the upper Hunter Valley and Pilliga to Peak Hill district [Harden, 1991]. Suitable habitat is not present at the study area. The species was not recorded during field inspection and there are no previous records of its occurrence at the site. IT IS CONCLUDED THAT THIS SPECIES IS NOT PRESENT AT THE SITE.
<i>Pterostylis cobarensis</i>	A possible occurrence in the region [EPBC Act database]. Harden [1993] notes that this species grows among rocks on low hills and on slopes above streams, chiefly from Nyngan to Bourke district. Bishop [1996] notes that this species occurs mainly in the Nyngan - Cobar - Bourke region and favours stony ridges, often growing under grey mallee [<i>Eucalyptus morrisii</i>]. Suitable habitat is not present at the study area. The species was not recorded during field inspection and there are no records of its presence at the site in the past. IT IS CONCLUDED THAT THIS SPECIES IS NOT PRESENT AT THE SITE.
<i>Swainsona murrayana</i>	Harden [1991] notes that this species often grows with <i>Maireana</i> species on heavy soil, especially in depressions. Thompson [1993] records that it occurs on the western slopes and plains of NSW and in equivalent areas of northern and western Victoria and southern Queensland, with an outlying population in SA west of Broken Hill. Suitable habitat possibly occurs within the study area. A possible, but unlikely, occurrence at the study area but away from its normal habitat niche. The species was not recorded during field inspection and there are no previous records of its occurrence at the site. IT IS CONCLUDED THAT THIS SPECIES IS NOT PRESENT AT THE SITE.

Table 3[Cont'd]
Assessment of the Likelihood of Occurrence of Threatened Flora Species at the Belmont Site

Page 3 of 3

Species	Assessment
<i>Thesium australe</i>	Recorded from the Central-west Slopes Botanical Subdivision [Harden, 1992]. It flowers spring - summer and grows in grassland or woodland, often in damp sites. Suitable habitat is not present at the study area. The species was not recorded during field inspection and there are no previous records of its occurrence at the site. IT IS CONCLUDED THAT THIS SPECIES IS NOT PRESENT AT THE SITE.
<i>Tylophora linearis</i>	Grows in dry scrub in the Barraba, Mendooran, Temora and West Wyalong districts [Harden, 1991]. Also recorded in the vicinity of the Hervey Range, some 9 - 10km east of Peak Hill. Suitable habitat is not present at the study area. The species was not recorded during field inspection and there are no previous records of its occurrence at the site. IT IS CONCLUDED THAT THIS SPECIES IS NOT PRESENT AT THE SITE.

5.3 Commonwealth Environment Protection and Biodiversity Conservation Act [EPBC Act] Online Database Threatened Species Listing

A search of the Commonwealth Environment Protection and Biodiversity Conservation Act Online Database revealed that seven plant species listed as threatened species under this Act were likely to occur in the 30 km radius of 'Belmont' homestead. [date of search 9th February, 2007]. These species are:

- *Cadellia pentastylis*;
- *Digitaria porrecta*;
- *Diuris sheaffiana*;
- *Homopholis belsonii*;
- *Philothea ericifolia*;
- *Pterostylis cobarensis*;
- *Swainsona murrayana*;
- *Thesium australis*; and
- *Tylophora linearis*.

These species are discussed in **Table 3**.

5.4 Endangered Ecological Communities and Populations

The Schedules of the *Threatened Species Conservation Act 1995* have been checked and it has been ascertained that there are no Endangered Ecological Communities or plant populations recorded within the study area.

However, the Endangered Ecological Communities listed in **Table 4** are likely to occur within the boundaries of the Boggabri 1: 100 000 map sheet area based on predictions obtained from the Department of Environment and Conservation.

The *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* Schedule of Threatened Ecological Communities also lists the White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland community as likely to occur in the region.

This community has the status of 'Critically Endangered' under the EPBC Act.

Table 4
Endangered Ecological Communities Likely to Occur Within the Boundaries of the
Boggabri 1: 100 000 Map Sheet Area

Endangered Ecological Community	Occurrence within Study Area
Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Penepplain, Murray-Darling Depression, Riverina and NSW South western Slopes	Not present in study area
Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions	Not present in study area
Coolibah - Black Box Woodland of the northern riverine plains in the Darling Riverine Plains and Brigalow Belt South bioregions	Not present in study area
Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions	Present in the study area
Howell Shrublands in the Northern Tablelands and Nandewar Bioregions	Not present in study area
McKies Stringybark/Blackbutt Open Forest in the Nandewar and New England Tableland Bioregions	Not present in study area
Semi-evergreen Vine Thicket in the Brigalow Belt South and Nandewar Bioregions	Not present in study area
Native Vegetation on Cracking Clay Soils of the Liverpool Plains	Not present in study area
White Box Yellow Box Blakely's Red Gum Woodland [TSC Act]	Not present in study area
White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland [EPBC Act]	Not present in study area

5.5 Critical Habitat

The Schedules of the *Threatened Species Conservation Act 1995* have been checked and it has been ascertained that there is no critical habitat recorded for the study area.

6 FIELD SURVEY DATA

6.1 Threatened Plant Species

The threatened plants likely to occur in the general region of the study area were targeted during the field surveys.

No threatened plant species were recorded.

