APPENDIX D

Grassland Assessment Report

WATERMARK COAL PROJECT

Grassland Assessment Report

For:

Shenhua Watermark Coal Pty Limited

October 2013

Final

PO Box 2474
Carlingford Court 2118

Report No. 9022RP4

The preparation of this report has been in accordance with the brief provided by the Client and has relied upon the data and results collected at or under the times and conditions specified in the report. All findings, conclusions or recommendations contained within the report are based only on the aforementioned circumstances. The report has been prepared for use by the Client and no responsibility for its use by other parties is accepted by Cumberland Ecology.

Revision	Date Issued	Reviewed by	Approved by	Date Approved	Revision Type
1	31/10/2013	D. Robertson	D. Robertson	31/10/2013	Final

Approved by: Dr David Robertson

Position: Director

Signed: David Robertson

Date: *31 October, 2013*

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Chapter 1

Introduction

1.1 Purpose

The purpose of this report is to provide a further assessment of the grassland vegetation within the Project Boundary, specifically areas within the Disturbance Boundary, to address submissions on the exhibited Ecological Impact Assessment (EIA) in relation to grassland mapping. A key issue raised in the submissions relating to grassland is that some areas of the vegetation community map unit 'Low Diversity Grassland, Planted and Exotic' could be included within the grassland component of the NSW *Threatened Species Conservation Act 1995* (TSC Act) listed Box Gum Woodland community.

1.2 Relevant Submissions

***RA9**: Some areas of vegetation currently mapped as 'Low diversity grassland, planted and exotic pasture potentially should be re-mapped as derived native grassland – a component of the Box-Gum Woodland EEC listed under the Threatened Species Conservation Act 1995.*

***SIG8**: There are 76 ha of derived grassland (C/EEC). It was stated that 3,084 ha of low diversity grassland were found but does not state how was this determined. Only a very low sampling intensity of rapid data points and quadrats were undertaken within the large grassland area.*

Chapter 2

Methodology

The following methods were utilised to further assess the grassland and agricultural areas within the Project Boundary:

- Review of the listings of Box Gum Woodland as listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1995* (EPBC Act) and TSC Act;
- Examination of historic aerial photographs from 1954, 1967, 1976, 1989 and 1998;
- Additional field surveys (outlined below); and
- Review of all floristic data collected within the 'Derived Native Grassland' and 'Low Diversity Grassland, Planted and Exotic' map units.

Additional surveys of the 'Derived Native Grassland' and 'Low Diversity Grassland, Planted and Exotic' map units within the Project Boundary were conducted during 12-16 August 2013 and 9-11 September 2013.

These surveys included the following:

- Re-survey of 10 sites assessed in the EIA, including use of the BioBanking methodology;
- Survey of an additional 20 sites;
- Collection of additional floristic data within each of the BioBanking plots; and
- Visual assessments of individual paddocks and some existing plots including collection of photographs and notes.

As surveys were done in late winter and early spring, 10 sites surveyed in spring/summer between 2010-2012 were resurveyed so as to determine the impacts of season of survey as a determinant of the number of native grassland species that were detected. When the 26 grassland quadrats from 2010-2012 are combined with the most recently collected quadrats in 2013, a total of 56 quadrats (at 46 sites) have now been completed using the BioBanking methodology within the 'Derived Native Grassland' and 'Low Diversity Grassland, Planted and Exotic' map units within the Project Boundary. This includes four sites within areas mapped as 'Derived Native Grassland' and 42 sites within 'Low Diversity Grassland, Planted and Exotic'. The locations of grassland/agriculture surveys sites are shown in **Figure 2.1**.

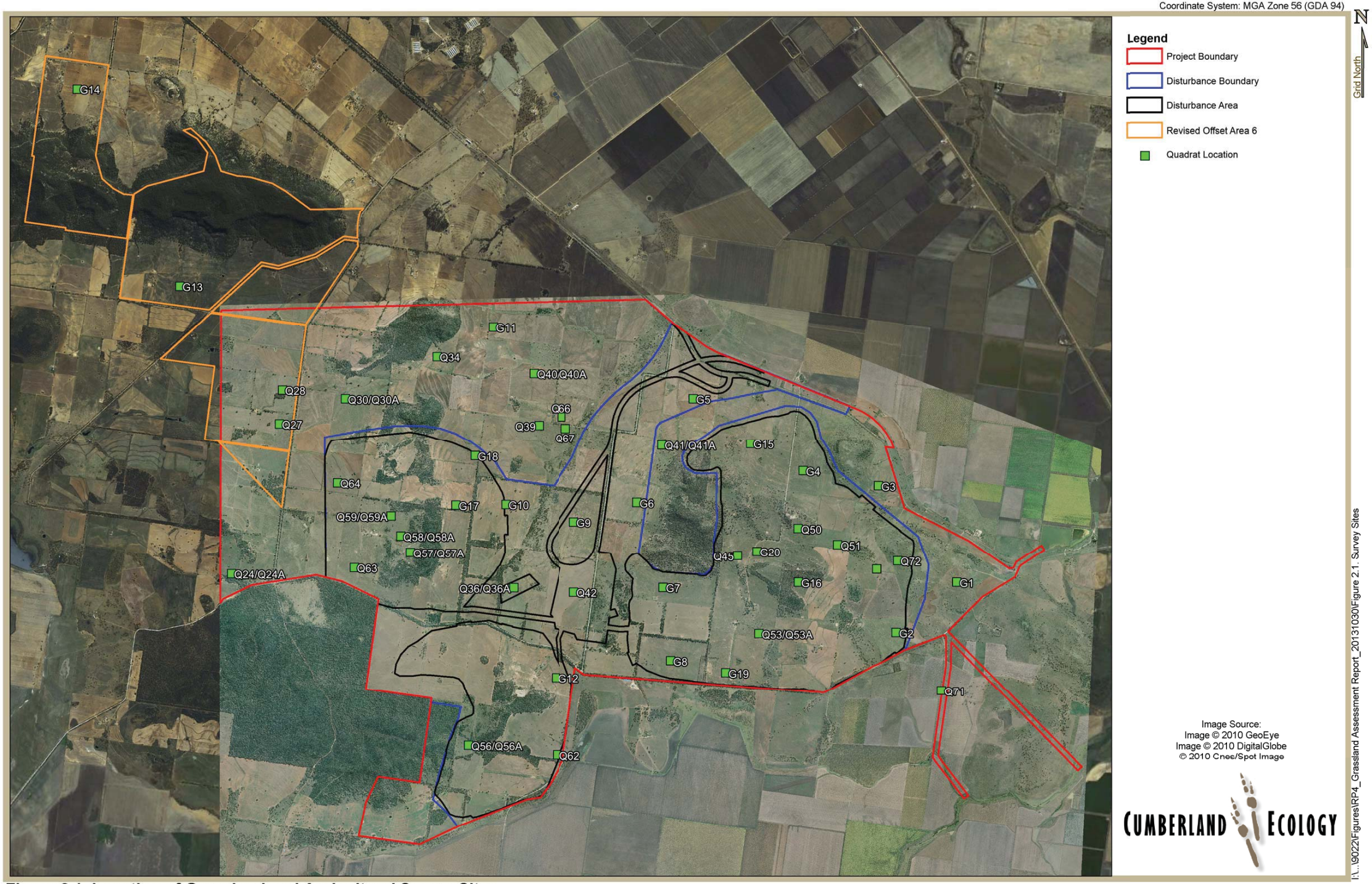


Figure 2.1. Location of Grassland and Agricultural Survey Sites

Chapter 3

Results

3.1 Reclassification of Grassland and Agricultural Area Map Units

The Project Boundary occurs within a landscape that has been intensively cleared for agricultural purposes. The majority of the remnant woodland vegetation is highly fragmented and mostly occurs as fragmented narrow tracts of woodland along boundary fences and road verges, isolated patches of remnant or regrowth patches on hills and steeper slopes, and as scattered paddocks trees.

These patterns are evident within the Project Boundary, where the majority of land has been cleared for agriculture and only higher elevation areas and fence lines support woodland vegetation. The Project Boundary has obviously had a long history of agricultural development and associated degradation and land clearing. As is evident in the sequence of historic aerial photographs (1954, 1967, 1976, 1989 and 1998), the majority of the site has been cleared since before 1954. Such historic clearing, particularly for use for cereal cropping, has had a pronounced impact on the original grassy woodland vegetation, including the ground stratum. This is further explained below.

Much of the grassland within the Project Boundary is degraded to varying degrees by past clearing, grazing practices and exploration and mining activities. Most areas of grassland contain a very low diversity of native species while others have been heavily impacted by agriculture and exist as cereal or other crops and/or pasture. Decades of stock grazing has resulted in a variety of ecological impacts including weed invasion, nutrient enrichment and soil erosion.

3.1.1 Existing Mapping of the Disturbance Boundary

Within the exhibited EIA, the grassland and agricultural areas for part of the following map units:

- **Derived Native Grassland**:
  - Native grasslands that have had relatively little modification, are typically enclosed by woodland vegetation and contain a higher diversity of native species;

- **Low Diversity Grassland, Planted and Exotic**:
  - Severely modified croplands, where the land has been cultivated to grow a crop, and consequently all the pre-existing understorey has been removed; and
  - Pasture improved grassland, where exotic pasture grasses and chemical fertilizer have been applied to improve their grazing value for stock, but where some native species remain.

Within the EIA, the 'Low Diversity Grassland, Planted and Exotic' map unit comprised a number of components. The croplands and pasture improved grassland was mapped as one vegetation type due to the constantly changing land use of these areas. That is, areas may change from the low diversity grassland component one season to croplands the next as different paddocks are ploughed and sown. The duration of the fallow period also appears to have an influence on the native species diversity but, based upon our recent analysis, repeatedly cropped areas appear to have lost much of their original native herbaceous plant species diversity.

