

**Tharbogang Quarry and Landfill Expansion
OFFSET STRATEGY**

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1	INTRODUCTION	5
2	BACKGROUND	6
3	NSW POLICY CONTEXT.....	7
3.1	Environmental Protection and Assessment Act, 1979	7
3.2	Threatened Species Legislation.....	7
3.3	Native Vegetation Act, 2003.....	7
3.3.1	Biobanking.....	8
3.4	Murrumbidgee Catchment Management Authority	8
4	REGIONAL VEGETATION CONTEXT	9
4.1	Cobar Peneplain Bioregion.....	9
4.2	McPherson Range	10
4.3	Cocoparra Range.....	11
4.4	Narrandera Range.....	12
4.5	Vegetation of the Murrumbidgee Catchment.....	12
5	PROPOSED DEVELOPMENT	14
5.1	Location and Zoning	14
5.1.1	Quarry.....	14
5.1.2	Landfill	14
6	ENVIRONMENTAL ASSESSMENT OF SITE.....	16
6.1	Site Description.....	16
6.1.1	Vegetation Communities	16
6.1.1.1	Lot 202	16
6.1.1.2	Lot 201	20
6.1.2	Flora and Fauna	21
6.1.2.1	Flora	21
6.1.2.2	Birds	22
6.1.2.3	Mammals.....	23
6.1.2.4	Reptiles	23
6.1.2.5	Amphibians	23

6.1.2.6 Insects.....	23
7 POTENTIAL BIODIVERSITY IMPACTS OF DEVELOPMENT.....	25
7.1 Potential Biodiversity Impacts of Development	25
7.1.1 PVP Developer Tool	26
7.1.2 Results	27
8 SITE DESIGN.....	29
9 BIODIVERSITY OFFSETS.....	31
9.1 Offset Principles	31
9.2 Offset Examples.....	32
10 OFFSET STRATEGY.....	33
10.1 Overview of the Offset Strategy	33
10.1.1 Principles behind Offset Strategy	33
10.1.2 Murrumbidgee Catchment Action Plan.....	34
10.2 Proposed Direct Offsets.....	35
10.2.1 Funding Arrangements	38
10.3 Citywide Vegetation Management Strategy	38
10.4 Options for Establishing Enduring Offsets.....	39
10.4.1 Rezoning.....	39
10.4.2 Development Control Plans.....	40
10.4.3 Conditional Approval	41
10.4.4 Acquisition	41
10.4.5 Covenants and Easements	41
10.4.6 Conservation Agreements	42
10.4.7 Incentives.....	43
10.5 Options for Ongoing Management	43
10.5.1 Management Plan	43
10.5.1.1 Regeneration and Enhancement	44
10.5.1.2 Grazing Control	44
10.5.1.3 Targeted Weed Control	44
10.5.1.4 Vermin Control	45
10.5.1.5 Browser Control.....	45
10.5.1.6 Managing Salinity	45
10.5.1.7 Fire Management	45
10.5.1.8 Managing Human Use.....	46
10.5.2 Monitoring	46

11 RECOMMENDATIONS 47**12 CONCLUSION 48****REFERENCES 49****TABLES**

Table 4.1: Ownership and management of Bimble Box–Pine communities 13

Table 10.2: *PVP Developer* offset area and ratio 27

Table 10.1 Conservation and Murrumbidgee catchment target priorities 35

Table 10.3: Key stages of a conservation agreement 42

FIGURESFigure 4.1: IBRA Bioregions of western Murrumbidgee Catchment Area (*in text*)

Figure 4.2: Remnant vegetation of Griffith region

Figure 5.1: Proposed development site

Figure 5.2: Development footprint

Figure 6.1: Vegetation communities in Lot 201 and Lot 202

Figure 8.1: Development footprint and vegetation communities

Figure 10.1: Sites proposed for flora and fauna assessments

APPENDICESAppendix A: *PVP Developer* results and assumptions

Appendix B: Map and overview of offsets

Appendix C: Current zoning of proposed offsets

1 Introduction

Griffith City Council (Council) has selected the Tharbogang Quarry and landfill as the most suitable site for the ongoing excavation of hard rock for use within the City area. This will involve the expansion of the existing quarry to the south and north.

The proposed site for expansion is situated in the McPherson Range and contains areas of remnant and native regrowth vegetation. The high level of clearance that has occurred historically in the Griffith region means that remaining areas of remnant vegetation are now considered of high conservation significance. The Director General's requirements for the preparation of the Environmental Assessment for the proposed development identified the need to deliver vegetation offsets that will compensate for the loss of, or damage to, native vegetation and habitat within the site.

This report provides an outline strategy for the provision of offsets to compensate for the clearing of the quarry and landfill excavation area.

2 Background

Griffith is the largest centre in the Murrumbidgee Irrigation Area and is the service centre for the Western Riverina region of New South Wales (NSW). Griffith contributes \$1.5 billion annually to the national economy and is the fastest growing inland city in Australia with a current annual growth rate of 2.4%.

Sustained rapid increase in the city's population and the development of industry within the city has substantially increased the rate of consumption of gravel for road construction and development. This increase has been paralleled by an increase in the volumes of waste disposed to the landfill site servicing the Griffith region. Due to this rapid growth, Council has identified a need to expand its existing quarry operations and waste management depot at the Tharbogang quarry.

The existing quarry has been in operation since 1991 and has provided a reliable source of gravel material. Although the material does not strictly meet RTA specifications, it has proved a reliable source for the region. The existing hard rock quarry covers an area of approximately 3 hectares adjacent to the existing landfill and the southern boundary of the council's land. Due to high demand, gravel extraction rates at Tharbogang have in some years exceeded the licence administered by the EPA under the *Protection of Environment Operations Act 1997*, which specifies extraction of no more than 50,000 tonnes per annum, due to high demand.

A landfill is located adjacent to the quarry and has been in operation since 1984. The landfill is located in a naturally occurring gully on the site and covers an area of approximately 11.8 hectares. The landfill operation includes a public landfill for domestic waste, a leachate retention dam, modified surface drainage and an area for a stormwater and sedimentation basin. The putrescible waste burial site covers an area of approximately 7.5 hectares north of the landfill site. The landfill site is almost at capacity with a minimum of 18 months remaining before additional landfill space will be required.

Council has recently reviewed its current quarry and solid waste disposal strategies for the Griffith Local Government Area. Considerable resources have been invested in the exploration and establishment of the current Tharbogang site and there is a considerable quantity of material remaining to be excavated. Following an exhaustive search and assessment of optional sites, Council considers the Tharbogang site as the most suitable quarry site for ongoing extraction of gravel. An independent cost benefit analysis comparing this site with two other sites is still to be completed.

3 NSW Policy Context

3.1 Environmental Protection and Assessment Act, 1979

The Minister for Planning in NSW approves major infrastructure or other major projects of State or regional environmental planning significance in accordance with the *Environmental Planning and Assessment Act, 1979* (EP&A Act). The proposed quarry and landfill at Tharbogang has been assessed as being subject to Part 3A (Major infrastructure and other projects) of the EP&A Act due to its status as an extractive industry that will extract more than 200,000 tonnes of material per year.

3.2 Threatened Species Legislation

The NSW *Threatened Species Conservation Act 1995* identifies and protects native plants and animals in danger of becoming extinct. The Act also provides for species recovery and threat abatement programs.

The *Threatened Species Legislation Amendment Act 2004* signalled the NSW Government's commitment to further integrating conservation with mainstream decision-making. The new reforms are aimed at establishing better frameworks and processes so that landholders, developers, farmers, community groups and government agencies can more effectively contribute to protecting the State's biodiversity.

The Amendment Act puts greater emphasis on land-use planning which focuses on the protection and restoration of native vegetation and threatened species habitat at the landscape scale and integrates with the Government's other reforms to natural resource management and planning.

3.3 Native Vegetation Act, 2003

The NSW *Native Vegetation Act 2003* (NV Act) came into effect in December 2005. The objectives of the NV Act include the prevention of broad scale clearing unless environmental outcomes are improved or maintained. Where impacts of development are residual, biodiversity offsets can be used to achieve environmental outcomes. A biodiversity offset is one or more appropriate actions that are put in place to counterbalance the impacts of development on biodiversity.

Assessment of biodiversity, lost due to development and gained through the implementation of offsets, must use the same currency and must be based on sound ecological principles. Assessment of biodiversity:

- must include structure, function and composition (including threatened species);
- must operate across scales;
- must consider conservation status of ecological communities; and
- must ensure long term viability and functionality of biodiversity.

The proposed development at Tharbogang is not subject to the *NV Act* as it has been given the status of a Major Project under the *EP&A Act*. However, the principles of biodiversity offsets as outlined in the *NV Act* will be applied to the development.