6.2 Endangered Ecological Communities and Populations

Of the Endangered Ecological Communities listed in **Table 4**, there are three that are represented in the region close to the study area. These are:

- Native Vegetation on Cracking Clay Soils of the Liverpool Plains;

- White Box - Yellow Box - Blakely's Red Gum Woodland [TSC Act] and its equivalent White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland [EPBC Act]; and
- Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions.

However, after considering the structure and composition of the vegetation communities present in the study area and the published descriptions of the Endangered Ecological Communities likely to occur in the region [NSW Scientific Committee, 2001, 2002; Department of the Environment and Heritage, 2006], it has been determined that the study area:

- [a] **does not contain** remnants of the Endangered Ecological Community, **Native Vegetation on Cracking Clay Soils of the Liverpool Plains** that is listed in the Schedules of the Threatened Species Conservation Act 1995;
- [b] **does not contain** remnants of the **White Box - Yellow Box - Blakely's Red Gum Woodland** that are listed in the Schedules of the Threatened Species Conservation Act 1995; and
- [c] **does not contain** remnants of the **White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland** community that is listed in the Schedules of the Commonwealth Environment Protection and Biodiversity Conservation Act 1999.

However, the study area **does contain** a small isolated remnant of a Brigalow community representative of the **Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions Endangered Ecological Community**. This occurrence, containing about 55 Brigalow stems, was described in Section 3.2.5.

The community occupies probably less than 0.10 hectares of the paddock area.

6.3 Critical Habitat

There are no areas of critical habitat listed for the study area or its environs.

6.4 Introduced Plant Species

Of the 84 ground cover [pasture] species recorded within the study area, some 23 [or 27%] are introduced.

The proportion of the cover provided by introduced species on most sections of the site is quite significant.

This situation would further exacerbated in the cooler months when the introduced annuals are more prevalent.

6.5 Seven - Part Test

The likelihood of the occurrence of the Threatened flora species has been recorded in **Table 3** and it has been concluded none are currently present within the study area.

In addition, there is no suitable habitat present within the study area for many of the threatened flora species likely / predicted to occur there.

Field observations have failed to record any Threatened flora species and there are no past records of any Threatened flora species within the study area.

The outcome of the assessments and field survey observations has been the conclusion that none of the Threatened flora species recorded or predicted to occur in the wider region around Belmont occurs at the site.

For the purposes of the *Environmental Planning and Assessment Act 1979* N^o. 203 the following must be taken into account in deciding whether there is likely to be a significant effect on threatened species, populations or ecological communities, or their habitats:

- a) each of the factors listed in the following paragraph; and
- b) any assessment guidelines.

The following factors must be taken into account in making a determination of the likely significance of an action on threatened species, populations or communities or their habitats.

[a] in the case of a Threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction:

No Threatened flora species have been recorded within the study area in the past and none were recorded during field survey. Consequently it is concluded that there would be no adverse affect from the Project on the life cycle of any Threatened flora species such that a viable local population of the species is likely to be placed at risk of extinction.

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

No endangered flora populations have been recorded from within the study area in the past and none were recorded during field survey. Consequently it is concluded that there would be no adverse affect from the Project on the life cycle of any flora species that constitutes an endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

[c] in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

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

[ii] is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

The study area contains a remnant of the ***Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions Endangered Ecological Community***. This community was recorded on the 'Glenroc' property in the northern section of the study area.

The design for the Project allows for the ***Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions Endangered Ecological Community*** to remain intact and so it would not be subjected to any significant impact.

Consequently it is considered that the Project:

- is not likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction; nor
- is it likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

[d] in relation to the habitat of a threatened species, population or ecological community:

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

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

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

The Project would not impact in any significant manner on the ***Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions Endangered Ecological Community*** as the area supporting this community would not be disturbed.

Consequently it is concluded that the Project would not have any significant impact on this endangered ecological community.

[e] whether the action proposed is likely to have an effect on critical habitat [either directly or indirectly].

No critical habitat is present within the study area. Consequently, it is concluded that the Project would not have any effect on any critical habitat.

[f] whether the action proposed is consistent with the objectives or actions of a species recovery plan or threat abatement plan.

There is no species recovery plan in existence for the ***Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions Endangered Ecological Community*** and there are no threat abatement plans that have been finalised and that are relevant to the study area.

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

The Project involves, among other activities:

- 'Clearing of Native Vegetation; and
- 'Removal of Dead Wood and Dead Trees'.

Both of these activities are listed as Key Threatening Processes in the Schedules of the *NSW Threatened Species Conservation Act 1995*.

As most of the area proposed to be developed has been cleared for farming in the past the number of live and dead native trees to be removed is not great. There is some dead wood lying on the ground in areas that have not been farmed at all or not farmed for many years.

The number of native trees proposed for removal is not great and would be more than compensated for by the proposed offsets. Consequently the impact of the proposed clearing is not significant in the longer term.

With regard to dead trees and dead wood on the ground, the impact of the Project would be no greater than that of a program aimed at removing rabbit and fox harbour to control these feral animals – an obligation under the law. The impact of this activity is not considered to be significant.

Consequently, it is unlikely that the impact of the Project would significantly increase the impact of a key threatening process.