3.1.2 Updated Mapping of the Disturbance Boundary

In this latest analysis, the grassland and agricultural areas have been re-mapped within the Disturbance Boundary into the following categories (see **Figure 3.2**):

- Derived Native Grassland;
- Low Diversity Native Grassland; and
- Cropland / Exotic Pasture.

The extent of each of these map units within the Disturbance Boundary and the Disturbance Area is provided in **Table 3.1**. The updated mapping of the Disturbance Area represents a 'snapshot' of the vegetation at the time of survey. At any point, the 'Low Diversity Native Grassland' may be ploughed and used for cultivation and over time 'Cropland / Exotic Pasture' could be left fallow and return (over a period of one or more years) to the low diversity form of grassland.

Appendix A contains a suite of photographs taken within each of the map units and their locations within the Project Boundary are shown in **Figure A.1**.

Table 3.1 Extent of Grassland and Agricultural Areas

Vegetation Community	Disturbance Boundary (ha)	Disturbance Area (ha)
Derived Native Grassland	73	73
Low Diversity Native Grassland	2,609	1,691
Cropland / Exotic Pasture	1,719	1,393

i. Key descriptors

The key descriptors for each of these map units are provided in **Table 3.2**.

Table 3.2 Key Descriptors for Grassland/Agricultural Map Units

Map Unit	Key Descriptors
Derived Native Grassland	- Typically surrounded/enclosed by intact or regenerating woodland - Diversity of native grass and non-grass species in the ground layer, often with over 12 native non-grass herb species per 1,000 square metre sample - Often contain evidence or canopy and understorey regeneration - Low exotic plant cover
Low Diversity Native Grassland	- Cultivated land that has been left fallow in recent years - Land currently used for grazing - Dominated by native grasses such as *Bothriochloa spp* and *Aristida* spp. - Few native understorey species and often in low abundances - Canopy only present in the form of widely scattered paddock trees - Few locations where midstorey or canopy regeneration present - Few logs and cut stumps
Crop / Exotic Pasture	- Currently cultivated land - Ploughed land - Dominated by exotic species (especially cereal crops) - Very few native species present in the ground layer

ii. Analysis of BioBanking data

Table 3.3 contains the average BioBanking Site Values for several attributes in the 'Derived Native Grassland', 'Low Diversity Native Grassland' and 'Cropland / Exotic Pasture' plots undertaken within the Disturbance Boundary. Plots were excluded where the existing data did not match the current mapping (Q42 and Q51).

Plot and quadrat data for all survey sites within the Project Boundary are provided in **Appendix B**.

Table 3.3 Average BioBanking Site Values in Grassland/Agricultural Plots within the Disturbance Boundary

BioBanking Site Attribute	Derived Native Grassland	Low Diversity Native Grassland	Cropland / Exotic Pasture
Number of Plots	8	21	6
Overstorey Cover	0.0 *(0)*	0.0 *(0)*	0.0 *(0)*
Midstorey Cover	0.5 *(0-2.5)*	0.0 *(0)*	0.0 *(0)*
Native Plant Species Richness	18.75 *(12-36)*	14.6 *(8-30)*	6.8 *(3-13)*
Native Ground Cover (grasses)	85.0 *(64-100)*	65.0 *(6-100)*	11.2 *(0-28)*
Native Ground Cover (shrubs)	5.3 *(0-10)*	2.7 *(0-10)*	0.0 *(0)*
Native Ground Cover (other)	26.8 *(12-48)*	12.5 *(0-28)*	2.0 *(0-6)*
Exotic Plant Cover (groundcover only)	19.0 *(6-36)*	42.5 *(4-82)*	79.2 *(50-100)*

Range of values shown in italics

iii. Analysis of historical aerial photographs

Examination of the areas mapped as 'Low Diversity Grassland, Planted and Exotic' within each of the historic aerial photographs (see **Figures 3.3** to **3.7**) has indicated that significant modification to the original vegetation has taken place. Key observations include:

- The majority of vegetation clearance currently apparent was undertaken prior to 1954;
- Cleared areas have been maintained as agricultural land (mixed purposes) since clearing took place;
- Extensive areas have been utilised for cropping; and
- Many areas have had their landform changed as evidenced by the presence of contour banks.

The historical aerial photographs demonstrate that a high proportion of the Project Boundary has been subject to significant and ongoing disturbance through agricultural practices which has contributed to the degradation and removal of the native vegetation. The presence of

contour banks in broad areas suggests that these lands may have been subject to significant erosion control works due to serious past erosion.

iv. Relationship of updated map units to OEH classification

The updated grassland/agricultural map units and how they align with the map units proposed by OEH are summarised in **Table 3.4**.

Table 3.4 Relationship of Updated Map Units to OEH Classification

OEH Classification	Updated Map Units
a) cleared land	Cropland / Exotic Pasture
b) low condition	
c) >50% native ground cover with no native canopy present (derived native grasslands in moderate to good condition):	
i. grasslands that equate to EPBC Act and TSC Act definition	Derived Native Grassland
ii. grasslands that only equate to TSC Act definition	n/a
iii. non-listed native grasslands	Low Diversity Native Grassland
d) >50% native ground cover with a native canopy present (native vegetation in moderate to good condition).	n/a

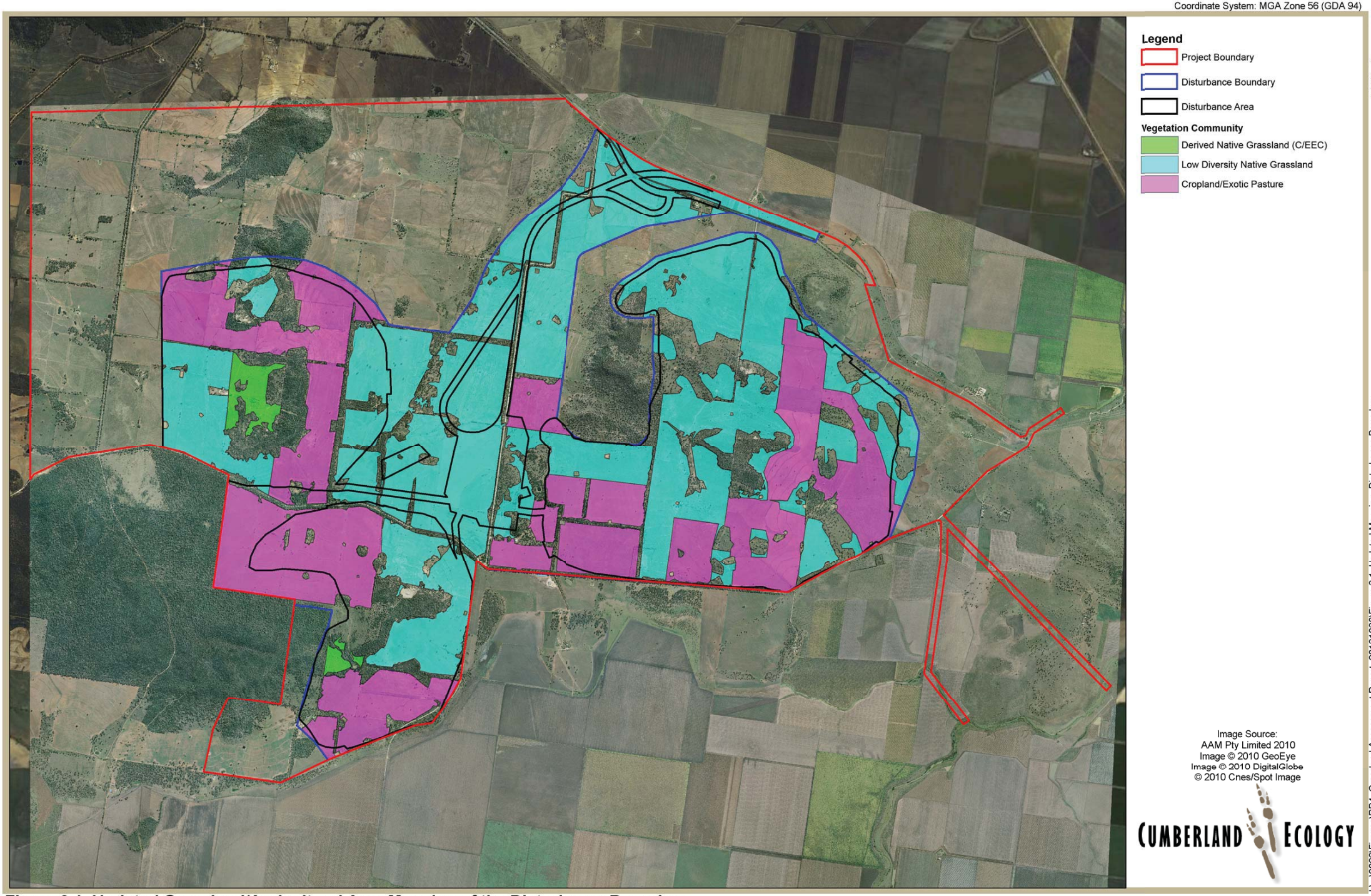


Figure 3.1. Updated Grassland/Agricultural Area Mapping of the Disturbance Boundary