3.3.1 Biobanking

NSW Parliament passed the *Threatened Species Conservation Amendment (Biodiversity Banking) Bill 2006* in late 2006. This gave effect to the NSW Biodiversity and Offset Scheme (Biobanking).

Biobanking is a new approach to threatened species conservation, which gives developers and local governments under certain circumstances an alternative path to the current threatened species assessment required under the *EP&A Act* and *NV Act*. It also offers a potentially less costly way of addressing biodiversity issues associated with a proposed development.

Biobanking provides a systematic and consistent framework for counterbalancing (offsetting) the impacts of development to achieve an 'improve or maintain' outcome for biodiversity values, thus removing the need for an assessment of significance (DEC, 2005).

Biobanking is still under development with trials about to commence and is expected to be in place by late 2007.

3.4 Murrumbidgee Catchment Management Authority

The proposed development falls within the area covered by the Murrumbidgee Catchment Management Authority (MCMA) and they are responsible for implementing natural resource management policy which would include the proposed development site. This is achieved via the *Threatened Species Legislation Amendment Act 2004* and the *Native Vegetation Act 2003* (Ecosurveys, 2002).

The draft Murrumbidgee Catchment Action Plan (CAP) 2006 identified Western Penneplain Woodlands (Pine-Poplar Box woodland and Poplar Box grassy woodland) within the CAP as being regionally vulnerable and thus of high conservation value within the Murrumbidgee Catchment. Inland Rocky Hills Woodlands (Dwyer's Red Gum-Currawang low woodland) has been identified as regionally depleted in the CAP and is therefore of medium conservation value within the Murrumbidgee Catchment.

The draft Murrumbidgee CAP (2006) also identifies a number of flora and fauna species as 'icons' of the Murrumbidgee Catchment. The following 'icon' species have been recorded utilising the McPherson Range:

- Grey-crowned Babbler; and
- Glossy Black Cockatoo (an endangered population found entirely within the Murrumbidgee Catchment).

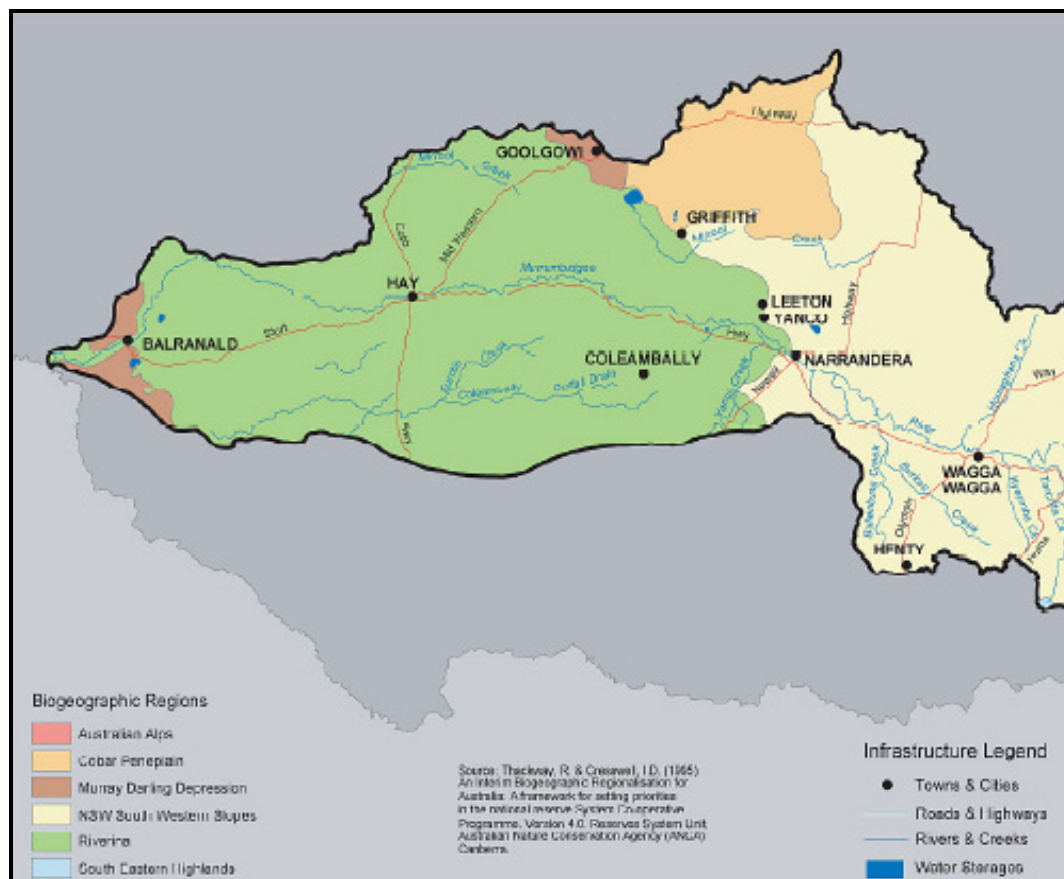
4 Regional Vegetation Context

The Griffith Local Government Area (LGA) is located entirely within the Murrumbidgee Catchment, and is intersected by three bioregions:

- Riverina, immediate to the southwest boundary of LGA;
- South Western Slopes, immediate to the east boundary of LGA; and,
- Cobar Penepplain, encompassing the northern section of the LGA and the McPherson range.

A fourth bioregion, the Murray-Darling Depression, is situated less than 25km northwest of the LGA. Figure 4.1 shows the intersection of these bioregions.

Figure 4.1: IBRA Bioregions of western Murrumbidgee Catchment Area



Source: MCMA (2006, 54)

4.1 Cobar Peneplain Bioregion

The area subject to this report is located within the Cobar Peneplain and adjacent to the Riverina and Murray-Darling Depression, as described by the draft Murrumbidgee CAP. The conservation significance of native vegetation in boundary areas is increased with remnant vegetation forming a link between bioregions (Ecosurveys, 2006).

The Cobar Peneplain is characterised by an undulating to hilly landscape with shallow, red earth soils where the vegetation is mainly open woodlands of Bimble (Poplar) Box *Eucalyptus populnea*, Red Box *Eucalyptus intertexta* and White Cypress Pine *Callitris glaucophylla*. Mean annual temperatures range from 15-19°C and mean annual rainfall ranges from 258-537mm (NPWS, 2007).

The draft Murrumbidgee CAP (2006) advises that 32.5% of the Cobar Peneplain has been cleared, and only 1.7% of the remainder is protected in conservation reserves. The majority of this is taken up by the two national parks and nine nature reserves.

These figures show that an intermediate to high proportion of remnant vegetation has been removed in the bioregion and very little of the remaining vegetation in the region has been protected in conservation reserves. Bimble Box woodlands have been identified as one of the most threatened vegetation types within the Cobar Peneplain Bioregion (Benson, 1999).

On a local scale, the Griffith LGA has even less remnant vegetation with 7% remaining (12,088ha) with approx 50% (5889.5) protected by environmental zonings 7 flora and fauna, 7(v) scenic and 7(w) wetlands under the Griffith Local Environmental Plan 2002. The majority of these protected areas are situated in McPherson Range and nearby regionally significant wetlands.

4.2 McPherson Range

The development site is located on the north western end of McPhersons Range.

McPherson Range has significant vegetation and habitat values in the local, regional and even broader ecosystem context. The vegetation communities of the Range, one of the largest areas of remnant vegetation within the Murrumbidgee Catchment, have been recognised as being locally and regionally significant for conservation (ERC, 2003).

McPherson Range is the largest connected area of remnant vegetation within the Griffith LGA. The majority of the vegetation associated with McPherson Range is located on a stony ridge running in an arc from the north-east to the north-west of Griffith, although it does include some vegetation located on lower slopes of the range on slightly higher quality soils.

On the north western end of the Range the remnant vegetation links up with a corridor of vegetation associated with the Kidman Way and the Griffith-Hillston rail line. Although fragmented, this linkage to the northwest eventually connects to remnant vegetation east of Tabbita (including Tabbita State Forest). The value of such a large landscape corridor is significant particularly in a region where the majority of the native vegetation has been cleared. A landscape corridor of this magnitude would be used by a large range of flora and fauna species ensuring that both the population and genetic diversity of species is maintained. A number of threatened species have been recorded utilising this corridor either as habitat or as a corridor to move across the landscape (Ecosurveys, 2006).

Scenic Hill is a spur comprising the southern-most section of the McPherson Range and includes a reservation area and Crown Reserve of approximately 650 hectares. It acts as a boundary between Slopes country and the flat riverine plain to the west and is considered one the few remaining examples of high value remnant vegetation in the

local region (ERC, 2003). The northern portion of Scenic Hill is part of a geologically complex elongated rocky outcrop that runs for 26km along the north-northwest axis of McPherson Range from Beelbanger to Tharbogang (Griffith City Council, 2000).