6.6 Threatened Species Overview

Based on the results of the literature review, field surveys and seven part test, the following is concluded regarding the impact of the Project on Threatened Flora.

- [i] There are no records of Threatened flora species contained in the 'Atlas of NSW Wildlife' database for the Project study area.
- [ii] No threatened flora species were recorded within the study area during field survey, despite predictions and records that indicated that a number of Threatened flora species might be likely to occur at the site. The likely occurrence of these species has been assessed in **Table 3**.
- [iii] Much of the study area has been cleared for many years. All areas have been grazed [and some cultivated] and have been heavily invaded by introduced and native weed species.
- [iv] There is a small occurrence of the endangered ecological community, *Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions*. This remnant will be conserved.
- [v] There are no threatened flora populations listed for the study area in the Schedules of the *Threatened Species Conservation Act 1995* or under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999*.
- [vi] There is no critical habitat listed for the study area or its environs.
- [vii] It is concluded after conducting a 7-part test that there will be no significant impact on Threatened flora species, endangered ecological communities, endangered flora populations or critical habitat as a consequence of the development of the Project.

7 ASSESSMENT OF PROPOSED DISTURBANCE AND PROPOSED OFFSETS

7.1 Disturbance within the Project Site

Within the Project Site, approximately 237ha of land would be disturbed through open cut mining, overburden placement, coal and soil stockpiling and infrastructure establishment. Of this 237ha, the majority would occur on previously disturbed land used for cropping and/or grazing, ie. Community 8. Approximately 36.3ha of native vegetation on the Project Site would be disturbed by the Project in the following communities.

- Community 1 – 11.6ha.
- Community 2 – 23.4ha.
- Community 3 – 1.3ha.

The Department of Environment and Conservation has noted that all remnant native vegetation within the Namoi River catchment is considered significant and should be conserved. Given that the conservation of these areas in-situ would be impractical, a suitable offset either on the Project Site or external to the Project Site, and representing similar vegetation communities at risk of future clearing, should be developed. Section 7.3 assesses the proposed offset strategy proposed by the Proponent and provides recommendations as to additions to this strategy.

7.2 Clearing Requirements along the Transport Route on Shannon Harbour Road

Construction of the transport route outside the Project Site would involve clearing of very few trees on the Riordon Road, 'Brentry', 'Stratford' section of the transport route as this area is almost completely cleared of trees.

Once the transport route reaches Shannon Harbour Road and proceeds west to its junction with Hoads Lane there would be a need for some clearing within Community 4.

This section of Shannon Harbour Road was inspected on 18th December, 2006 to ascertain the degree of clearing that would be required to enable construction of this section of the transport route (see **Figure 3**).

Prior to the inspection, it was known that the aim during road construction was to remove as few native trees as possible and that it was not of great concern if the road alignment was not completely straight as long as it remained within the road reserve.

It was evident after a traverse along this section of Shannon Harbour Road that, if these parameters were adhered to, then a road alignment with a few slight meanders was possible with the clearing of approximately twenty trees. This number would vary slightly according to the final choice of alignment.

The trees requiring clearing within Community 4 would include:

- 1 x *Schinus ariera** [Pepper Tree] [introduced];

- 2 x *Eucalyptus albens* [White Box] [one debilitated];
- 14 x *Casuarina luehmannii* [Bull Oak] [some mature, most smaller trees and saplings];
- 1 x *Callitris glaucophylla* [White Cypress Pine] [mature];
- 1 x *Eucalyptus crebra* [Narrow-leaved Ironbark] [mature]; and
- 1 x *Capparis mitchellii* [Wild Orange].

In addition an unknown number of *Callitris glaucophylla* [White Cypress Pine] seedlings and saplings of various sizes would need to be cleared. Seedlings and saplings of this species are extremely common in the vicinity of the proposed route and the Project Site.

The clearing required to allow construction of this section of the transport route would not have any significant environmental impact and is assessed in the overall 7-Part Test relating to the Project.