Figure 3.2. 1954 Aerial Photograph of the Project Boundary

Figure 3.3. 1967 Aerial Photograph of the Project Boundary

Figure 3.4. 1976 Aerial Photograph of the Project Boundary

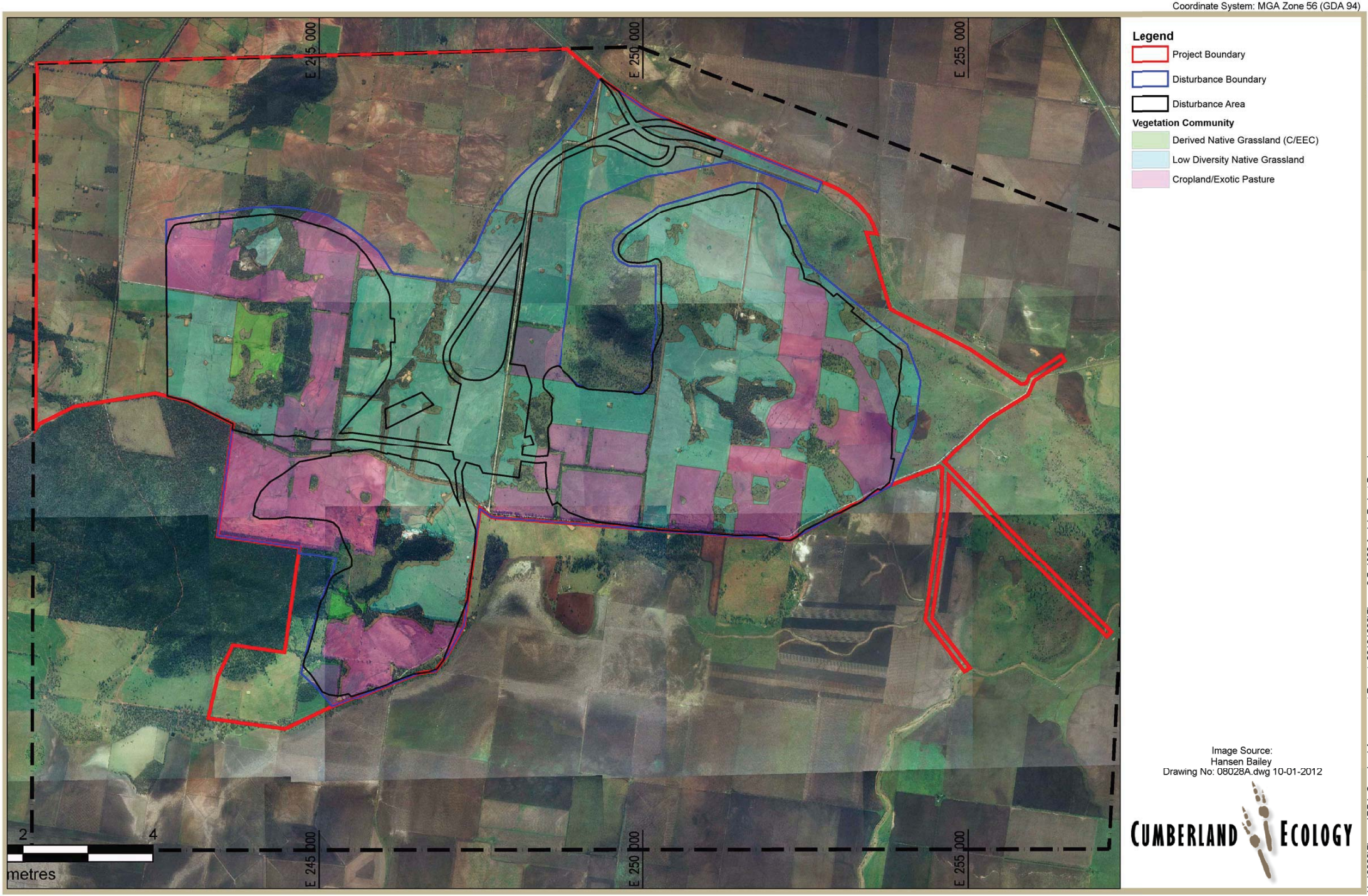


Figure 3.5. 1989 Aerial Photograph of the Project Boundary

Figure 3.6. 1998 Aerial Photograph of the Project Boundary

3.2 Identification of Derived Native Grasslands under the EPBC Act

3.2.1 Criteria

The EPBC Act Policy Statement for assessing Box Gum Woodland and Derived Native Grassland (DEH 2006) provides a prescriptive, detailed methodology for determining the presence of the Critically Endangered Ecological Community (CEEC).

The flow chart that summarises the Commonwealth Department of Environment (DoE) method for identifying Box Gum Woodland and Derived Native Grassland demonstrates that to confirm the occurrence of this CEEC as listed under the EPBC Act, it is firstly necessary to confirm the presence or historical presence of White Box (*Eucalyptus albens*), Yellow Box (*E. melliodora*) and/or Blakely's Red Gum (*E. blakelyi*) within the area of interest. Then, if one or more of these trees are present or was historically present as dominant or co-dominant, a quadrat should be completed within a plot of 1,000 m^2 (0.1 ha). DoE has published a list of native plant species that are characteristic of Box Gum Woodland and Derived Native Grassland: if the survey plot contains 12 native understorey non-grassy species (excluding native grasses) and at least one is an "important" native plant as signified in the list of characteristic species, then the plant community is said to be present.

3.2.2 Assessment

Table 3.5 demonstrates whether each updated map unit conforms to the identification of Box Gum Woodland under the EPBC Act. Based on this assessment, only the 'Derived Native Grassland' map unit conforms to the grassland component of Box Gum Woodland under the EPBC Act. Therefore, the total area of EPBC Act listed grassland conforming to Box Gum Woodland is identical to the area reported within the EIA.

Table 3.5 Identification of Box Gum Woodland under the EPBC Act

Criteria	Derived Native Grassland	Low Diversity Native Grassland	Cropland / Exotic Pasture
Is, or was previously, at least one of the most common overstorey species White Box, Yellow Box or Blakely's Red Gum (or Western Grey Box or Coastal Grey Box in the Nandewar Bioregion?	Yes. Patch occur immediately adjacent to Box Gum Woodland dominated by either White Box or Blakely's Red Gum	Yes. Remaining woodland patches indicate that a large portion of this map unit would have White Box, Yellow Box or Blakely's red Gum as a common species in the overstorey.	Yes. Remaining woodland patches indicate that a large portion of this map unit would have White Box, Yellow Box or Blakely's red Gum as a common species in the overstorey.
If YES continue. If NO then not the listed ecological community.			
Does the patch have a predominantly native understorey?	Yes. The understorey is dominated by native grasses and a diversity of native non-grass herbs is also present.	Yes. The understorey is dominated by native grasses, with a few native non grass herbs present.	No. The understorey is either cleared or dominated by exotic species.
If YES continue. If NO then not the listed ecological community.	↓	↓	**Not the listed ecological community.**
Is the patch 0.1 ha or greater in size?	Yes. Both patches of this community are greater than 0.1 ha in size.	Yes. All patches of this community are greater than 0.1 ha in size.	
If YES continue. If NO then not the listed ecological community.	↓	↓	
There are 12 or more native understorey species present (excluding grasses). There must be at least one important species.	Yes. >12 native non-grass species, including shrubs and herbs, occur within some plots in this community. Mapping has been extrapolated to	No. <12 native non-grass species occur within plots in this community.	

Table 3.5 Identification of Box Gum Woodland under the EPBC Act

Criteria	Derived Native Grassland	Low Diversity Native Grassland	Cropland / Exotic Pasture
	paddock boundaries and may include patches that have <12 native non-grass species.		
If YES then the listed ecological community. If NO then continue.	**The listed ecological community.**	↓	
Is the patch 2 ha or greater in size		Yes. 24 patches of this community are > 2 ha in size.	
If YES continue. If NO then not the listed ecological community.		↓	
Does the patch have an average of 20 or more mature trees per hectare, or is there natural regeneration of the dominant overstorey eucalypts?		No. Due to historical and ongoing agricultural land uses within this community, mature trees are largely absent from this community (occurrence as paddock trees) and there is little to regeneration of canopy species.	
If YES then the listed ecological community. If NO then not the listed ecological community.		**Not the listed ecological community.**	

3.3 Identification of Derived Native Grasslands under the TSC Act

3.3.1 Criteria

A derived grassland form of the Box Gum Woodland community is included in the definition of the TSC Act listing of the community. The TSC Act Final Determination of the Box Gum Woodland EEC provides the following description of the community:

> *11. Disturbed remnants are still considered to form part of the community including remnants where the vegetation, either understorey, overstorey or both, would, under appropriate management, respond to assisted natural regeneration, such as where the natural soil and associated seed bank are still at least partially intact.*

Like the EPBC Act, the TSC Act Final Determination makes a comment about the viability of areas that are to be included in the TSC Act listing. Grassland forms of the TSC Act listed Box Gum Woodland are required to exhibit a "natural regenerative ability" (assisted or unassisted) that would indicate a mostly intact soil bed and associated seed bank. Therefore, to be considered to meet the TSC Act definition of Box Gum Woodland, the grassland should be capable of assisted natural regeneration and not require active planting of trees and understorey.

3.3.2 Assessment

To be considered to meet the TSC Act definition of Box Gum Woodland, the site should be capable of assisted natural regeneration and not require active planting of trees and understorey. Regeneration relies on native seed stored in the soil or in the canopy, or seed transported to the site by water, wind or animals; revegetation is the introduction of seed or seedlings (Rawlings et al. 2010) to a site that would otherwise remain predominantly exotic or poorly diverse.

Based on the assessment of each map unit below, only the 'Derived Native Grassland' map unit conforms to the grassland component of Box Gum Woodland under the TSC Act. Therefore, the total area of TSC Act listed grassland conforming to Box Gum Woodland is identical to the area reported within the EIA.

i. Derived native grassland

Based on this definition, only the 'Derived Native Grassland' map unit is considered to conform to the grassland component of Box Gum Woodland under the TSC Act. The two mapped areas of this community have not been used for high intensity agricultural purposes; they contain a diversity of native herbs (grasses and non-grasses) within the ground layer; and they occur in proximity to woodland patches that could provide a seed source for trees, shrubs and other species. All four of the plots within the 'Derived Native Grassland' map unit were resurveyed as part of this assessment and all plots were found to contain a higher diversity of native species than was found during previous surveys, indicating that some level

of natural regeneration may have occurred and/or that seasonal conditions were better for detection of plants in 2013 than during earlier survey times.

ii. Low diversity native grassland

The 'Low Diversity Native Grassland' map unit is not considered to conform to the grassland component of Box Gum Woodland under the TSC Act. Based on the results of this assessment, including review of historic aerials and analysis of survey data, this map unit is not considered to be capable of assisted natural regeneration. For the majority of areas within this map unit, the natural soil and associated seed bank has been highly modified as a result of land use practices. Notable factors that have had a significant negative influenced the capability for assisted natural regeneration include soil disturbance and soil enrichment, both of which has occurred over decades within the Project Boundary.