The general vegetation of McPherson Range is classified as an Open Woodland of Bimble Box-Pine on gentle slopes, while the steeper slopes support a Dwyers Red Gum-Currawang association. This vegetation is typical of the proposed development site (ERC, 2003).

4.3 Cocoparra Range

The Cocoparra Range is one of the highest, widest and most geologically complex features in the district and is the most south-westerly range in the State apart from the much smaller and lower McPhersons Range which lies 10km to the west.

The width, height and broken landform of the Cocoparra Range have resulted in a wide variety of habitats in comparison with other ranges in the region. The southern section of Cocoparra Range is a National Park and is managed by the NSW National Park and Wildlife Service (NPWS). The Park contrasts with the surrounding plains which have been intensively modified for commercial agricultural purposes, including irrigation. These plains were previously covered in mallee, acacia, or pine-box woodland. The patches of vegetation on the valley floors of the range are scarce remnants of this formerly contiguous plains woodland.

The Cocoparra Range is close to the most westerly limit of distribution for a large number of plant and animal species which occur more commonly in the Southern Tablelands or in cypress pine woodlands of the Western Slopes and ranges. It is also the easterly limit of species which occur on the Western Plains. As such, Cocoparra Range has high species diversity.

Cocoparra National Park and Cocoparra Nature Reserve, which are located at the southern end of the Cocoparra Range, contain the following vegetation communities:

- Hill slopes supporting woodland dominated by Black Cypress Pine *Callitris endlicheri* which is the most common vegetation type in the park and reserve. Associated species are generally Currawang *Acacia doratoxylon*, Dwyers Gum *Eucalyptus dwyeri* and Red Stringybark *E. macrorhyncha*.
- Sheltered slopes with deeper soils also support Black Cypress Pine communities but the trees are taller and denser with a greater variety of shrubs including *Acacia spp*, *Prostanthera ovalifolia* and *Exocarpus cupressiformis*.
- Ridge-tops support similar species but the woodland is low and more open. Where trees are sparse, shrubs such as *Melaleuca uncinata*, *Cassinia laevis* and *Leptospermum trivalve* form dense stands. Dwyers gum often occurs as mallee on the ridges.
- Gentle north-westerly slopes at the northern end of the nature reserve support open woodland of Bimble Box, Drooping She-oak *Allocasuarina stricta*, Grey Box *E. microcarpa* and Yarran *Acacia homalophylla* with Tussock Grass *Danthonia sp.*

- Lower slopes and valley floors support a taller woodland or forest of White Cypress Pine, and Bimble Box (NPWS, 1996).

4.4 Narrandera Range

The Narrandera Range extends from the Murrumbidgee River near Narrandera, in the south of the range, to north of Leeton. Contained within the Narrandera Range are the Brobenah Hills, which comprise significant remnant vegetation, situated on an outstanding range of hills with a rocky character. The surrounding terrain is predominately flat and has been developed, primarily for agriculture and irrigation (Murrumbidgee Field Naturalists, n.d.).

The vegetation of the ridges and higher slopes of the Brobenah Hills contains Black Cypress Pine, Dwyers' Gum, Drooping She-Oak and Currawang with a well developed understorey of heaths and wattles.

The lower slopes and valley floor of the Hills contain Grey Box (*Eucalyptus macrocarpa*), Bimble Box, and Blakely's Red Gum (*Eucalyptus blakelyi*). It also includes areas of Green Mallee (*Eucalyptus viridis*) and White Cypress Pine, with a well developed understorey present on the slopes and upper valley floor.

The Narrandera Range and Brobenah Hills are primarily under private ownership.

Connectivity between McPherson, Cocoparra and Narrandera Ranges is low as much of the low lying and relatively fertile land has been altered for intensive agricultural purposes and remnant vegetation corridors on the plains are scarce. **Figure 4.2** shows the position of the ranges and illustrates the lack of vegetation connectivity between them.

4.5 Vegetation of the Murrumbidgee Catchment

A study of the condition and biodiversity of vegetation remnants within the Catchment (Eldridge, 2002) found that remnant vegetation is generally restricted to hills and isolated depressions, or in areas set aside for forestry. East of Barren Box Swamp, intensive irrigation restricts the area of remnants. However, west of Barren Box Swamp, larger areas of native vegetation remain. McPhersons Range is situated in the predominately cleared area.

Five vegetation communities occurring within the Murrumbidgee Catchment have been identified as of some concern in a conservation context, with the Bimble Box–Pine community considered endangered (<10% of pre-European extent remaining).

The Bimble Box-Pine community found at Tharbogang occurs over areas of gentle undulating plains, sand plains, foot slopes and mid-slopes. The dominant trees in this community are Bimble Box and White Cypress Pine. Tree densities range from nil to 2700 trees/ha reflecting the dense pine regeneration in some areas. Eldridge (2002, 17-18) notes in general the community exhibits a 'moderately high degree of landscape patchiness', with mean tree densities of 362 trees/ha, good tree health and an average density of 1.3 hollows per tree. These communities are also characterised by few shrub species and low shrub cover.

Rocky hills and outcrops in the area are covered by dry woodlands comprising White Cypress Pine, Currawang, Drooping She-Oak, Dwyers Red Gum and Bimble Box and are often bordered by Bimble Box–Pine communities. An overlap provides areas of significant habitat value.

Eldridge (2002, 24) identified ownership and management of Bimble Box–Pine communities in the Murrumbidgee Catchment as detailed in Table 4.1 below.

Table 4.1: Ownership and management of Bimble Box–Pine communities

TENURE	GRAZING STATUS	AREA (ha)
Private	Ungrazed	360.1
Private	Grazed	382.8
Crown	Ungrazed	310.7
Crown	Grazed	239.7
Rural Lands Protection Board	Ungrazed	89.3
State Forest	Grazed	611.9
Total Grazed		1234.4
Total Ungrazed		760.1

5 Proposed Development

Council's development proposal is to expand an existing quarry operation located at Tharbogang and backfill the current quarry void with landfill.

5.1 Location and Zoning

The quarry and proposed development site is located within an area of elevated, sandstone country north of Slopes Road, off Hillside Drive, Tharbogang. The site is located approximately 8 kilometres to the northwest of Griffith on the north western end of the largest connected area of remnant vegetation within the Griffith LGA.

The site is located within two adjacent Lots: Lot 201/ Deposited Plan (DP) 756035 zoned 1(f) Rural Forestry, 1(b) Rural Agricultural Protection, and 7(v) Environmental Protection (scenic); and Lot 202 / Deposited Plan (DP) 756035 zoned 5(a) Special Uses (Landfill and Quarry) and 7(v) Environmental Protection (scenic) (see **Figure 5.1**). The proposed development footprint will be restricted to areas zoned 5(a) and 1 (f).

5.1.1 Quarry

The primary aim of the quarry expansion is to provide an economically and environmentally viable resource to the rapidly expanding infrastructure industry in the Griffith Region. Griffith's population has risen sharply in recent years and this growth is expected to continue, demonstrating the need for a long term gravel source for the region.

The proposed quarry operation will involve the extraction of 150,000t.p.a of gravel in the first year, increasing in increments of between 1-3% over the next 50 years to match the expected increase in population and the required improvements to existing infrastructure as funding becomes available. It is envisaged that approximately 37.6ha of the site will need to be progressively cleared over the lifespan of the proposed development (see **Figure 5.2**).

The quarrying operation will be a staged approach, as shown in **Figure 5.2**. Part of the current quarry void will be utilised for landfill once quarrying operations cease. PIT103, PIT101, PIT205 and PIT303 and associated infrastructure such as roads will be progressively cleared and will remove approximately 27ha of Bimble Box-Pine and 10.6ha of Dwyers Ref Gum-Currawang. PIT101 includes an area of 7.3ha of cleared land that is currently used as a speedway, and PIT205 includes a small section (1.8ha) of the animal pit which has little vegetative cover.

5.1.2 Landfill

The landfill operation will involve moving the landfill into the void of the current adjacent quarry once the existing landfill cell has reached full capacity, which is expected within the next few years. No vegetation will be cleared for the development of the landfill.

Currently, the landfill facility receives approximately 20,000t.p.a of waste which is predicted to increase at a rate of 1.5% - 2% annually for the life of the facility. The

proposed landfill is expected to provide a suitable long term solution for waste disposal in Griffith LGA for a period of approximately 50 years before reaching capacity.