7.3 Groundwater Dependent Ecosystems

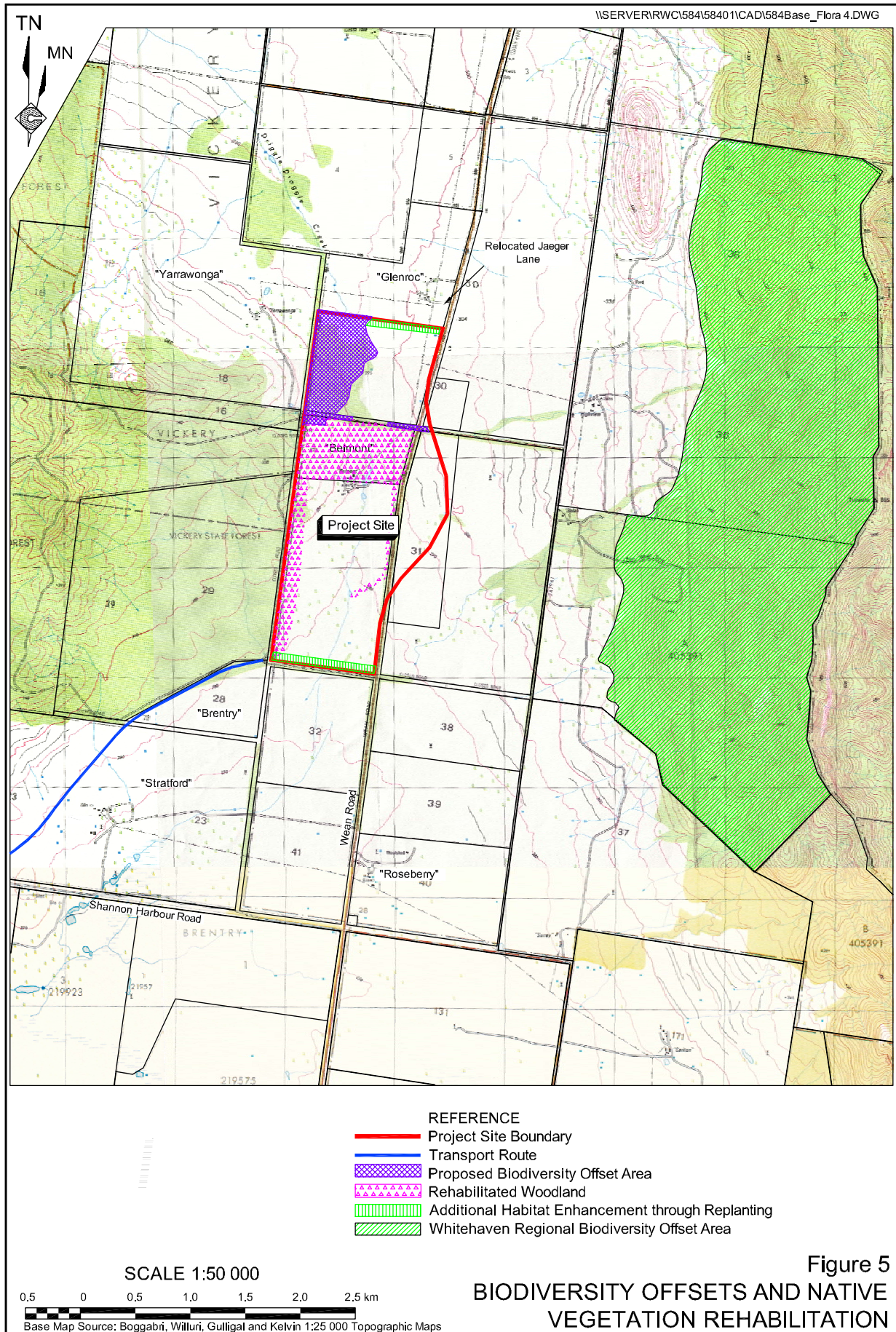
The Department of Water and Energy have drawn attention to records of tree roots occurring within bores of the region to a depth of 30m. While this suggests some form of groundwater dependence of the vegetation surrounding these bores, the vegetation communities on and surrounding the Project Site are highly unlikely to set roots to this depth. Therefore, as the depth to groundwater recorded by RCA (2007) approximates 35m (both in 2002 and 2007), nor has it been observed to form perched water tables or springs and is also unlikely to recharge the alluvium aquifer located to the north and south of the Project Site (RCA, 2007), it is considered highly unlikely that the vegetation on or surrounding the Project Site is groundwater dependent or would be affected by any drawdown in the local groundwater table.

It is also noted that Schedule 4 of the Water Sharing Plan for the Upper and Lower Namoi Groundwater Sources states '*There are no high priority groundwater dependent ecosystems identified and scheduled at the commencement of this Plan*', (WSP 2003).

7.4 Biodiversity Offsets

It is recommended the areas of the Project Site identified on **Figure 5** be excluded from ongoing agricultural activity and/or enhanced through planting of native tree and shrub species. The areas include the following.

- (i) 42.3ha of Community 2 remnant native vegetation in the northwestern corner of the Project Site on the "Glenroc" property. This area is currently directly linked to the vegetation of Vickery State Forest. Further enhancement of this linkage is proposed in [ii] and [iii] below.



- (ii) Establishment of a 50m wide habitat corridor between offset area [i] and Wean Road along the northern boundary of the Project Site [2.6ha]. The vegetation enhancement activities would focus on extending the Community 2 segment of the offset area [i]. To achieve this end a small section of the offset area as shown on **Figure 5** would be planted to native tree and shrub species representative of those occurring within Community 2. This replanted section would then be continued using the same species to provide a 50m wide linkage with the Wean Road.
- (iii) Establishment of a 50m wide habitat corridor within the Project Site on the northern side of Riordan Road. This corridor is located along the southern boundary of the Project Site [3.8ha]. This vegetation enhancement activity would involve establishing Community 1 type vegetation along the western section [ie. west of the drainage line] and a community typical of the species found in Community 2 on the eastern section that links with Wean Road.

Figure 5 also illustrates the proposed rehabilitation to native vegetation over 84ha of the Project Site. These recommended offsets total 135.3ha in area and represents a ratio of approximately 3.7 hectares of native vegetation rehabilitation / conservation for every 1 hectare of native vegetation disturbed by the Project.