Due to the paddocks within this map unit having been cropped, ploughed, fertilised and cattle-grazed over many decades, the soil profile and native seed bank have been disturbed to the extent that they appear to have been lost and so natural regeneration of the grassland back to the original woodland is unlikely without significant human assistance. The original soil itself is also likely to be compromised (through partial or total physical alteration) by the passing of considerable periods of time, by fertiliser additions and by extensive mechanical disturbance. The mechanical disturbance is evidenced by the ploughing and contouring of the soil.

There are some areas within this map unit where *Callitris glaucophylla* (White Cypress Pine) has regenerated, however recent surveys of these areas has shown that the ground layer contained few native non-grass species and 25-50% exotic plant cover. These paddocks are unlikely to have been cleared in the last 2-5 years (based on size of the Cypress Pine), and there appears to have been little to no increase in the diversity and abundance of native plant species over time.

Despite the presence of limited regeneration in some areas, the majority of the map unit shows no regeneration of canopy and midstorey species.

iii. Cropland/Exotic Pasture

The 'Cropland/Exotic Pasture' map unit does not conform to the grassland component of Box Gum Woodland under the TSC Act. The paddocks that comprise this map unit have recently been cropped, ploughed, fertilised and the soil profile and native seed bank have been disturbed to the extent that unaided natural regeneration to woodland is unlikely.

3.4 Descriptions of Updated Map Units

3.4.1 Derived Native Grassland

EPBC Act: White Box, Yellow Box, Blakely's Red Gum Grassy Woodland and Derived Native Grassland (CEEC)

TSC Act Status: White box Yellow box Blakely's Red Gum Woodland (EEC)

This community occurs at two locations within the Project Boundary. It is derived from the clearing of woodland vegetation conforming to Box Gum Woodland and the patches are largely surrounded by intact or regenerating forms of this woodland. The shrub layer is sparse and includes regenerating *Callitris glaucophylla* (White Cypress Pine) and *Eucalyptus albens* (White Box). *Maireana microphylla* (Small-leaf Bluebush) and the exotic *Sida spinosa* were also consistently recorded within the shrub layer. A diversity of native grasses dominate the understorey with herbs occurring less frequently. Common grass species include *Aristida ramosa* (Purple Wiregrass), *Bothriochloa decipiens* var. *decipiens*, *Cymbopogon refractus* (Barbed Wire Grass), *Panicum effusum* (Hairy Panic) and *Sporobolus creber* (Western Rat-tail Grass). Native herbaceous species in the understorey include *Cheilanthes sieberi* subsp. *sieberi* (Poison Rock Fern), *Cymbonotus lawsonianus* (Bears-ear), *Vittadinia cuneata* var. *cuneata* and *Dichondra* sp. A. Exotic herbaceous species in the understorey include *Cyclospermum leptophyllum* (Slender Celery), *Conyza sumatrensis* (Tall Fleabane), *Medicago minima* (Wooly Burr-Medic) and *Trifolium arvense* (Haresfoot Clover). This community is shown in **Photograph 3.1** and **Photograph 3.2**.

Photograph 3.1 Derived Native Grassland: Q58A (August 2013)

Photograph 3.2 Derived Native Grassland: Q56A (August 2013)

3.4.2 Low Diversity Native Grassland

EPBC Act: Not listed

TSC Act Status: Not listed

This community occurs throughout the Project Boundary and is the result of a combination of highly intense agricultural land use and variable resting periods that has produced paddocks that are dominated by a few species of native grasses and a low diversity of herbs. A canopy layer is largely absent and represented by paddock trees of species from the suite of adjoining vegetation communities. The shrub layer is variable, however largely absent. Species in the shrub layer include the native *Maireana microphylla* (Small-leaf Bluebush) and *Callitris glaucophylla* (White Cypress Pine) and the exotic *Sida spinosa* and *Malvastrum americanum* (Spiked Malvastrum). Native grasses dominate the understorey including *Aristida ramosa* (Purple Wiregrass), *Bothriochloa decipiens* var. *decipiens*, *Sporobolus creber* (Western Rat-tail Grass) and *Panicum effusum* (Hairy Panic). Exotic grasses commonly recorded include *Lolium perenne* (Perennial Ryegrass), *Bromus hordeaceus* (Soft Brome) and *Eragrostis cilianensis* (Stinkgrass). Non-grass herbs within the ground layer are predominately exotic and include *Carthamus lanatus* (Saffron Thistle), *Cyclospermum leptophyllum* (Slender Celery), *Medicago polymorpha* (Burr Medic), *Medicago minima* (Wooly Burr-Medic), *Hypochaeris radicata* (Catsear), *Anagallis arvensis* (Scarlet/Blue Pimpernel), *Buglossoides arvensis* (Sheepweed) and *Verbena officinalis* (Common Verbena). Native non-grass species in the ground layer include *Cheilanthes sieberi* subsp. *sieberi* (Poison Rock Fern), *Vittadinia cuneata* var. *cuneata*, *Dichondra* sp. A, *Rumex brownii* (Swamp Dock) and *Schenkia spicata*. This community is shown in **Photograph 3.5** and **Photograph 3.6**.

Photograph 3.3 Low Diversity Native Grassland: G19 (August 2013)

Photograph 3.4 Low Diversity Native Grassland: P5 (September 2013)

3.4.3 Cropland / Exotic Pasture

EPBC Act: Not listed

TSC Act Status: Not listed

This community occurs at a number of locations within the Project Boundary and is represented by land that is currently utilised for high intensity agricultural purposes. This community can occur as ploughed fields, cropland or exotic pasture. Species composition is variable within this community and is dependent on the crop species utilised within each field. The ground layer is dominated by exotics and commonly recorded species include *Lolium perenne* (Perennial Ryegrass), *Sida spinosa* (Saffron Thistle), *Carthamus lanatus*, *Medicago polymorpha* (Burr Medic), *Hypochaeris microcephala* (White Flatweed), *Lepidium africanum* and *Xanthium spinosum* (Bathurst Burr). In some instances, native species have been recorded in pasture areas that have been left fallow for a short period of time. This includes the grass *Bothriochloa decipiens* var. *decipiens* and the herbs *Oxalis perennans* and *Vittadinia cuneata* var. *cuneata*. This community is shown in **Photograph 3.5** and **Photograph 3.6**.

Photograph 3.5 Cropland / Exotic Pasture: P9 (August 2013)

Photograph 3.6 Cropland / Exotic Pasture: G2 (August 2013)

Chapter 4

Conclusion

This detailed assessment of the grassland and agricultural areas within the Project Boundary, and specifically the Disturbance Boundary, has verified the previously mapped extent of the grassland component of Box Gum Woodland listed under the EPBC Act and TSC Act that was exhibited within the EIA. Despite the EPBC Act and TSC Act having different criteria for identifying grassland forms of Box Gum Woodland, the results of this assessment has found that within the Disturbance Boundary the conforming and non-conforming map units are the same. That is, grassland is either 'Low Diversity Native Grassland' and/or 'Cropland / Exotic Pasture' that does not comply with either the EPBC Act or TSC Act, or, it is more intact 'Derived Native Grassland' that complies with both Acts. The latter is confined to a few areas that have not apparently been repeatedly used for intensive agricultural purposes. All of the flatter, low-lying areas of grassland have apparently been repeatedly used for agricultural purposes.

Whilst the existing 'Low Diversity Grassland, Planted and Exotic' map unit has been split into two new units, neither of these units are considered to be forms of Derived Native Grassland. The primary reason for the 'Low Diversity Native Grassland' map unit not conforming to the EPBC Act and TSC Act definitions is that the map unit is not considered to be capable of assisted natural regeneration.

Appendix A

Photographs

A.1 Derived Native Grassland

Q56A

Q57A

Q58A

Q59A

A.2 Low Diversity Native Grassland

G4

G5

G6

G7

G9

G10

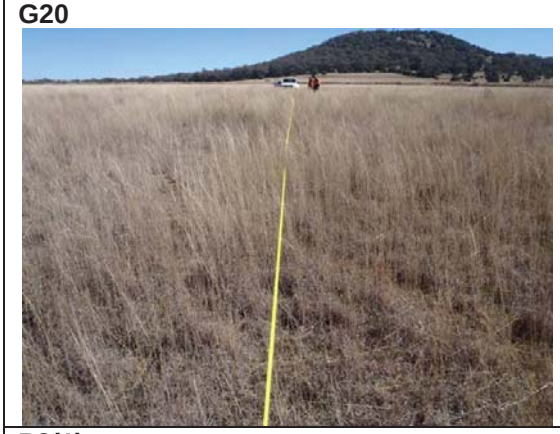
G12

G15

G16

G19

G20



P1

P2(1)

P2(2)

P3(1)

P3(2)

P4(1)

P4(2)

P5(1)

P5(2)

P6(1)

P6(2)