6 Environmental Assessment of Site

6.1 Site Description

In 2000, Ettamogah Research Consultants (ERC) conducted a flora and fauna survey of the entire area contained within Lot 202. A Species Impact Statement relevant to that survey was also completed in 2002 (results from both surveys are documented in ERC, 2003). In 2006, Ecosurveys was contracted to complete a field survey for Lot 201 and complete a site assessment. The ecological site description (biodiversity, landscape and site values) presented in this section comes from those reports.

The proposed development site is located within the Cobar Peneplain Bioregion on a north-easterly oriented slope following the western ridge line of McPhersons Range. The Range provides the only relief in a predominantly flat landscape. Most of the land in the Griffith LGA has been cleared for agricultural enterprises and only isolated pockets of vegetation have been retained, located in natural depressions and rocky ridge tops, sand hill rises, roadsides, travelling stock reserves, state forests and isolated paddock trees. Few, if any, of these remaining remnants are in pristine condition due to pressures such as altered water regime, grazing, surface quarrying, past clearing practices and noxious weeds and pests. Contrary to landscape of the LGA, remnant vegetation of varying quality covers the majority of McPhersons Range.

The proposed development site is situated in Lot 202 and the southern section of Lot 201. The existing quarry and landfill is situated in Lot 202. A strip of land zoned Environmental Protection (Scenic) is located on the north western boundary and agricultural properties are located on the south western boundary. A speedway complex is located in the southeast section of Lot 202. Native regrowth and remnant vegetation covers the remaining areas.

The natural vegetation of Lot 202 has been modified by the operations of the landfill and quarry and the past removal of surface gravels. In contrast, quarry and landfill operations have had little direct impact on Lot 201, although surface gravel has been removed from the ridge top and higher slopes.

The vegetation of the site comprises a mixture of woodland and forest vegetation types, consisting of remnant vegetation and natural regrowth. Ground cover consists of a mixture of native and introduced species with introduced species dominating around the immediate tip area. The site has a high level of structural diversity which is reflected in the high number of bird species recorded during flora and fauna surveys.

6.1.1 Vegetation Communities

6.1.1.1 Lot 202

White Cypress Pine was found to be the dominant overstorey species, occurring largely in the form of single stand natural regrowth, indicative of previous scrapping for gravel. Patches of Currawang regrowth and Dwyers Gum in association with White Cypress Pine tended to dominate ridge areas and higher slopes. Currawang was more dominant adjacent to the existing landfill and quarry. Bimble Box and White Cypress Pine

dominated lower slopes and flatter areas. Remnant Bimble Box, White Cypress Pine and Dwyers Gum dominated the overstorey in areas not previously scraped for surficial gravels but mature and old growth specimens were also found scattered throughout the White Cypress Pine and Currawang regrowth (ERC, 2003).

The shrub layer was generally absent, sparse or dominated by regrowth of White Cypress Pine. Patches of Hop-bush *Dodonaea spp.* were recorded in most woodland areas associated with Bimble Box.

Ground cover diversity was also characterised by past disturbance history, with diversity generally poorer in areas previously scraped of surficial gravels, especially on the upper slopes west of the speedway. Native species generally dominated the ground cover of woodland and forested areas, especially native grasses. Woodland areas recorded high ground cover diversity and were dominated by native species, whereas areas of dense White Cypress Pine regrowth recorded poorer ground cover diversity. Disturbed areas were characterised by high diversity of introduced species.

Despite the site being modified from its original state, a great deal of remnant vegetation was recorded. The subject site overall displays a high level of structural and floristic diversity. Four vegetation communities were identified during field surveys and are described below and shown in **Figure 6.1**:

1. **White Cypress Pine Forest.** This community covered approximately 21 ha of the subject site and was found to the south of the existing quarry, north of the speedway and north of the landfill area in the north-east corner of the subject site.

Most of this community appeared to be the result of natural regrowth (2 - 4 metres in height) due to past modification of the area. Mature trees ranged in height from 10 to 20 metres. Occasional remnant Bimble Box or Dwyer's Mallee Gum was recorded.

The understorey largely consisted of juvenile White Cypress Pine with some Wilga *Geijera parviflora* and Currawang. Ground cover in this area was sparse, largely consisting of native forbs with some grasses.

The Cypress Pine Forest provided various foraging, roosting and breeding opportunities for many bird species. Areas where all age structures were present, especially in combination with isolated Bimble Box remnants and small clearings provided a structurally diverse environment. Standing dead trees were common and provided resting and foraging opportunities for many birds. Fallen timber was common, but not abundant and largely in the form of small branches and stems of White Cypress Pine regrowth.

The threatened Grey-crowned Babbler and many declining woodland bird species were observed foraging in this vegetation type.

Loose bark of the larger White Cypress Pine and Bimble Box provides suitable roosting habitat for microchiropteran bat species, particularly in vegetation around the perimeter of this vegetation community. High bat activity and diversity was recorded along flyways of this community in the eastern part of the subject

site. The grassy understorey found in this community provided for suitable foraging and sheltering habitat for some ground dwelling mammals including the Eastern Grey Kangaroo.

2. **Bimble Box-White Cypress Pine woodland.** This community covered approximately 18 ha of the subject site. The community was almost entirely restricted to the southern portion of the proposed development site.

Bimble Box dominated the overstorey, with White Cypress Pine dominating the lower strata. This area contained many remnant old growth Bimble Box. Tree health was generally very good, with few trees showing signs of dieback and stress.

The understorey was generally sparse consisting of juvenile White Cypress Pine regrowth, with the occasional Currawang, Wedge-leaf Hop-bush *Dodonea cuneata* and Narrow-leaf Hop-bush *Dodonea viscosa ssp angustissima*. Ground cover predominately consisted of native grasses with some introduced species.

This woodland area supported the highest species diversity, especially birds, as opposed to other areas of the site. The woodland community contained open grassy areas, with mature trees providing for a wide range of foraging, sheltering and breeding opportunities for a number of species. Many of the mature Bimble Box contained hollows, crevices and bark slabs, which provide suitable nesting and roosting sites for some birds, arboreal mammals and microchiropteran bat species. Several White Cypress Pine in the south-eastern section supported nesting sites for the Grey-crowned Babbler and Grey-crowned Babblers were observed foraging within Bimble Box trees within the road reserves. A number of stag trees were recorded that would provide suitable nesting and sheltering sites. Fallen timber was common, but not abundant, and largely in the form of small branches and twigs confined to areas beneath Bimble Box.

3. **Dwyers Gum-White Cypress Pine-Currawang woodland.** This vegetation community covered approximately 14 ha of the site and was generally associated with rocky outcrops, the ridgeline and upper slope areas. The community was restricted to two areas, the southerly facing hillside of the northern section of the site (8ha) and a smaller portion, also including crown land area along the western boundary (6 ha).

The overstorey was dominated by Dwyers Mallee Gum with some areas dominated by patches of White Cypress Pine. Currawang and White Cypress Pine dominated the lower strata, particularly White Cypress Pine on lower and south facing slopes. Currawang as shrub and advanced regrowth dominated sections of the ridgeline and mid-slopes.

The understorey consisted largely of juvenile White Cypress Pine and Dwyers Gum, Weeping Pittosporum *Pittosporum phillyreoides* and the occasional Bimble Box. White Cypress Pine became dominant in the lower lying mid-section forming a significant ecotone. The ground layer was generally sparse and consisted of native grasses and forbs.

A natural ephemeral drainage line running west-east traversed this community north of the landfill and supported native rush/sedge species and other riparian zone.

Many of the mature and all of the old growth Dwyers Gum supported hollows, with the larger old growth tress providing a full range of hollow sizes. Fallen timber was scarce and largely in the form of small branches and twigs, confined to areas beneath mature Dwyers Gum and White Cypress Pine.

4. **Mixed Bimble Box-White Cypress Pine-Dwyers Mallee Gum, open forest.**

This community covers approximately 28 hectares of the subject site and occurred in two different areas: to the north of the landfill and south of the quarry.

The community north of the tip lies in a natural gully resembling an open valley floor, with a natural drainage line running through the centre of this area. White Cypress Pine was well represented throughout all age structures. A high proportion of remnant vegetation was recorded along the gully floor and drainage line. Numerous old growth and mature Bimble Box, White Cypress Pine and Dwyers Gum were recorded in this area. Dwyers Gum and Currawang became dominant as the slope increased. White Cypress Pine and Currawang regrowth dominated the southern part of the community due to past disturbance.

Early to advanced regrowth of White Cypress Pine and Currawang dominated the understorey stratum. The shrub layer apart from the White Cypress Pine was patchy with most species recorded along the drainage line and in association with Bimble Box trees and stands.

Ground cover comprised a mixture of predominately native grasses, with some forbs and introduced species.