Disturbance to native vegetation would be further offset through the Whitehaven Regional Biodiversity Offset Strategy which is being developed by the Proponent in conjunction with the Department of Planning and Department of Environment and Climate Change and is close to finalisation. The Whitehaven Regional Biodiversity Offset Strategy provides for the long-term conservation of approximately 1000ha of Proponent-owned land adjacent to allocation to Community Conservation Area (CCA) Zone 2 – Kelvin or creation of a covenant with succession in title over the land (under the *Conveyancing Act, 1919*). The value of the vegetation within the regional biodiversity offset area is currently being quantified such that appropriate offset areas are allocated for the various projects of the Proponent.

The impact of the proposed offsets on the DECC [NSW Government] estate are very positive since they allow for the conservation of areas of good condition native vegetation [including an area of the White Box Yellow Box Blakely's Red Gum endangered ecological community immediately adjacent to Vickery State Forest and provide for new linkages between the Forest and currently relatively isolated native vegetation remnants.

8 CONCLUSION

Impacts on Threatened Species, Populations and Communities

On the basis of :

- the flora surveys conducted over the study area in February, July and August, 2002 and December, 2006;
- the assessment of the data obtained from the National Parks and Wildlife Service and Commonwealth EPBC Act databases; and
- the details of endangered ecological communities provided by the Scientific Committee.

it is concluded that no Threatened flora species, Threatened flora populations or critical habitat exist within the study area.

A small remnant of the endangered ecological community, *Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions* occurs at the site but will be conserved.

The vegetation of the study area is relatively heavily invaded by introduced plants.

Completion of the 7-Part Test indicates that there will be no significant impact on any Threatened flora species, Threatened flora populations, endangered ecological communities or critical habitat resulting from development of the Project.

Remnant Vegetation Disturbance Impacts

On the basis of :

- the flora surveys conducted over the study area in February, July and August, 2002 and December, 2006;
- an assessment of the proposed level of disturbance associated with the Project; and
- the details of available areas for biodiversity offsets.

it is concluded that any disturbance to remnant vegetation on the Project Site [36.3ha] could be appropriately offset through exclusion of clearing or agricultural activities to approximately 149.4ha on the Project Site and surrounding properties owned by the Proponent.

9 CUMULATIVE IMPACTS

The Belmont Coal Project would involve the clearing of 36.3ha of remnant native vegetation.

The recommended offsets, that involve the conservation of 51.3ha of existing native vegetation and the re-establishment of 27.1ha of native vegetation representative of the communities occurring on the Project Site and its environs, adequately compensate for the loss of the native vegetation within the area proposed for disturbance.

The recommended offsets not only achieve the conservation of areas of native vegetation typical of that proposed for removal but also allow for the conservation of a sizeable remnant of the White Box Yellow Box Blakely's Red Gum endangered ecological community adjacent to Vickery State Forest.

Additionally, the recommended offsets improve linkages between currently isolated patches and corridors of native vegetation.

Overall, the recommended offsets would contribute significantly to the conservation of native vegetation both locally and regionally and to the enhancement of linkages between currently relatively isolated remnants of native vegetation.

10 ADDRESSING DIRECTOR-GENERAL'S REQUIREMENTS

A number of issues relating to flora have been raised in the Director-General's Requirements.

Appendix 2 lists the issues and indicates the section of this study where each issue is addressed.

In particular there is a requirement of the Department of Environment and Climate Change (formerly Department of Environment and Conservation) within the Director-General's Requirements that notes that the EA must clearly state whether it meets each of the key thresholds set out in Step 5 of the draft guidelines.

Step 5 of the draft guidelines requires:

- [a] that the key attributes of the proposal should be considered in a quantitative sense in terms of their impact. Aspects of the proposal relevant to the flora study include an assessment of the impact of the proposal on remnant native vegetation native, timing and duration of the development activity and an overview of the total area affected; and
- [b] assessment of the impact of the proposed development on threatened biodiversity.

These guideline requirements have been met in Sections 6 [threatened biodiversity], 7 [proposed offsets / reduction of impact] and 9 [cumulative impacts] of this report.

11 REFERENCES:

- Anon [1976] - Gunnedah District Technical Manual. Soil Conservation Service of New South Wales, Sydney.
- Anon [1978] - Narrabri District Technical Manual. Soil Conservation Service of New South Wales, Sydney.
- Anon [1986] - Vickery Joint Venture. Environmental Impact Statement. Prepared by the Vickery Joint Venture.
- Benson, J.S. [1993] - The Biology and Management of Ooline [*Cadellia pentastylis*] in NSW. Species Management Report No.2. National Parks and Wildlife Service, Sydney.
- Bishop, A [1996] - Field Guide to the Orchids of New South Wales and Victoria. University of NSW Press, Sydney.
- Cannon, G., Cannon, M., Harding, W., McCosker, R., Spinner, B, Steenbeeke, G. and Watson G. [2003] – Native Vegetation Map Report; Abridged Version. No.3 Bellata, Gravesend, Horton and Boggabri 1: 100 000 map Sheets 2002. Department of Land and Water Conservation, Parramatta.
- Cunningham, G.M., Mulham, W.E., Milthorpe, P.L. and Leigh, J.H. [1992] - Plants of Western New South Wales. Inkata Press, Melbourne.
- Department of the Environment and Heritage [2006] – White Box – Yellow Box – Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands. EPBC Policy Statement. Department of the Environment and Heritage, Canberra.
- Elliott, W.R. and Jones, D.L. [1986] - Encyclopaedia of Australian Plants suitable for Cultivation. Volume 4 [Eu - Go]. Lothian Publishing, Port Melbourne.
- Harden, G.J. [Ed] [1990] – Flora of New South Wales. Volume 1. University of NSW Press, Kensington.
- Harden, G.J. [Ed] [1991] – Flora of New South Wales. Volume 2. University of NSW Press, Kensington.
- Harden, G.J. [Ed] [1992] – Flora of New South Wales. Volume 3. University of NSW Press, Kensington.
- Harden, G.J. [Ed] [1993] – Flora of New South Wales. Volume 4. University of NSW Press, Kensington.
- NSW Scientific Committee [2002] - Final Determination. *Native Vegetation on Cracking Clay Soils of the Liverpool Plains* as an Endangered Ecological Community in Part 3 Schedule 1 of the Threatened Species Conservation Act.
- NSW Scientific Committee [2002] - Final Determination. *Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions* as an Endangered Ecological Community in Part 3 Schedule 1 of the Threatened Species Conservation Act.