A.3 Cropland / Exotic Pasture

G2

G8

G17

G18

P7

P8

P9

P10

P11

P12

P13

P14

P15

P16

P17

P18

Figure A.1. Location of Photograph Points

Appendix B

Plot and Quadrat Data

Table B.1 BioBanking Plot Data for Grassland and Agricultural Sites

Plot Name	NPS	NOS	NMS	NGCG	NGCS	NGCO	EPC	NTH	OR	FL
Q24	9	0	0	0	0	10	12.67	0	0	3
Q24A	16	0	0	26	0	2	24.67	0	0	0
Q27	10	0	0	86	2	4	6	0	0	0
Q28	9	0	0	4	0	8	27.33	0	0	0
Q30	12	0	0	10	0	0	29.33	0	0	0
Q30A	10	0	0	30	0	0	28	0	0	0
Q34	8	0	0	42	0	0	19.33	0	0	0
Q36	16	0	0	80	2	0	1.33	0	0	0
Q36A	14	0	0	34	2	12	21.33	0	0	0
Q39	17	0	0	96	12	30	2	0	0	3
Q40	19	0	0	44	4	0	18.67	0	0	0
Q40A	20	0	0	28	0	14	20	0	0	0
Q41	14	0	0	58	6	0	20	0	0	0
Q41A	14	0	0	28	0	6	24.67	0	0	0
Q42	8	0	0	0	0	0	14	0	0	0
Q45	17	0	0	96	0	8	7.33	0	0	0
Q50	15	0	0	100	6	26	8.67	0	0	0
Q51	12	0	0	66	22	28	12	0	0	0
Q53	16	0	0	84	10	8	5.33	0	0	0
Q53A	12	0	0	72	2	14	16.67	0	0	0
Q56	19	0	1.5	98	4	28	7.33	0	0	0
Q56A	36	0	0	60	2	42	7.33	0	0	0

Table B.1 BioBanking Plot Data for Grassland and Agricultural Sites

Plot Name	NPS	NOS	NMS	NGCG	NGCS	NGCO	EPC	NTH	OR	FL
Q57	17	0	0	98	10	12	2	0	0	0
Q57A	17	0	0	64	10	16	12	0	0	0
Q58	14	0	2.5	96	4	16	2.67	0	0	0
Q58A	21	0	0	70	2	12	10.67	0	0	0
Q59	12	0	0	100	10	48	2.67	0	0	0
Q59A	14	0	0	94	0	40	6	0	0	0
Q62	12	0	0	98	0	2	2.67	0	0	0
Q63	19	0	0	98	0	14	2.67	0	0	0
Q64	3	0	0	0	0	0	32.67	0	0	0
Q66	19	0	0	72	2	16	6.67	0	0	0
Q67	37	0	0	76	0	27	0.67	0	0	0
Q71	17	0	0	48	2	40	12.67	0	0	0
Q72	30	0	0	76	4	22	20	0	0	0
Q73	20	0	0	98	0	4	1.33	0	0	0
G1	12	0	0	80	0	26	9.33	0	0	0
G2	4	0	0	0	0	0	33.33	0	0	0
G3	17	0	0	78	0	10	14	0	0	0
G4	15	0	0	64	0	24	18.67	0	0	0
G5	14	0	0	22	0	10	27.33	0	0	0
G6	12	0	0	48	10	4	17.33	0	0	0
G7	16	0	0	36	8	22	20	0	0	0
G8	8	0	0	0	0	6	28	0	0	0
G9	11	0	0	24	10	8	23.33	0	0	0

Table B.1 BioBanking Plot Data for Grassland and Agricultural Sites

Plot Name	NPS	NOS	NMS	NGCG	NGCS	NGCO	EPC	NTH	OR	FL
G10	8	0	0	6	0	16	21.33	0	0	0
G11	13	0	0	22	0	2	19.33	0	0	0
G12	12	0	0	32	2	18	22.67	0	0	0
G13	14	0	0	74	0	22	11.33	0	0	0
G14	9	0	0	20	0	4	25.33	0	0	0
G15	10	0	0	72	0	6	18	0	0	0
G16	11	0	0	50	0	28	18.67	0	0	0
G17	13	0	0	28	0	4	16.67	0	0	0
G18	6	0	0	28	0	0	21.33	0	0	0
G19	17	0	0	90	0	10	8.67	0	0	0
G20	10	0	0	84	0	6	14	0	0	0

Key
Highlighted plots used to calculate averages presented in Table 3.3 (plots within Disturbance Boundary only)

- Derived Native Grassland
- Low Diversity Native Grassland
- Cropland / Exotic Pasture

Table B.2 Quadrat Data for Grassland and Agricultural Sites

Family	*	Scientific Name	Common Name	Q24	Q27	Q28	Q30	Q34	Q36	Q39	Q40	Q41	Q42	Q45	Q50	Q51	Q53	Q56	Q57	Q58	Q59	Q62	Q63	Q64	Q66	Q67	Q71	Q72	Q73	Q24A	Q30A	Q36A	Q40A	Q41A	Q53A	Q56A	Q57A	Q58A	Q59A	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13	G14	G15	G16	G17	G18	G19	G20
Trees																																																											
Cupressaceae		*Callitris glaucophylla*	White Cypress Pine																																																								
Myrtaceae		*Eucalyptus albens*	White Box								X																		X																														
Myrtaceae		*Eucalyptus camaldulensis*	River Red Gum																								adj																																
Myrtaceae		*Eucalyptus dealbata*	Tumbledown Red Gum																									X																															
Myrtaceae		*Eucalyptus melliodora*	Yellow Box																										X																														
Small Tree																																																											
Cupressaceae		*Callitris glaucophylla (small tree)*	White Cypress Pine																	2																																							
Shrubs																																																											
Apocynaceae	*	*Gomphocarpus fruticosus*	Narrow-leaved Cotton Bush											2																																				2			1						2
Asteraceae		*Cassinia arcuata*	Sifton Bush																																														1										
Cactaceae	*	*Opuntia aurantiaca*	Tiger Pear																	X																																							
Cactaceae	*	*Opuntia stricta*	Common Prickly Pear							X						2					2		X															1	2			1	1																
Capparaceae		*Capparis mitchellii*	Wild Orange																X																											2													
Chenopodiaceae		*Atriplex semibaccata*	Creeping Saltbush								2	2				2									2	X							2	2											1			2											
Chenopodiaceae		*Enchylaena tomentosa*	Ruby Saltbush																							X																																	
Chenopodiaceae		*Maireana microphylla*	Small-leaf Bluebush		2	1	1		2					2		2		2	2		2	1									2	2	2			1	3		2							2					2	1					1	1	2
Chenopodiaceae		*Maireana sp.*																																								1																	
Cupressaceae		*Callitris glaucophylla (shrub)*	White Cypress Pine																		2		X												1	1		2														1		1					
Fabaceae (Mimosoideae)		*Acacia pendula (shrub)*	Weeping Myall							1																																																	
Lamiaceae	*	*Marrubium vulgare*	White Horehound										1			1																																											
Malvaceae	*	*Malvastrum americanum*	Spiked Malvastrum				2					2				3			2												2		1	2								2		X	2	2									2				
Malvaceae		*Sida hackettiana*	Spiked Sida												1													2	2																														
Malvaceae		*Sida sp.*																								1								2																									
Malvaceae	*	*Sida spinosa*		1	2	2	2		2	2			2	2	2	2	2	2	2	2	2	2	2	2	2			2	2	2	2	2		2	2	2	2	2	1	2	1	2	2	2	2	2	2	2	3	2	2	2	2	2	1	2	2	2	2
Malvaceae		*Sida trichopoda*	Hairy Sida																						2	2																																	
Myoporaceae		*Eremophila debilis*	Winter Apple						2																																							1											
Myrtaceae		*Eucalyptus albens (shrub)*	White Box																																	1																							
Oleaceae		*Notelaea microcarpa var. microcarpa (shrub)*	Velvet Mock Olive															X																																									
Pittosporaceae		*Bursaria spinosa*	Blackthorn																																			1																					
Sapindaceae		*Dodonaea viscosa subsp. angustifolia (shrub)*	Sticky Hop-bush																																	1																							
Solanaceae	*	*Lycium ferocissimum*	African Boxthorn									2													1								2	2								1		1	1			1											
Solanaceae		*Solanum esuriale*	Quena								1	1														2							1																										
Solanaceae		*Solanum parvifolium subsp. parvifolium*								1																																																	
Herbs - Ferns and Allies																																																											
Marsileaceae		*Marsilea drummondii*	Common Nardoo																								2																																
Ophioglossaceae		*Ophioglossum lusitanicum*	Adders Tongue																																	2																							
Pteridaceae		*Cheilanthes distans*	Bristly Cloak Fern																																	1																							
Pteridaceae		*Cheilanthes sieberi subsp. sieberi*	Poison Rock Fern											2	2		2	2			2		2			2		1								2	2	2	2	2			2								1	2	2	1	2			2	2
Herbs - Dicots																																																											
Acanthaceae		*Brunoniella australis*	Blue Trumpet																							2										2																							

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Table B.2 Quadrat Data for Grassland and Agricultural Sites