This area provided for a wide array of habitat features including a natural gully, drainage line, rocky outcrops and diverse age structure of the overstorey species. A large amount of ground debris in the form of fallen logs, branches and leaves was evident. These features could provide suitable habitat for reptiles and small ground dwelling mammals. Many mature White Cypress Pine and Bimble Box occurred in this area, providing suitable shelter and roosting habitat for some bird, arboreal mammal and microchiropteran bat species.

Vegetation in the area surrounding the proposed development site consisted of the following:

- To the west of the site, a narrow strip (no greater than 20 metres) of low open-forest dominated by Dwyers Gum and some White Cypress Pine. Adjacent to this corridor, orange orchards extended the length of the western boundary.
- To the east of the site, woodland vegetation reminiscent of the vegetation found at the foot slopes of McPhersons Range area prior to disturbance. Dominated by White Cypress Pine and Bimble Box, with an understorey of the same species and largely a native grassy ground cover.

6.1.1.2 Lot 201

Lot 201 was surveyed in 2006 by Ecosurveys. The vegetation structure consisted of a wide diversity of habitats that supported a variety of fauna, in particular bird species. Approximately 300 hollow bearing trees were identified, providing a significant habitat feature for nesting and roosting bird and bat species. Fallen timber was also found scattered throughout vegetation communities. These critical resources have been largely removed from adjacent agricultural land, leading to a corresponding decline in reptiles and ground foraging, roosting and nesting bird species in these areas (Ecosurveys, 2006).

On the ridge and upper slopes of the proposed development site, vegetation is open woodland consisting of scattered old Dwyers Gum with no understorey and mixture of native and introduced species in the ground layer. Acacia shrub land, open areas without an overstorey or understorey, and dense stands of White Cypress Pine regrowth were also identified. White Cypress Pine and Poplar Box woodland dominated on the lower slopes. The understorey varied from dense White Cypress Pine regrowth to open woodland with no understorey. The ground layer on lower slopes was diverse with native and introduced species present throughout the proposed development site.

Three vegetation communities were identified in the proposed development site of Lot 201. Ecosurveys adopted the vegetation classification system of Benson *et al.* (2006) and a description of each vegetation community in Lot 201 is provided below and shown in **Figure 6.1**:

1. **Dwyer's Red Gum-Currawang low woodland.** Found on the ridge top and higher slopes of the site, this community is dominated by regrowth Currawang and White Cypress Pine with scattered Dwyers Gum and has been previously disturbed by the removal of surface gravel.

The understorey is sparse, although thick White Cypress Pine regrowth acts as a shrub layer where it is present. Wonga Wonga Vine is also present across open areas. The ground layer is diverse and contains a large range of native forbs and grasses. Capeweed was the most common introduced species identified, and scattered occurrences of Paterson's Curse and Saffron Thistle were also noted.

2. **White Cypress Pine-Poplar Box woodland.** Found on the lower slopes, this community has not been disturbed by the removal of surface gravel. The overstorey consists of large, old scattered individual trees and small stands of White Cypress pine and Bimble Box.

The understorey is dominated by thick White Cypress Pine regrowth and scattered individuals of other species such as Hooked Needlewood *Hakea tephrosperma*. The ground layer is diverse, containing a large range of native forbs and grasses, including Orchids (Midget Greenhood *Pterostylis mutica*) and Lilies (Bulbine Lily *Bulbine bulbosa*). Introduced grasses were the most common weeds identified in the ground layer with scattered occurrences of Capeweed, Paterson's Curse and Saffron Thistle.

3. **Poplar Box grassy woodland.** Found within a shallow valley between the proposed development site and a slightly higher rocky slope to the north. This grassy woodland consists primarily of White Cypress Pine and Bimble Box regrowth approximately 50 years old. The overstorey consists entirely of old hollow bearing Bimble Box trees.

Although there is no understorey in this community, the ground layer contains a diverse range of native forbs and grasses. Scattered occurrences of Capeweed, Paterson's Curse and Saffron Thistle were also present in the ground layer. Within this community there were small openings that contained no trees and were dominated by grasses and forbs.

Vegetation in the area surrounding the proposed development site consisted of the following:

- At the northern boundary Bimble Box woodland community is present with a large number of hollow bearing trees.
- To the west a narrow strip of Dwyers Red Gum-Currawang woodland provides a barrier with the orange orchids further to the west. Further north, the western boundary slopes down to open woodland with very little canopy cover and poor tree health
- To the east of the site, Cypress White Pine regrowth dominates and fallen timber is present.

The vegetation of Lot 202 and 201 forms part of a much larger corridor linking McPhersons Range with remnant vegetation associated with Kidman Way and Griffith-Hillston rail line which eventually connects with remnant vegetation east of Tabbita (including Tabbita State Forest). Although fragmented, this corridor is the largest connected area of remnant vegetation within the Griffith LGA and currently allows the movement of fauna species across the region. It maintains the connection between local populations of fauna species and ensures the genetic flow between sub-populations of fauna inhabiting the LGA.

6.1.2 Flora and Fauna

A total of 69 native and three introduced vertebrate fauna species were recorded during the field surveys for Lot 202. Although, specific fauna surveys were not undertaken for Lot 201, 60 species of fauna were observed and recorded, including 59 species of bird and 1 species of reptile.

6.1.2.1 Flora

Vegetation communities are as described in section 6.1.1. No Rare or Threatened Australian Plants (ROTAP) listed plant species were recorded in Lot 202 during the 2000 investigations. The ROTAP listed species, *Lomandra patens*, was considered as a potential species of conservation significance in the study area and was investigated further. The species was not recorded at the site during field surveys but has been recorded at Scenic Hill. ERC (2003) considered that even if the species was to be found in the study area, it was unlikely that the proposed development would have a significant effect it.

Two noxious weeds, African Boxthorn *Lycium ferocissimum* and Horehound *Marrubium vulgare* were found in both Lots. These species were recorded in a few scattered localities and are considered rare on the site.

A small number of Wilga trees in Lot 201 were infested with Mistletoe, which is a keystone resource within undisturbed Australian forests and woodlands. Mistletoe plays a significant role in faunal diversity by providing abundant food and nesting resources (Watson, 2002). Removing this resource may impact upon fruit eating species such as the Mistletoe bird *Dicaeum hirundinaceum* and the Silvereye *Zosterops lateralis*.

6.1.2.2 Birds

A total of 55 native birds and 3 introduced species were recorded in Lot 202. A number of threatened bird species as listed under the *TSC Act 1995* were identified as potentially utilising the site, although only the Grey Crowned-babbler was actually recorded onsite. The mature woodland vegetation communities yielded the highest diversity of species, particularly in Lot 201 but also Lot 202.

In addition to the Grey Crowned-babbler, ERC (2003) indicated Lot 202 could also provide suitable habitat for seven listed threatened species, including the Grey Falcon *Falco hypoleucos*, Major Mitchell Cockatoo *Cacatua leadbeateri*, Glossy Black-cockatoo, Turquoise Parrot *Neophema pulchella*, Barking Owl *Ninox Connivens*, Painted Honeyeater *Grantiella picta*. These species may potentially occur on the site or actually use the area as part of their overall habitat. The 'eight part test' was applied to each of these species. It was found that the proposed development (which at the time covered a greater proportion of Lot 202 but did not extend into Lot 201) was unlikely to have a significant effect on any of the eight species.

Eight bird of prey species were recorded in Lot 202. The high number of prey species was considered to be due to the vermin and insects associated with landfill sites. It was considered likely that the proposed development would, however, have an adverse effect upon the bird of prey species within the study area due to the removal or modification of a significant proportion of roosting and breeding sites (ERC, 2003).

In Lot 201, Ecosurveys (2006) recorded the threatened Grey-crowned Babbler at two locations. In addition, a number of threatened bird species were identified as potentially utilising the site as a regional corridor to move across the landscape including the Glossy Black Cockatoo and Major Mitchell's Cockatoo.

Although not listed as threatened or endangered, the following species have been identified as declining woodland birds in south western NSW and were recorded on site:

- Chestnut-rumped Thornbill *Acanthiza uropygialis*
- Southern White face *Aphelocephala leucopis*
- Red-capped Robin *Petroica goodenovii*
- Rufous Whistler *Pachycephala rufiventris*

The high occurrence of old hollow bearing trees in Lot 201 was considered a habitat feature providing nesting sites for hollow dependent nesting bird species such as Australian Ringneck *Barnardius Barnardi*, Chestnut-rumped Thornbill and Southern

Whiteface. These hollows and other fallen timber also provide a food source for ground foraging bird species as they are likely to increase the diversity in insects.