NSW Scientific Committee [2002] - Final Determination. White Box Yellow Box Blakely's Red Gum Woodland as an Endangered Ecological Community in Part 3 Schedule 1 of the Threatened Species Conservation Act.

Orchard, A.E [1990] - Haloragaceae. *Flora of Australia* 18: 5 - 85. Australian Government Publishing Service, Canberra.

Robinson, L. [1994] - Field Guide to the Native Plants of the Sydney Region. Revised Second Edition. Kangaroo Press, Kenthurst.

Thompson, J. [1993] - A Revision of the genus *Swainsona* [Fabaceae]. *Telopea* 5[3]: 427 – 581.

Vickery, J.W. [1961] - 19. Gramineae. Contributions from the New South Wales National Herbarium Flora Series, No. 19, Part 1. New South Wales Department of Agriculture, Sydney.

Geoff Cunningham B.Sc.Agr.[Hons]; FAIAST.
Managing Director and Principal Ecologist.

APPENDICES

- Appendix 1** **Listing of Plant Species Recorded from the Belmont Coal Project Study Area**
- Appendix 2** **Director-General's Requirements and Requirements of Consulted Government Agencies**

[No. of pages excluding this page = 7]

This page has intentionally been left blank

Appendix 1

Listing of Plant Species Recorded from the Belmont Coal Project Study Area

[No. of pages excluding this page = 3]

This page has intentionally been left blank

NOTE: * denotes introduced species

Acacia dealbata [Silver Wattle]
Acacia decora [Western Golden Wattle]
Acacia oswaldii [Miljee]
Alectryon oleifolius [Rosewood]
Allocasuarina luehmannii [Bull Oak]
*Alternanthera pungens** [Khaki Weed]
Amaranthus sp.* [Amaranth]
Aristida ramosa var. *speciosa* [Wiregrass]
Atriplex spinebractea
Austrodanthonia setacea [Small-flowered Wallaby Grass]
Austrostipa aristiglumis [Plains Grass]
Austrostipa scabra [Rough Speargrass]
Austrostipa verticillata [Slender Bamboo Grass]
Beyeria viscosa
Boerhavia dominii [Tah Vine]
Bothriochloa macra [Red Grass]
Brachychiton populneus [Kurrajong]
Bracteantha bracteata [Golden Everlastings]
Brunoniella australis [Blue Trumpets]
Callitris endlicheri [Black Cypress Pine]
Callitris glaucophylla [White Cypress Pine]
Calotis lappulacea [Yellow Burr-daisy]
Capparis mitchellii [Wild Orange]
*Carthamus lanatus** [Saffron Thistle]
Cassinia laevis [Cough Bush]
Casuarina cristata [Belah]
*Centaurium tenuiflorum** [Centaury]
Chamaesyce drummondii [Caustic Weed]
Cheilanthes sieberi [Rock Fern]
Chloris truncata [Windmill Grass]
Chloris ventricosa [Tall Chloris]
*Chondrilla juncea** [Skeleton Weed]
Chrysocephalum apiculatum [Yellow Buttons]
*Citrullus lanatus** [Camel Melon]
Convolvulus erubescens [Australian Bindweed]
*Conyza bonariensis** [Flax-leaf Fleabane]
Cuscuta sp. [Dodder]
Cymbopogon refractus [Barbed Wire Grass]
Cynodon dactylon [Couch Grass]
Desmodium brachypodum [Large Tick-trefoil]
Dichanthium sericeum [Queensland Bluegrass]
Dichondra repens [Kidney Weed]
Digitaria brownii [Cotton Panic]
Digitaria divaricatissima [Spreading Umbrella Grass]
*Dittrichia graveolens** [Stinkwort]
Dodonaea viscosa ssp. *spatulata* [Broad-leaf Hopbush]
*Echium plantagineum** [Paterson's Curse]
Einadia nutans [Climbing Saltbush]
Elymus scaber [Common Wheatgrass]
Enneapogon gracilis [Slender Bottlewashers]
Enteropogon acicularis [Curly Windmill Grass]