Family	*	Scientific Name	Common Name	Q24	Q27	Q28	Q30	Q34	Q36	Q39	Q40	Q41	Q42	Q45	Q50	Q51	Q53	Q56	Q57	Q58	Q59	Q62	Q63	Q64	Q66	Q67	Q71	Q72	Q73	Q24A	Q30A	Q36A	Q40A	Q41A	Q53A	Q56A	Q57A	Q58A	Q59A	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13	G14	G15	G16	G17	G18	G19	G20
Acanthaceae		*Rostellularia adscendens var. adscendens*																																	2																									
Amaranthaceae	*	*Alternanthera pungens*	Khaki Weed	X	2						1	2				2	2											X				1									1																			
Amaranthaceae	*	*Gomphrena celosioides*	Gomphrena Weed																	2			2																																	2				
Apiaceae	*	*Ammi majus*	Bishop's-weed									2	2												X		1																	2			1												
Apiaceae	*	*Cyclospermum leptophyllum*	Slender Celery						2	2	1	2		2	2	2		2	2						2	2	2	2				2	2		2	2	2	2		X		2	2	2	2			2		2		2	2	2	2			2	2
Apiaceae	*	*Daucus carota*	Wild Carrot																															1											2														
Apiaceae		*Daucus glochidiatus*	Native Carrot							1								2				2										2									1		2	2	X		2									2				
Asteraceae	*	*?Genus ?species*																																								2														2				
Asteraceae	*	*Arctotheca calendula*	Capeweed																													2	1														X												
Asteraceae	*	*Aster subulatus*	Wild Aster																								2																																
Asteraceae	*	*Bidens pilosa*	Cobbler's Pegs																																															2									
Asteraceae		*Brachyscome chrysoglossa*	Yellow-tongue Daisy																							2																																	
Asteraceae		*Brachyscome ciliaris*	Variable Daisy																							1																																	
Asteraceae		*Calotis cuneifolia*	Purple Burr-daisy																																																					2				
Asteraceae		*Calotis hispidula*	Bogan Flea																											2			1																										
Asteraceae		*Calotis lappulacea*	Yellow Burr-daisy	2		2					1					2	2			2						2		2	2	2			X	2		2											2	2		2										
Asteraceae	*	*Carthamus lanatus*	Saffron Thistle		2	2		3	2		2		3	2	2	3	2	2	2					5		X		3							2	2				2	2	2		2	2	2	2	2	2		2	2	2	1	1	2		2	2
Asteraceae	*	*Centaurea solstitialis*	St Barnaby's Thistle		3	2				2	2		2				2					2		2		2																																	
Asteraceae	*	*Chondrilla juncea*	Skeleton Weed					2			2		2	2			2					2	2	2	X			2																															
Asteraceae		*Chrysocephalum apiculatum*	Common Everlasting																																							1																	
Asteraceae	*	*Cirsium vulgare*	Spear Thistle								1																1									1	1								1						1									2
Asteraceae	*	*Conyza bonariensis*	Flaxleaf Fleabane		2	2																																																					
Asteraceae	*	*Conyza sp.*																																				2								2			2		2	2		2				2
Asteraceae	*	*Conyza sumatrensis*	Tall Fleabane	3		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	X	2	2	2									2																					
Asteraceae		*Cotula australis*	Carrot Weed																											2			2		2		2						1			2	2												
Asteraceae		*Cymbonotus lawsonianus*	Bears-ear												2		2	2								2		2							2	2	2			2	X	1				2								2		2			
Asteraceae		*Euchiton involucratus*	Star Cudweed										1																																														
Asteraceae		*Euchiton japonicus*																							2	2	2		2																														
Asteraceae		*Euchiton japonicus sp. complex*						2		2								2	2																																								
Asteraceae		*Euchiton sphaericus*					2						2																				2												2	2			1		2	2	2								
Asteraceae	*	*Gamochaeta purpurea*	Purple Cudweed																																											2												
Asteraceae	*	*Gamochaeta sp.*																																										1															
Asteraceae		*Glossocardia bidens*	Cobblers Tack			X					1									2																	1																					
Asteraceae	*	*Helianthus annuus*	Common Sunflower			1																																																				
Asteraceae	*	*Hypochaeris glabra*	Smooth Catsear																							2																																	
Asteraceae	*	*Hypochaeris microcephala*	White Flatweed																														2			2	1	2			X			2							2		2			X	2	2	2
Asteraceae	*	*Hypochaeris microcephala var. albiflora*	White Flatweed																							2	2																															
Asteraceae	*	*Hypochaeris radicata*	Catsear																											2		2	2		2			2	2	2		2	2	2			2		2	2	2	2		2	2				2
Asteraceae	*	*Hypochaeris sp.*											2	2										2																																			
Asteraceae	*	*Lactuca saligna*	Willow-leaved Lettuce											2	2		2				2						2																		1														
Asteraceae	*	*Lactuca serriola*	Prickly Lettuce		1			2			1	2										2																																				
Asteraceae		*Leiocarpa panaetioides*	Woolly Buttons																							2																																	
Asteraceae	*	*Onopordum acanthium subsp. acanthium*	Scotch Thistle							1			2					1																																									
Asteraceae	*	*Schkuhria pinnata var. abrotanoides*		X									X												X			2																														
Asteraceae		*Senecio prenanthoides*																																2		2	2				2	X						2				2	2				2
Asteraceae		*Senecio tenuiflorus*												2													1																															
Asteraceae	*	*Silybum marianum*	Variegated Thistle																									2																												2			
Asteraceae	*	*Soliva sessilis*	Bindyi																													2																												

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Table B.2 Quadrat Data for Grassland and Agricultural Sites

Family	*	Scientific Name	Common Name	Q24	Q27	Q28	Q30	Q34	Q36	Q39	Q40	Q41	Q42	Q45	Q50	Q51	Q53	Q56	Q57	Q58	Q59	Q62	Q63	Q64	Q66	Q67	Q71	Q72	Q73	Q24A	Q30A	Q36A	Q40A	Q41A	Q53A	Q56A	Q57A	Q58A	Q59A	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13	G14	G15	G16	G17	G18	G19	G20
Asteraceae	*	*Sonchus asper*	Prickly Southistle										1												2	2		2																															
Asteraceae	*	*Sonchus oleraceus*	Common Sowthistle																																	2			2			2	1	2	2		2	2										2	
Asteraceae	*	*Taraxacum officionale*	Dandelion																								1															1			2		2			1		2			2				
Asteraceae	*	*Tolpis barbata*	Yellow Hawkweed																	2		2	2																																				
Asteraceae		*Triptilodiscus pygmaeus*	Common Sunray																			1																																					
Asteraceae		*Vittadinia cuneata var. cuneata*				1	1				1		2	1	2	2	2				2				2				2	2	2		2	2		2	2	2		2		2	2	2	2	2		2	2	2			2	2	2	2	2		
Asteraceae		*Vittadinia dissecta var. hirta*																												X			1																										
Asteraceae		*Vittadinia gracilis*	Woolly New Holland Daisy																							1																																	
Asteraceae		*Vittadinia muelleri*																		1								1	X			2				2		2				1							2	2			1	2		2			
Asteraceae		*Vittadinia pterochaeta*	Winged New Holland Daisy																						2	2			1																														
Asteraceae	*	*Xanthium spinosum*	Bathurst Burr	X								2	1											1			1														1						2	2											
Asteraceae		*Xerochrysum bracteatum subsp. bracteatum*	Golden Everlasting	2	1	2	1				1							2			1							2	2																														
Boraginaceae	*	*Buglossoides arvensis*	Sheepweed																													2			2	2		2		2		2	2			2	1		2					2			2	2	2
Boraginaceae	*	*Echium plantagineum*	Patterson's Curse																																															1									
Brassicaceae	*	*Capsella bursa-pastoris*	Shepard's Purse																											2		2		2									2												2				
Brassicaceae	*	*Lepidium africanum*		2	2	2		2				2	2			2	2		2	2				2	2	X		2	2				2	2				1		2	1					2	2		2				2					1	
Brassicaceae	*	*Rapistrum rugosum*	Giant Mustard									2	1												2		2			2			2				2					1		2	2			2	2	2						2	2		
Brassicaceae	*	*Sisymbrium irio*	London Rocket																															2																									
Brassicaceae	*	*Sisymbrium orientale*	Indian Hedge Mustard					2																																																			
Campanulaceae		*Wahlenbergia ?communis*	Tufted Bluebell																														2																										
Campanulaceae		*Wahlenbergia communis*	Tufted Bluebell											1											2	2		2	2						2															2			2						
Campanulaceae		*Wahlenbergia gracilis*	Australian Bluebell	2	2	2		2			1		1				1			1		2	2															2												1									
Campanulaceae		*Wahlenbergia luteola*																															2									1		2	1				2	2	2					2		1	1
Campanulaceae		*Wahlenbergia planiflora subsp. longipila*																																																					1				
Campanulaceae		*Wahlenbergia sp.*	Tall bluebell												1																																												
Campanulaceae		*Wahlenbergia stricta*	Australian Bluebell																																	2																							
Caryophyllaceae	*	*Cerastium vulgare*	Mouse Ear Chickweed																																																				2				
Caryophyllaceae	*	*Petrorhagia nanteuilii*			2	2								2	2			2		2	2	2				2		2																															
Caryophyllaceae	*	*Petrorhagia velutina*																																	2	2	1	2	2	2			2				2		2		2	2		2	2				2
Caryophyllaceae	*	*Polycarpon tetraphyllum*	Four-leaved Allseed																							2																																	
Caryophyllaceae	*	*Silene gallica*																					2																																				
Caryophyllaceae	*	*Silene gallica var. gallica*																																				2																	2				
Caryophyllaceae	*	*Spergularia rubra*	Sandspurry	1																						1																																	
Caryophyllaceae	*	*Stellaria media*	Common Chickweed																																					2																			
Chenopodiaceae		*Atriplex leptocarpa*	Slender-fruit Saltbush																													1																											
Chenopodiaceae		*Einadia hastata*	Berry Saltbush	X																																																							
Chenopodiaceae		*Einadia nutans*	Climbing Saltbush																											2			2	1		2									1	2	X	2					2			X		2	
Chenopodiaceae		*Einadia nutans subsp. linifolia*									2					1			2						2	2		2	2																														
Chenopodiaceae		*Einadia nutans subsp. nutans*	Climbing Saltbush																																									2															
Chenopodiaceae		*Einadia polygonoides*																												2									2								1												
Chenopodiaceae		*Einadia trigonos*	Fishweed																																																								
Chenopodiaceae		*Einadia trigonos subsp. stelluata*	Fishweed				2																																																				