The Superb Parrot *Polytelis swainsonii* (threatened species) and the Rainbow Bee-Eater *Merops ornatus* (listed migratory species) are both listed as species of National Environmental Significance under the EPBC Act and are considered to potentially utilise the site (Webster, pers. comm., 2007). In addition, a Wedge-tailed Eagle *Aquila audax* nest was located in Lot 201. The Wedge-tailed Eagle is a protected native animal under the *National Parks and Wildlife Act 1974*.

6.1.2.3 Mammals

Thirteen native and three introduced mammals were recorded within the Lot 202, including ten species of microchiropteran bats. These bats can be found roosting in tree hollows, under bark slabs and deep fissures. These resources are only offered by large, mature native trees and stags such as Bimble Box found within the study area.

Two threatened microchiropteran bat species, Inland Forest Bat *Vespadelus baverstocki* and Fishing Bat *Myotis macropus*, were captured during harp trapping along the flyways at the eastern boundary of Lot 202. In addition, anabat analysis indicated the Eastern Long-eared Bat *Nyctophilus timoriensis*, Little Pied Bat *Chalinolobus picatus*, may also utilise the site. The 'eight part test' was applied to all four species and ERC (2003) concluded that it was very unlikely that the proposed development would significantly threaten the survival or evolutionary development of the species.

6.1.2.4 Reptiles

Ten reptile species were recorded in Lot 202 and three in Lot 201. All species were relatively common throughout the Griffith region. No threatened reptile species as listed under the *TSC Act 1995* was recorded during the field study or previous studies.

6.1.2.5 Amphibians

Two amphibian species were recorded in Lot 202 and one within Lot 201. No threatened amphibian species as listed under the *TSC Act 1995* were recorded during the field study or previous field studies.

In Lot 201, there are two intermittent drainage lines that move overland flow from the upper slopes to the lower slopes of the site. These drainage lines would only flow for short periods following heavy or persistent rainfall and may provide temporary habitat to frogs during wet and dry periods.

A dam is situated on the drainage lines at the Northern end of Lot 201 and may provide habitat for frogs and be a source of drinking water for fauna. The Australian Wood Duck *Chenonetta jubata* was present during the survey. The design of the dam and constant grazing pressure has reduced the presence of aquatic vegetation and the habitat quality of the dam.

6.1.2.6 Insects

A small number of hollows located in the proposed development site of Lot 201 were being used by Feral Bees *Apis mellifera*. The presence of fallen timber is likely to

increase the diversity of insects on site and therefore provide a valuable resource for ground foraging birds.

7 Potential Biodiversity Impacts of Development

7.1 Potential Biodiversity Impacts of Development

As noted above, Council commissioned flora and fauna studies of the proposed development site in 2000 and 2002 for Lot 201 and 2006 for Lot 201. In summary, the potential flora and fauna impacts of the proposed development are:

1. The removal of vegetation from areas to be disturbed within the proposed development site
2. The partial interruption of a regional corridor
3. The reduction of flora and fauna habitat from the proposed development site
4. The loss of outstanding habitat features from the proposed development site

Council subsequently referred the development to MCMA for review, advice and recommendation with respect to the 'maintain and improve' principle that underpins vegetation management in NSW. This referral was done even though the project, which is considered a Major Part 3A Project under the *EP&A Act*, is not subject to the *NV Act* and the need for an offset strategy had not been identified.

The MCMA assessed the development proposal (involving the clearance of 52 hectares of vegetation over both Lots) using the *Property Vegetation Plan (PVP) Developer Tool* (see Section 7.2 below) and also considered the proposal in the context of the Murrumbidgee CAP.

The result of that assessment indicated that, if the development was not excluded from the *NV Act*, then the MCMA would not be able to approve the project. MCMA felt that the development failed the 'improve and maintain' test for the following reasons:

1. The proposal was inconsistent with the Murrumbidgee CAP, which includes a high priority to protect vegetation in good condition¹ that has between 30-50% remaining. Bimble Box woodlands are considered regionally endangered with 45% currently remaining. White Cypress Pine-Poplar Box woodlands and Poplar Box grassy woodland are considered regionally vulnerable, whereas Dwyers Red Gum-Currawang woodlands are considered regionally well retained (Murrumbidgee CAP, 2006).

¹ In Eldridge, D. J. (2002), condition is assessed using three indices of ecosystem health: landscape structure, landscape composition and landscape function. Quality of remnants is assessed using features including patch size, connectivity, tree health, grazing status, weediness, extent of tree and shrub regeneration.

2. The biodiversity tool of the *PVP Developer* determined that the project would not be approved under the *NV Act* because improvements in the landscape value would be less than the losses from the proposed clearing;
3. The threatened species tool of the *PVP Developer* determined that the project would not be approved under the *NV Act* due to the presence of 18 threatened species and 1 endangered population (White Browed Tree Creeper) and the viability of those species to be able to handle loss of habitat;

The *PVP Developer* initially calculated that, if the viability test is overridden in the threatened species toll, then the minimum offset required based on 18 threatened species and 1 endangered population would be 1300 hectares for the clearing of 52 hectares. This equated to a ratio of 1:25 and with so little remnant vegetation remaining in the Griffith LGA was not a practicable target.

Following extensive consultation with DECC regarding the likelihood of particular threatened species inhabiting the proposed development site, the *PVP Developer* was run a second time. The second run also took into account the different vegetation types likely to be cleared, of which approximately 30% would be Dwyers Red Gum-Currawang and therefore of lower conservation value. The resultant ratios of 1:10 for Dwyers Red Gum-Currawang and 1:12.5 for Bimble Box-Pine were adopted as appropriate for determining the overall area to be protected under offsets.

7.1.1 *PVP Developer* Tool

PVP Developer is a computer program that is used by NSW Catchment Management Authorities (CMA) to help decide whether applications for vegetation clearing should be approved. *PVP Developer* (version 2.0) is a major upgrade of the prior version of the software that was trialled on over 100 properties across NSW last year. It incorporates major changes that are the result of these on-farm trials, public submissions and assessment by a panel of independent scientists (NSW Government, 2007).

The *PVP Developer* has separate modules for salinity, water quality, biodiversity (including threatened species), land and soil capability and invasive native species. The biodiversity assessment (NSW Government, 2007) is in two parts:

1. A biodiversity assessment which allows for offsets to balance the biodiversity impacts of the clearing in many circumstances, particularly where clearing of paddock trees or low condition vegetation is proposed. It also recognises that some clearing such as thinning or clearing invasive native scrub can in its own right, improve or maintain environmental outcomes for biodiversity under certain conditions. There is some clearing which, because of the importance of the vegetation, can not improve or maintain environmental outcomes.
2. A threatened species assessment that allows for clearing where offsets would improve the habitat for specific threatened species at least to the same extent as the habitat values lost through the proposed clearing. The assessment does not allow clearing where impacts are unsustainable for a local population of a threatened species.

PVP Developer relies on detailed data held in specific databases including the threatened species profile database; the vegetation benchmarks database; over cleared landscapes database; and the over cleared vegetation types database.

The NSW Government is updating a number of the datasets that underpin the *BioMetric*² and *Threatened Species Tools* that are used within the *PVP Developer*. The revised data will apply to future PVPs and variations to existing PVPs. The data reviews are part of the NSW Government's commitment to improving the scientific information that underpins the Tools within the *PVP Developer* as new information becomes available. The data reviews cover:

- Updated vegetation types
- Updated vegetation benchmarks
- Updated threatened species offset requirements

The benefits of the data reviews are improved accuracy of biodiversity and threatened species assessment in the *PVP Developer* and a review of the 14 priority threatened species that were causing high offsets requirements and 'red lights' for some PVPs (NPWS, 2006).

As new and better information becomes available the *PVP Developer* tool can also be modified to take account of this information.

7.1.2 Results

The *PVP Developer* was employed to give an estimate of the area required to offset the proposed development and was run on two separate occasions. The second run calculated offset ratios for the two broad vegetation communities identified onsite of Bimble Box-Pine and Dwyers Red Gum-Currawang. **Table 10.2** outlines the calculated offsets required for each vegetation community.

Table 10.2: *PVP Developer* offset area and ratio

VEGETATION COMMUNITY	AREA CLEARED (ha)	OFFSET AREA (ha)	RATIO
Bimble Box-Pine	27	337.5	1:12.5
Dwyers Red Gum-Currawang	10.6	106	1:10

The high ratios are indicative of several factors, including:

- Recorded sightings of the threatened Grey-crowned Babbler at Tharbogang

² *BioMetric* assesses the value of native vegetation for terrestrial biodiversity at the national, regional, landscape and site scales.