*Eragrostis cilianensis** [Stinking Lovegrass]
Eragrostis lacunaria [Purple Lovegrass]
Eragrostis megalosperma
Eragrostis microcarpa [Dainty Lovegrass]
Eriochloa pseudoacrotricha [Early Spring Grass]
Eucalyptus albens [White Box]
Eucalyptus crebra [Narrow-leaf Ironbark]
Eucalyptus dealbata [Tumbledown Gum]
Eucalyptus melanophloia [Silver-leaf Ironbark]
Eucalyptus melliodora [Yellow Box]
Eucalyptus pilligaensis [Pilliga Grey Box]
Eucalyptus populnea ssp. *bimbil* [Bimble Box]
Geijera parviflora [Wilga]
Glycine sp. [Glycine]
Indigofera australis [Hill Indigo]
Juncus sp. [Rush]
*Lactuca serriola** [Prickly Lettuce]
*Lepidium africanum** [Peppercress]
Lomandra bracteata
Ludwigia peploides ssp. *montevidensis* [Water Primrose]
Lycium ferocissimum * [African Boxthorn]
Maireana microphylla [Eastern Cottonbush]
*Malvastrum americanum** [Malvastrum]
*Marrubium vulgare** [Horehound]
*Medicago sativa** [Lucerne]
Myoporum montanum [Western Boobialla]
Notelaea microcarpa var. *microcarpa* [Native Olive]
Opuntia sp.* [Prickly Pear]
Oxalis ? *perennans* [Wood Sorrel]
Parsonsia eucalyptophylla [gargaloo]
Paspalidium constrictum [Box Grass]
*Petrohragia nanteuillii** [Proliferous Pink]
Pimelea microcephala [Shrubby Rice-flower]
Pittosporum phillyraeoides [Butterbush]
Portulaca oleracea [Munyeroo]
Rostellularia adscendens [Pink Tongues]
Rumex brownii [Slender Dock]
Salsola kali [Buckbush]
Scirpus sp.
Sclerolaena birchii [Galvanised Burr]
Sclerolaena muricata [Black Roly-poly]
Senna barclayana [Pepper-leaf Senna]
Sida corrugata [Corrugated Sida]
Sida cunninghamii [Ridge Sida]
Sida rhombifolia * [Paddy's Lucerne]
Sida subspicata [Spiked Sida]
*Silybum marianum** [Variegated Thistle]
Solanum esuriale [Quena]
Solanum ferocissimum [Spiny Potato-bush]
Sporobolus caroli [Fairy Grass]
Sporobolus creber [Western Rat'stail Grass]
Swainsona galegifolia [Smooth Darling Pea]
Swainsona monticola
Tribulus terrestris [Cathead]

*Trifolium glomeratum** [Cluster Clover]
Urochloa advena *
Urtica incisa [Scrub nettle]
*Urtica urens** [Small Nettle]
Vitadina cuneata var. *cuneata* forma *minor* [Fuzzweed]
Vitadina muelleri [Fuzzweed]
Wahlenbergia communis [Tufted Bluebell]
*Xanthium spinosum** [Bathurst Burr]

This page has intentionally been left blank

Appendix 2

Director-General's Requirements and Requirements of Consulted Government Agencies

[No. of pages excluding this page = 4]

This page has intentionally been left blank

Table A2.1
State Government Technical and Policy Guidelines – For References

Aspect	Policy / Methodology	Section
Flora and Fauna		
	• Draft Guidelines for Threatened Species Assessment [DEC]	Section 10
	• Threatened Biodiversity Survey and Assessment: Guidelines for Development and Activities [DEC]	Section 10

Table A2.2
Assessment Requirements of Consulted Government Agencies – 2002

Page 1 of 2

Government Agency	Issue	Section
PlanningNSW [30/08/02]	Statutory Instruments / Policies – Assess the proposal against the relevant provisions in <i>State Environmental Planning Policy No. 44 – Koala Habitat Protection</i> ,	Section 5
	Key issues – Assess the following potential impacts of the proposal during construction and operation, and describe what measures would be implemented to manage, mitigate, or off-set these potential impacts: Fauna and flora, particularly on critical habitats, threatened species, populations, or ecological communities	Sections 6, 7
	Commonwealth Environment Protection and Biodiversity Conservation Act 1999 If your proposal contains any actions that could have a significant impact on matters of National Environmental Significant, then it may required additional approvals under the <i>Commonwealth Environment Protection Biodiversity and Conservation Act 1999 [EPBC Act]</i> .	Sections 6, 7
Department of Land and Water Conservation [15/08/02]	Vegetation with White Box and Yellow Box The EIS, through a suitably qualified Consultant will need to address:	Sections 6, 7
	[a] Commonwealth Environment Protection and Biodiversity Conservation Act 1999 which lists Grassy White Box Community	
	[b] New South Wales <i>Threatened Species Conservation Act 1995</i> which under the NSW Scientific Committee has listed the White Box and Yellow Box Blakely's Red Gum Woodland as an Endangered Ecological Community	Sections 6, 7
	[c] A study is required to access the area to be disturbed under the development proposal including access, to determine any Threatened Species is within the area or is the area a habitat for any Threatened Flora and Fauna	Sections 4, 6, 7