Table B.2 Quadrat Data for Grassland and Agricultural Sites

Family	*	Scientific Name	Common Name	Q24	Q27	Q28	Q30	Q34	Q36	Q39	Q40	Q41	Q42	Q45	Q50	Q51	Q53	Q56	Q57	Q58	Q59	Q62	Q63	Q64	Q66	Q67	Q71	Q72	Q73	Q24A	Q30A	Q36A	Q40A	Q41A	Q53A	Q56A	Q57A	Q58A	Q59A	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13	G14	G15	G16	G17	G18	G19	G20
Chenopodiaceae		*Einadia trigonos subsp. trigonos*	Fishweed																									2																															
Chenopodiaceae		*Maireana decalvans*	Black Cotton Bush								1																																																
Chenopodiaceae		*Salsola australis*								2	2																						X																										
Chenopodiaceae		*Sclerolaena birchii*	Galvinized Burr					1				2				X																		1							1																		
Chenopodiaceae		*Sclerolaena diacantha*	Grey Copperburr																																																					1			
Chenopodiaceae		*Sclerolaena divaricata*	Tangled Copperburr																															2																									
Chenopodiaceae		*Sclerolaena intricata*	Poverty Bush																						2																																		
Chenopodiaceae		*Sclerolaena muricata*	Black Rolypoly																													2		2										2	2			3		1									
Chenopodiaceae		*Sclerolaena muricata var. muricata*	Black Rolypoly						1																																																		
Chenopodiaceae		*Sclerolaena muricata var. semiglabra*	Black Rolypoly						2		2	2																																															
Clusiaceae		*Hypericum gramineum*	Small St. John's Wort																				2																				1																
Convolvulaceae		*Convolvulus angustissimus subsp. angustissimus*			1								1				2								1		2	1	1																														
Convolvulaceae		*Dichondra repens*	Kidney Weed																										X											2						2						2							
Convolvulaceae		*Dichondra sp. A*						1						1			2	2	2		2		2	2												2	2	2	2			2	2			2					2							2	2
Crassulaceae		*Crassula sieberiana*	Australian Stonecrop																											2			2				2										2		2										
Cucurbitaceae	*	*Citrullus colocynthis*	Colocynth																								1														2																		
Cucurbitaceae	*	*Cucumis myriocarpus subsp. leptodermis*	Paddy Melon			1							2												X												1							1															
Cupressaceae		*Callitris glaucophylla (seedling)*	White Cypress Pine																																			2																					
Euphorbiaceae		*Chamaesyce drummondii*	Caustic Weed										2							1						1			X															1									1						
Fabaceae (Faboideae)		*Cullen tenax*	Tough-scurf Pea																								1																																
Fabaceae (Faboideae)	*	*Medicago minima*	Wooly Burr-Medic						2				2			2	2		2																	2		2	2	2		2	2	4	2	2		2			2		4		2			2	
Fabaceae (Faboideae)	*	*Medicago polymorpha*	Burr Medic																							2				3		4		5	2		2				4	2	3	4	4	3	3	3	2		4	2		4		2	2	2	
Fabaceae (Faboideae)	*	*Medicago sativa*	Lucerne	4	2		4	3			3					2									2		2				3		3																	2				1					
Fabaceae (Faboideae)	*	*Medicago truncatula*	Barrel Medic																						2																																		
Fabaceae (Faboideae)	*	*Trifolium angustifolium*	Narrow-leaved Clover		X									1																																													
Fabaceae (Faboideae)	*	*Trifolium arvense*	Haresfoot Clover															2		2		2						2	2									2									2				2								
Fabaceae (Faboideae)	*	*Trifolium campestre*	Hop Clover												1		2											2																															
Fabaceae (Faboideae)	*	*Trifolium glomeratum*	Cluster Clover														1	2	1	1									2																														
Fabaceae (Faboideae)	*	*Trifolium sp.*													2																																												
Fabaceae (Faboideae)	*	*Vicia villosa subsp. eriocarpa*	Russian Vetch																																									2						2									
Fabaceae (Mimosoideae)		*Neptunia gracilis f. gracilis*	Sensitive Plant							1																2	2																																
Fumariaceae	*	*Fumaria muralis subsp. muralis*	Wall Fumitory																															X																				2					
Gentianaceae		*Schenkia spicata*							2	2	2		2	2	2			2	2	2	2	2	2			2		2	2								2										2											2	
Geraniaceae		*Erodium crinitum*	Blue Storksbill										X													1															2																		
Geraniaceae		*Geranium homeanum*																																		2			1													2						X	
Geraniaceae		*Geranium solanderi*	Native Geranium															2																																									
Goodeniaceae		*Goodenia fascicularis*																								2																																	
Goodeniaceae		*Goodenia pinnatifida*																										1																															

Table B.2 Quadrat Data for Grassland and Agricultural Sites

Family	*	Scientific Name	Common Name	Q24	Q27	Q28	Q30	Q34	Q36	Q39	Q40	Q41	Q42	Q45	Q50	Q51	Q53	Q56	Q57	Q58	Q59	Q62	Q63	Q64	Q66	Q67	Q71	Q72	Q73	Q24A	Q30A	Q36A	Q40A	Q41A	Q53A	Q56A	Q57A	Q58A	Q59A	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13	G14	G15	G16	G17	G18	G19	G20
Haloragaceae		*Haloragis heterophylla*	Rough Raspwort																								2											1													2								
Lamiaceae		*Ajuga australis*	Austral Bugle																									2								1																							
Lamiaceae	*	*Lamium amplexicaule*	Henbit																													2			2				1	2		2	2			2								2	2		1		2
Lamiaceae		*Mentha satureioides*	Native Pennyroyal																				1				2									2		1																				2	
Lamiaceae	*	*Stachys arvensis*	Stagger Weed												1																																											2	
Linaceae	*	*Linum trigynum*	French Flax																																												2					2							
Lobeliaceae		*Pratia purpurascens*	Whiteroot																								2																																
Lythraceae		*Lythrum hyssopifolia*	Hyssop Loosestrife						2														2																																				
Malvaceae	*	*Malva parviflora*	Small-flowered Mallow										1															X																															
Malvaceae	*	*Modiola caroliniana*	Red-flowerd Mallow																													2		2			2				1						2											2	
Malvaceae		*Sida corrugata*	Corrugated Sida																									2																															
Myrsinaceae	*	*Anagallis arvensis*	Scarlet/Blue Pimpernel										1		2										1					2			X		2	2		2					2				2		2	2	2	2	2		2			2	2
Nyctaginaceae		*Boerhavia dominii*	Tarvine						1			1													2		1	2	2																														
Onagraceae		*Epilobium billardierianum subsp. cinereum*													2																																												
Onagraceae	*	*Oenothera mollissima*																				2																																					
Oxalidaceae		*Oxalis perennans*																							2							1		1	1		2		2			1					2						1			2			
Oxalidaceae		*Oxalis sp.*				2								1	1	2	2						2																																				
Oxalidaceae	*	*Oxalis thompsoniae*																										2	2																														
Plantaginaceae		*Plantago debilis*																2																	2																								
Plantaginaceae	*	*Plantago lanceolata*	Lamb's Tongues																																						1																		
Plantaginaceae	*	*Veronica arvensis*	Wall Speedwell																																2																								
Polygonaceae	*	*Fallopia convolvulus*	Black Bindiweed																								2	1																															
Polygonaceae		*Persicaria lapathifolia*	Pale Knotweed																										1																														
Polygonaceae	*	*Polygonum aviculare*	Wireweed	X					2		2		2											4	2		2	X				2	2										1				1												
Polygonaceae		*Rumex brownii*	Swamp Dock											1	1		1	1			1		2					1		2					2	2	1	2	2	2		1	2				X										2	2	
Polygonaceae	*	*Rumex crispus*	Curled Dock																								2																																
Ranunculaceae		*Ranunculus sessiliflorus var. sessiliflorus*																												2																													
Rubiaceae		*Asperula conferta*	Common Woodruff																								2																																
Scrophulariaceae	*	*Misopates orontium*	Lesser Snapdragon										1																																														
Scrophulariaceae	*	*Verbascum virgatum*	Twiggy Mullein		2	2											1											1										1									2		1			1			2				
Solanaceae	*	*Solanum nigrum*	Black-berry Nightshade			X																																																					
Urticaceae	*	*Urtica dioica*	Stinging Nettle																																							2																	
Verbenaceae	*	*Phyla nodiflora*	Carpet Weed																								2																																
Verbenaceae	*	*Verbena bonariensis*	Purpletop										1																																				1									2	
Verbenaceae	*	*Verbena officinalis*	Common Verbena											2									1					2	2													2	2		2	2	2												2
Zygophyllaceae		*Tribulus micrococcus*	Yellow Vine																								2		X																														
Zygophyllaceae	*	*Tribulus terrestris*	Caltrop																																																								
Herbs - Monocots (Grasses)																																																											
Poaceae		*?Genus ?species*		2																																							2		2					1									
Poaceae		*Aristida ramosa*	Purple Wiregrass				2	3	2			2		2	4	3	4	2	2	2	3		3		2			3	2		4	2	2	2	5	2	2	3	4	3		3	5	3	2	2		2			2	3	X	5	4		2	4	4
Poaceae		*Austrostipa aristiglumis*	Plains Grass						2	4		4													3	3	3						1									2		2				2		2									
Poaceae		*Austrostipa scabra*	Speargrass																											2	2		2									3		2															
Poaceae		*Austrostipa scabra subsp. scabra*	Speargrass	2						2		2		2	2	2	1								X																																		
Poaceae		*Austrostipa setacea*	Corkscrew Grass																							2							1																										
Poaceae		*Austrostipa sp.*									3																																																
Poaceae		*Austrostipa verticillata*	Slender Bamboo Grass	2	2		2					3				X			2											2	2			4		2	2					2				2												1	2
Poaceae	*	*Avena barbata*	Bearded Oats																																															3						2			
Poaceae	*	*Avena sp.*				1																			2				X																					2									