- Likelihood of a further 15 threatened species utilising habitat at Tharbogang
- Regional conservation value of vegetation communities
- High connectivity of Tharbogang with McPhersons Range

The *PVP Developer* also took into consideration management actions in delivering a ratio such as stock control and exclusion, weed and pest management, retention of dead timber and vegetation enhancement. Implementing positive management actions often improves the condition and quality of a remnant and increases utilisation by fauna.

The assumptions and results of the *PVP Developer*, including a list of threatened species and positive management actions, are provided in **Appendix A**.

8 Site Design

The most effective mitigation strategy is to avoid environmental impacts wherever possible. Avoidance of impacts is generally most easily achieved at the design and planning stages of the project.

The project design team has proposed a number of design modifications following discussions with DECC that will result in the avoidance of potential environmental impacts that would have resulted under a “Business as Usual” approach. These modifications are based on the recommendations provided in the flora and fauna surveys and focus on maintaining areas containing significant vegetation communities and habitat features, and include:

- Not encroaching on the White Cypress Pine-Poplar Box grassy woodland in Lot 201, therefore protecting a large number of hollow bearing trees
- Removing rubbish from the drainage line passing through the Poplar Box grassy woodland exclusion zone
- Maintaining and establishing a 100 meter corridor along the eastern and western boundary of the site to ensure the vegetation of McPhersons Range remains connected
- Maintaining a 100 meter corridor between the eastern and western boundaries to link vegetation across the site
- Maintaining a 100 meter buffer around the tree containing the Wedge-tailed Eagles nest
- Removing hollow trees and placing them in corridors and areas that will not be cleared
- Collecting seed from the site prior to clearing of vegetation for rehabilitation
- Removing vegetation outside of main breeding periods and encouraging the dispersal of native fauna prior to commencement by NPWS Officer or suitably qualified person
- Enhancing vegetation on the proposed development site in areas that will not be cleared through direct seeding, thinning of White Cypress Pine regrowth, grazing exclusion, removing noxious weeds and controlling feral animals

Extensive consultation between Council, the consultant preparing the EA and the project design team has further reduced the potential for onsite impacts on flora and fauna. Through careful planning and design of the quarry staging and landfill placement, a significant proportion of Lot 201 will not be cleared, and quarrying will not commence until 2041. This will protect many mature hollow bearing trees and other important habitat features, in addition to maintaining a greater area of connected remnant vegetation.

Furthermore, the staged approach will involve clearing vegetation one stage at a time, and allow progressive rehabilitation of the site. This will help maintain vegetated corridors through the development site and strengthen connectivity, although revegetated areas may initially be of lower quality.

Figure 8.1 illustrates the proposed footprint of the quarry stages over the specific vegetation communities identified in the specialist flora and fauna reports, and the intended exclusion zones. All effort has been given to protect vegetation communities of higher conservation value and significant habitat features, in addition to meeting other criteria such as minimum buffer zones to nearby residences.

9 Biodiversity Offsets

Despite the design modifications and impact reduction measures that have been incorporated in the project, expansion of the quarry and landfill will result in some residual environmental impacts in relation to flora and fauna. Council recognises that the residual impacts of the project on environmental values or functions represent a potential loss of habitat that is the shared property of the New South Wales community.

Therefore, Council has developed a strategy to compensate for residual impacts that may affect:

- The regionally endangered Bimble Box community;
- Habitat available for key fauna species; and
- Extent, quality, connectivity and level of protection of remnant vegetation in the Griffith region.

9.1 Offset Principles

Offsets are simple in concept but they must be carefully designed to ensure their full beneficial potential is achieved in practice. The NSW Government (2002) concept paper 'Green offsets for sustainable development' delivers the following set of offset principles:

- Environmental impacts must first be avoided by using all cost-effective prevention and mitigation measures. Offsets are only then used to address remaining environmental impacts
- All standard regulatory requirements must still be met
- Offsets must never reward ongoing poor environmental performance
- Offsets will complement other government programs
- Offsets must result in a net environmental improvement

Offsets must be:

- enduring – they must offset the impact of the development for the period that the impact occurs
- quantifiable – the impacts and benefits must be reliably estimated
- targeted – they must offset the impacts on a 'like for like **or better**' basis
- located appropriately – they must offset the impact in the same region
- supplementary – beyond existing requirements and not already be funded by another scheme
- enforceable – through development consent conditions, licence conditions, covenants or a contract

The Victorian *Native Vegetation Management Framework* (2002) includes some further principles relevant to valuing and offsetting impacts to native vegetation, including:

- retention and management of remnant native vegetation as the primary way to conserve natural biodiversity, with large remnants inherently more valuable than small patches that total the same area
- requirement of a landscape approach to planning native vegetation management is required, whereby the position of remnants in the landscape affects their conservation value
- the direction of public resources to increase the extent of native vegetation [including the connectivity to neighbouring patches] or to enhance the quality of vegetation through appropriate management, rather than to the status quo of retaining existing vegetation

9.2 Offset Examples

Biodiversity offsets (secured by in-perpetuity conservation agreements or covenants) might include:

- enhancing habitat to improve its condition and biodiversity value
- reconstructing habitat in strategic areas to link areas of high conservation value or increase buffer zones around areas of high conservation value
- entering into a conservation agreement, property agreement or covenant to protect vegetation
- acquiring land that contains very high conservation values through the open land market, which could then be placed in a private or in the public reserve system
- removing or reducing grazing pressure (controlled grazing) to allow for natural regeneration of native plants
- management of remnant areas through fencing, weed control, pest control
- leaving fallen timber on the ground (i.e. not collecting fire wood) to provide shelter for wildlife
- financial contributions to support management of conservation areas and/or funding for research into ecological functions (Biobanking)

10 Offset Strategy

The expansion of the quarry and landfill will result in 37.6ha being cleared. The vegetation communities that will be removed include Bimble Box-Pine and Dwyers Red Gum-Currawang, which the Murrumbidgee CAP (2006) identified as regionally vulnerable and well retained, respectively.

The removal of 37.6ha of vegetation from the site will be appropriately offset with consideration given to the principles outlined above in addition to the type and condition of vegetation in a bioregional context, the connectivity of vegetation in a landscape context, and the presence of significant habitat features in a site context.

10.1 Overview of the Offset Strategy

The proposed offset strategy combines a number of elements with the aim of presenting a package to offset the loss of flora and fauna values at the proposed site. The strategy proposed for the offsets has adopted an approach that has the following priorities (in order of importance):

1. Protect remnant vegetation with a view to maintaining local connectivity and to protecting Bimble Box-Pine and Dwyers Red Gum-Currawang communities;
2. Enhance existing remnant Bimble Box-Pine and Dwyers Red Gum-Currawang communities through reestablishment of other species and structural components of vegetation;
3. Revegetate areas of cleared land to improve connectivity between remnant vegetation patches and to expand patch size; and
4. Implement the Griffith LGA Environmental Strategy.

10.1.1 Principles behind Offset Strategy

The following principles have been used to guide the development of the Offset Strategy.

- **‘Improve and maintain’ Outcome**

The selection of proposed offsets should seek to ‘improve and maintain’ biodiversity values, whereby a net or equivalent gain is realised over what is lost from the proposed development. Achieving ‘improve and maintain’ outcomes involves consideration of vegetation values on a regional, landscape and site basis.

- **Like for Like**

Vegetation communities proposed as offsets should be largely the same vegetation community that is to be cleared i.e. Bimble Box-Pine. Exceptions would only be made to this where the area provides a connection to a waterway; a connection between adjacent areas of Bimble Box-Pine; or the vegetation community is of greater conservation status or more extensively cleared. The condition of the site and the importance of the site in a landscape context are important factors in determining

habitat value in the context of 'like for like' and will form the basis for the offset selection process.

- **Ecosystem Diversity**

Vegetation communities with high structural complexity and floristic diversity should be a priority for offsets as they are generally more resilient and provide more habitat features than less complex vegetation communities. Ecosystem complexity is driven by the understorey and groundcover, which is influenced by topography, soil type and moisture regime. Riparian areas and wetlands, and areas of native grass should also be considered in offset selection, as they provide critical food and habitat to a number of threatened species.

- **Habitat Features**

The vegetation in Lot 201 currently provides significant habitat features in the form of mature hollow bearing trees and dead standing trees. These hollows provide habitat for bird species, arboreal mammals and microchiropteran bats. Other habitat features that have been identified on site include fallen timber, rocky outcrops, and drainage lines. The presence of mature trees with hollows will be a key factor in selecting offset sites and to a lesser extent other habitat features mentioned.

- **Corridors**

Corridors are to be created and/or protected to enhance local connectivity between patches and help retain an overall corridor effect. Corridors will ideally be greater than 100m in width to minimise edge effects and will not be less than 25m in accordance with the Murrumbidgee CAP (2006).