Table A2.2
Assessment Requirements of Consulted Government Agencies – 2002

Page 2 of 2

Government Agency	Issue	Section
Department of Land and Water Conservation [15/08/02]	Vegetation on Crown Lands If in the process of developing any Crown lands natural vegetation is to be removed, the EIS needs to address the significance of the vegetation removal	Section 8
NSW EPA [19/08/02]	Cumulative impacts The EIS must assess the following issues in regard to cumulative impacts: <ul style="list-style-type: none"> Identify the extent that the receiving environment is already stressed by existing development/s and background levels of emissions to which this proposal will contribute 	Section 10
NSW NPWS [13/08/02]	Native Vegetation The NPWS considers that there is inadequate reservation of woodland vegetation communities in the Brigalow Belt South Bioregion, within which the site of the proposed mine occurs. The NPWS recommends in the strongest terms that certain components of the development [particularly the out of pit dump] be relocated within the project site, allowing the native vegetation remnant in the northern corner of the project site to remain undisturbed. The listing of 'clearing of native vegetation' as a KTP must be considered in deciding whether or not there is likely to be a significant impact on threatened species, communities or their habitat as a result of the proposed mine.	Section 7
	Threatened Species <ol style="list-style-type: none"> To adequately assess the likely impacts of the development, a full description of the vegetation communities proposed to be disturbed is required. Particular attention should be paid to the assessment of native vegetation for the Endangered Ecological Community, White Box – Yellow Box – Blakely's Red Gum [Box Gum] Woodland The '8-part test' should be completed for those flora and fauna species and communities which are <i>predicted</i> to occur, as well as those which are <i>known</i> to occur in the area <i>State Environmental Planning Policy 44 – Koala Habitat Protection</i> [SEPP 44] applies to the Gunnedah Local Government Area [LGA]. The EIS must consider the presence of 'potential' and 'core' koala habitat [defined under SEPP 44 by the abundance of scheduled food trees and/or the presence of koalas]. Where 'core' habitat is found, SEPP 44 requires the preparation of a CKPoM for the site [if one is not already in place for the entire LGA] 	Sections 6, 7 Sections 6, 7 Section 5

Table A2.3
Additional Assessment Requirements of Consulted Government Agencies – 2006

Page 1 of 2

Government Agency	Issue	Section
Department of Environment and Conservation [27/07/06]	The key issues which the EA must focus on are: <ul style="list-style-type: none"> • cumulative impacts within the local area 	Section 10
	<ul style="list-style-type: none"> • the potential impacts on Threatened Species, Flora, Fauna and Endangered Ecological Communities and their habitats 	Sections 6, 7
	<ul style="list-style-type: none"> • the potential impacts on adjacent DEC estate 	Section 7
	Cumulative Impacts The EA must consider the cumulative impact	Section 10
	Native Vegetation Impacts of the project on native vegetation [as per the 2002 requirements]	Section 10
	Impacts of the project on threatened species, populations, communities and their habitats The EA must follow the 'Draft Guidelines for Threatened Species Assessment'. A field survey should be conducted and documented in accordance with the guidelines. Likely impacts on threatened species and their habitat need to be assessed, evaluated and reported on. The EA should specifically report on the considerations listed in Step 3 of the draft guidelines. It should be noted that the assessment criteria listed in Appendix C of that document have now been changed. The new criteria are listed under Part 5A of the EP&A Act	Section 6
	The EA must describe the actions that will be taken to avoid impacts, or to mitigate unavoidable impacts of the project on threatened species and their habitat. This should include an assessment of the effectiveness and reliability of the measures and any residual impacts after these measures are implemented	Section 6
	Where measures to avoid or mitigate are not possible, offset strategies need to be considered. In the event that offset strategies are investigated as part of the Belmont Coal Project, the large scale of the proposal and the little potential for offsets within the project site will necessitate consideration of the regional context	Section 10
	The EA must clearly state whether it meets each of the key thresholds set out in Step 5 of the draft guidelines	Section 10
	A full description of the vegetation communities proposed to be disturbed is required. Particular attention should be paid to the assessment of native vegetation for the Endangered Ecological Community, White Box – Yellow Box – Blakely's Red Gum [Box – Gum] Woodland	Sections 4, 6, 7
The EIS must consider the presence of 'potential' and 'core' koala habitat [defined under SEPP 44 by the abundance of scheduled food trees and/or the presence of koalas]. Where 'core' habitat is found, SEPP 44 requires the preparation of a CKPoM for the site [if one is not already in place for the entire LGA]	Section 5	

Table A2.3 [Cont'd]
Additional Assessment Requirements of Consulted Government Agencies – 2006

Page 2 of 2

Government Agency	Issue	Section
Department of Environment and Conservation	A full description of the vegetation communities proposed to be disturbed is required. Particular attention should be paid to the assessment of native vegetation for the endangered ecological Community, White Box – Yellow Box – Blakely's Red Gum [Box – Gum] Woodland	Sections 4, 6, 7
[27/07/06]	<p>Corridor Values</p> <p>Vegetated areas adjoining DEC estate play a complimentary role in providing essential linkages for the maintenance of biodiversity and minimise potential edge effects in DEC estate.</p>	Sections 7.3,10
	Development in areas of native vegetation adjoining DEC estate can result in fragmentation of habitat corridors or isolation with other areas of native vegetation in the locality	Sections 7.3,10
	The EA must consider the corridor values or connective importance of any vegetation on the subject land. The DEC prefers that vegetation on adjoining land that exhibits these corridor values should be retained and, where necessary, rehabilitated	Sections 7.3,10