Table B.2 Quadrat Data for Grassland and Agricultural Sites

Family	*	Scientific Name	Common Name	Q24	Q27	Q28	Q30	Q34	Q36	Q39	Q40	Q41	Q42	Q45	Q50	Q51	Q53	Q56	Q57	Q58	Q59	Q62	Q63	Q64	Q66	Q67	Q71	Q72	Q73	Q24A	Q30A	Q36A	Q40A	Q41A	Q53A	Q56A	Q57A	Q58A	Q59A	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13	G14	G15	G16	G17	G18	G19	G20
Poaceae		*Bothriochloa decipiens* var. *decipiens*					X	2	3	3		2		2	4			5		5					X	2			3	3	3	2	3	2	3	4	5	3	3	3		3	3	3	4		2	3	2	3	4	5	2	3	3	2	2	4	4
Poaceae		*Bothriochloa macra*	Red-leg Grass											5								6	5	2				3																															
Poaceae		*Bothriochloa sp.*														3	5		5		6																																						
Poaceae	*	*Bromus brevis*																																		1																							
Poaceae	*	*Bromus catharticus*	Prairie Grass									2																																															
Poaceae	*	*Bromus hordeaceus*	Soft Brome							1					2			2								2				2	4									2				2							2				2			2	2
Poaceae	*	*Bromus racemosus*	Smooth Brome																									2																															
Poaceae	*	*Cenchrus echinatus*	Mossman River Grass																																											2					2						
Poaceae	*	*Chloris gayana*	Rhodes Grass																																												2							1			
Poaceae		*Chloris truncata*	Windmill Grass	2			2		3	2	4		2			2	2		2			2	2		3	2		3	5																															
Poaceae		*Chloris ventricosa*	Plump Windmill Grass	X								2						2								2				2				2		4						2									2	2						2	
Poaceae	*	*Chloris virgata*	Feathertop Rhodes Grass								2	2																																														
Poaceae		*Cymbopogon refractus*	Barbed Wire Grass											2					2	2	2		2					2		2					2			3	3	2												2			3			2	2
Poaceae	*	*Cynodon dactylon*	Common Couch		2						3	2							2			3					3						4	2												2					2		2						
Poaceae		*Dichanthium sericeum*	Queensland Bluegrass																																							1								3									
Poaceae		*Dichanthium sericeum* subsp. *sericeum*	Queensland Bluegrass								2														2	4	2	3																														
Poaceae		*Dichelachne micrantha*	Shorthair Plumegrass																																					2																			
Poaceae		*Dichelachne sieberiana*																									3																																
Poaceae		*Digitaria brownii*	Cotton Panic Grass																									2																															
Poaceae	*	*Digitaria ciliariis*	Summer Grass																										2																														
Poaceae		*Digitaria divaricatissima*	Umbrella Grass	3	3															2			2	2		2		2																															
Poaceae		*Digitaria sp.*																																																							1	
Poaceae	*	*Echinochloa sp.*																																																		3						
Poaceae	*	*Eleusine tristachya*	Goose Grass																1						X				2																														
Poaceae		*Enneapogon gracilis*	Slender Bottle-washers														2														2					2							1																
Poaceae		*Enneapogon sp.*												1																																													
Poaceae		*Enteropogon acicularis*					2	2	1	1									3							2					2	2	2	2		2					2			2	2			2						2		2			
Poaceae		*Eragrostis alveiformis*			3													3			2	2	2																																				
Poaceae		*Eragrostis australasica*	Cane Grass		3		2																												2				2			2																	
Poaceae		*Eragrostis brownii*	Brown's Lovegrass																																	3		2																		2			
Poaceae	*	*Eragrostis cilianensis*	Stinkgrass			2					2	2	1				2														2				2									1		2	2								2			2	
Poaceae		*Eragrostis elongata*	Clustered Lovegrass																2	2		2	2																																				
Poaceae		*Eragrostis leptostachya*	Paddock Lovegrass																			1										2				2	2	2		2											1	2							
Poaceae		*Eragrostis parviflora*	Weeping Lovegrass																2																																						
Poaceae	*	*Eragrostis pilosa*	Soft Lovegrass																						3																																		
Poaceae		*Eragrostis sp.*																																						X																	
Poaceae		*Eriochloa pseudoacrotricha*	Early Spring Grass						2	2	3	2							2						2				X																														
Poaceae	*	*Hordeum leporinum*	Barley Grass																								2																															
Poaceae	*	*Hyparrhenia rufa* subsp. *altissima*																									X																															
Poaceae		*Lachnagrostis filiformis*																													2																											
Poaceae		*Leptochloa asthenes*								1				2				2				3																																					
Poaceae	*	*Lolium perenne*	Perennial Ryegrass																						2					4		4	4		2			2	2		5	2	2	2	2		3	2	5	3	2	2		2		2	5	5	3
Poaceae		*Panicum buncei*										2														3																																	
Poaceae		*Panicum decompositum*	Native Millet																						2																																		
Poaceae		*Panicum effusum*	Hairy Panic			2	2			2				1		2	2		2	2			2					3			1	1				2		2	2	2		X	1			2						2		X		1			
Poaceae		*Panicum queenslandicum*	Yadbila Grass															2																											2													
Poaceae		*Panicum queenslandicum* var. *queenslandicum*	Yadbila Grass																																																								

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Table B.2 Quadrat Data for Grassland and Agricultural Sites

Family	*	Scientific Name	Common Name	Q24	Q27	Q28	Q30	Q34	Q36	Q39	Q40	Q41	Q42	Q45	Q50	Q51	Q53	Q56	Q57	Q58	Q59	Q62	Q63	Q64	Q66	Q67	Q71	Q72	Q73	Q24A	Q30A	Q36A	Q40A	Q41A	Q53A	Q56A	Q57A	Q58A	Q59A	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13	G14	G15	G16	G17	G18	G19	G20
Poaceae		*Paspalidium constrictum*	Knottybutt Grass								3	2																																															
Poaceae		*Paspalidium gracile*	Slender Panic																						2	2																																	
Poaceae		*Paspalidium jubiflorum*	Warrego Grass			3			2																																																		
Poaceae		*Paspalidium sp.*								1	2																																																
Poaceae	*	*Paspalum dilatatum*	Paspalum																						X																										1						2		
Poaceae		*Paspalum distichum*	Water Couch																								X		3																														
Poaceae	*	*Paspalum notatum*	Bahia Grass																			1																																					
Poaceae	*	*Paspalum sp.*																															1																										
Poaceae		*Poa sp.*																																						2																			
Poaceae		*Rytidosperma bipartitum*	Wallaby Grass					2																		2																																	
Poaceae		*Rytidosperma caespitosum*	Ringed Wallaby Grass																														1																										
Poaceae		*Rytidosperma fulvum*	Wallaby Grass			1																																							2														
Poaceae		*Rytidosperma racemosum var. obtusatum*																										3	2																														
Poaceae		*Rytidosperma sp.*																	2																	1																							
Poaceae		*Rytidosperma tenuius*																																																						1		1	
Poaceae		*Sporobolus caroli*	Fairy Grass								2														2	2							X											1				2											
Poaceae		*Sporobolus creber*	Western Rat-tail Grass	2	3		2								2	3	2	2		2		2	2					3	3	3	3	2			2	3	2						2		1	3					2	3	2		2	2	2	4	
Poaceae		*Sporobolus sp.*							2																																																		
Poaceae	*	*Stenotaphrum secundatum*	Buffalo Grass																																												2												
Poaceae	*	*Triticum aestivum*	Common Wheat																					2																																			
Poaceae	*	*Triticum sp.*				5																																																					
Poaceae	*	*Urochloa panicoides*	Urochloa Grass			1						1	2			2	1							2	3		2	X																															
Poaceae		*Walwhalleya pungens*																									3																																
Herbs - Monocots (Other)																																																									
Anthericaceae		*Arthropodium minus*																								1																																	
Anthericaceae		*Dichopogon fimbriatus*	Nodding Chocolate Lily																							2																																	
Anthericaceae		*Tricoryne elatior*	Yellow Autumn-lily		1																																																						
Asphodelaceae		*Bulbine bulbosa*	Native Leek																							1																																	
Cyperaceae		*Carex inversa*												2	1											1	2		1																										1				
Cyperaceae		*Cyperus bifax*																									3																																
Cyperaceae	*	*Cyperus eragrostis*	Umbrella Sedge																																		2																						
Cyperaceae		*Cyperus fulvus*	Sticky Sedge																				1																																				
Cyperaceae		*Cyperus gracilis*	Slender Flat-sedge																									2	1							1	2									1						1						2	1
Cyperaceae	*	*Cyperus rotundus*	Nutgrass																																																		2						
Juncaceae		*Juncus australis*		X										X																																													
Juncaceae		*Juncus sp.*							2									1	1							1											2																						
Juncaceae		*Juncus subsecundus*																									2			2		2	2			2		2	1				1						2					1		2			
Lomandraceae		*Lomandra multiflora subsp. multiflora*	Many-flowered Mat-rush																																	2										1													
Phormiaceae		*Dianella longifolia*	Blueberry Lily																																			1																					
Climbers and Vines																																																									
Convolvulaceae		*Convolvulus erubescens*	Blushing Bindweed																																									2						2	1								
Convolvulaceae		*Convolvulus sp.*																																				2																					
Fabaceae (Faboideae)		*Glycine tabacina*								1																		2								2																							

* denotes exotic species

X denotes presence within plot outside of the 20x20m quadrat

Abundance: 1 = sparse - less than 5% cover; 2 = any number - less than 5% cover; 3 = 5-25% cover; 4 = 26-50% cover; 5 = 51-75% cover; 6 = 76-100% cover