- **Patch Size**

To support viable populations of identified threatened species into the future, patch sizes of proposed offset sites should be consistent with the minimum threshold requirements of threatened species. The Murrumbidgee CAP (2006) indicates priority should be given to patches 10ha or greater in size, or less than 1.5km from the nearest patch of 10ha or greater where a corridor linking the smaller patch to the larger patch exists or is easily attainable.

10.1.2 Murrumbidgee Catchment Action Plan

At a regional level, the value of vegetation is directly related to the percentage cleared. The draft Murrumbidgee CAP (2006) categorises Bimble Box-Pine associations in the Western Peneplain Woodlands as regionally vulnerable and of high conservation value as there are few remnants of this vegetation type left in the region, whereas Dwyers Red Gum-Currawang associations have been well-retained and are of lower conservation value. **Table 10.1** shows the Murrumbidgee CAP priorities based on conservation status and value, and region representation of vegetation type.

Table 10.1 Conservation and Murrumbidgee catchment target priorities

CONSERVATION STATUS	CONSERVATION VALUE		
	HIGH	MEDIUM	LOWER
Regionally endangered	X		
Regionally vulnerable	X		
Regionally depleted		X	
Regionally well-retained			X
Murrumbidgee MCAP target priorities^	1 - 2	3	3

Source: draft MCAP (2006, 137)

The target priorities set out in the draft MCAP (2006) for vegetation communities are consistent with the above matrix and include the following:

1. Protect and actively manage existing native vegetation
2. Enhance existing native vegetation
3. Protect the best examples of each vegetation class
4. Aim to conserve the least protected and most extensively cleared vegetation classes
5. Expand and connect existing patches of native vegetation
6. Revegetation of cleared land

The selection of offsets should focus on upholding Murrumbidgee CAP priorities in ascending order, as this will assist in bringing about a net and/or equivalent gain of the vegetation communities that will be cleared and improving and maintaining biodiversity values.

10.2 Proposed Direct Offsets

Council proposed and conducted an initial appraisal of 54 potential offset sites within 10km of the proposed development site. Council's appraisal provided a basic overview of the dominant canopy species, condition of the understory and ground layer, past disturbances, and necessary enhancement measures. A map of offsets proposed by Council and the overview of vegetation type and condition is provided as **Appendix B**.

The final selection of suitable offsets requires detailed flora and fauna assessments to confirm the suitability of proposed sites and to aid in the preparation of a design strategy for enhancement measures. Council has indicated flora and fauna assessments will be undertaken in the event the project is approved. This decision is partially to do with the high anticipated cost of conducting detailed flora and fauna assessments to the standard required over an extensive area. Further field work may also be needed if one or more of the sites do not meet the criteria of a suitable offset.

Although Council has indicated it will not undertake assessments at this time because of the high costs involved, Council has completed a preliminary assessment and significant lead work has been carried out to facilitate the commencement of the assessments as soon as approval is received.

The initial assessment indicated that sites numbered 2, 4, 6, 7, 9, 12, 16, 19, 21 and 22 (as shown in **Figure 10.1**) would benefit from detailed flora and fauna assessments to

determine their suitability for inclusion as offsets. These sites were chosen, in consultation with DECC, to improve connectivity between McPhersons Range and Tabbita Range, a large forested area of approximately 55km² that transects the boundary of Griffith and Carrathool LGAs.

The total area of the sites listed above is 536.6ha and the vegetation is primarily Bimble Box-Pine with some Dwyers Red Gum-Currawang on rocky outcrops. The *PVP Developer* ratios indicated a required offset area of 443h.5a of 'like for like' vegetation. Site number 21 (31.4ha) is a well vegetated patch of Mallee, which the Murrumbidgee CAP (2006) considers to be regionally depleted and of medium conservation value. This site was included to improve connectivity.

The initial assessment revealed the quality of vegetation on these sites was generally moderate to good, with some stands of mature trees present.

In late 2007, Council prepared a brief to secure a consultant to undertake the flora and fauna assessments for these sites. The brief incorporated the information requests of DECC for the provision of offsets, as outlined in the Director-Generals requirements for the Environmental Assessment. The objectives of the brief reflect these requirements and are as follows:

- Collection of appropriate data to assess the proposed offset sites as to their suitability for inclusion in the Offset Strategy
- Description of potential offset sites in accordance with the Biometric Operational Manual (DEC, 2005) referring to regional value; threatened species; landscape value; and site value
- Assessment of the value of the areas for threatened species, including Grey-crowned Babbler, Major Mitchell's Cockatoo, Superb Parrot and Eastern Long-eared Bat, potentially affected by the development at Tharbogang
- Assessment of which PVP Threatened Species Filter Habitat³ attributes present on the areas proposed to be cleared to enable a final list of threatened species requiring offsetting to be determined

In order to meet the objectives and fulfil the Director-General's requirements, the following assessment tasks were identified in the brief:

- At each site, identify the vegetation types, and the area of each vegetation type. And assess which relevant *PVP* Threatened Species Habitat Filter features are present
- Undertake site surveys to identify and record the natural values occurring on the proposed offset sites including *PVP* Threatened Species Habitat Filter features, vegetation types and other natural values

³ Anticipated Affected Vegetation Types and Threatened Species Habitat Filter features are provided in the Appendix A.

- Record and map the vegetation types, threatened species locations, Threatened Species Habitat Filter features at each proposed offset site
- Correlate identified vegetation types with the recently revised *PVP* Biometric vegetation types so that the *PVP Developer* can be used to determine the offset size
- Provide comment on the condition of the vegetation including presence of weed species, evidence of previous tree clearing/thinning, feral or domestic animals, and *phytophthora cinnamomi*
- Identify for each offset area which of the management actions used in *PVP Developer* (both for Biometric and Threatened Species) would be appropriate to apply to affect a gain on the offset sites
- Undertake targeted threatened species surveys using appropriate methods to quantify the threatened species habitat values of the offset sites. This should include the use and importance of each site for relevant threatened species (as described earlier)
- Prepare a report describing natural values at each of the proposed offset sites in accordance with the Biometric Operational Manual and the relevant threatened species habitat features used in the *PVP*:
 - Regional value
 - Threatened species confirmed to be present
 - Landscape value (connectivity)
 - Site value (threatened species habitat filter features such as hollow trees - hollow trees will need to be categorised into the hollow classes used in the *PVP Developer*)
 - Vegetation type and condition (low or moderate/good)
 - Area of each vegetation type

The brief focuses on the assessment of threatened species and their habitat as identified in the *PVP* results as potentially utilising habitat at the proposed development site. Threatened species are a priority in the region as much remnant vegetation has been previously removed and what is left is highly fragmented. Offsets should therefore provide suitable navigable habitat for threatened species and non-threatened species likely to be affected by the development.

The selection of suitable offsets will be consistent with the findings of the flora and fauna assessments and the principles outlined in section 10.2, whereby offsets will:

- Be 'like for like' with the proposed clearing
- Demonstrate strong ecosystem diversity (understorey and groundcover quality),
- Contain suitable habitat features to support fauna
- Be of significant size or well connected to a patch of significant size

As there are few remnants remaining in the Griffith LGA, some enhancement and revegetation may need to be incorporated into the offset strategy. Re-establishing vegetation communities is of low value as an offset as vegetation can take a long time to establish to a point where it provides suitable habitat for fauna, and is not always successful. However, strategic revegetation can greatly improve connectivity between

existing remnants in the LGA and should be considered where enduring protection can be secured. This includes roadside corridors and other linkages between remnant patches.

10.2.1 Funding Arrangements

Council intends to fund the provision and management of offsets from royalties acquired from the quarry as they become available. Royalties are calculated on a per tonnage basis and are payable by the Leasee and Council. By utilising royalties, funding will be available for a period of time that extends beyond the life of the impacts associated with the proposed development, and will incorporate post closure rehabilitation and monitoring. Currently, a proportion of royalties from the existing quarry is put aside for rehabilitation of the existing operation and maintenance of the road network. In relation to the future quarry, Council will direct royalties towards the progressive implementation of offsets as necessary.

The proposed development involves progressively clearing vegetation in seven stages and the implementation of offsets will mirror this approach. Before each quarry stage commences a suitable offset will be established and protected, and a management regime put in place shortly thereafter. This will be the case for all offsets with the exception of the offset for Stage 2 of the proposed development, which will be implemented in parallel with quarrying in Stage 2 as royalties become available from the resource.

Implementing a staged approach to offsets provides Council with the opportunity to negotiate with landholders and secure enduring protection well in advance of when the offset is needed, thus minimising the risk of failure through lack of support or poorly executed procedures.

10.3 Griffith LGA Environmental Strategy

Council has prepared a scope of work for the completion of a Griffith LGA Environmental Strategy. The intention is that, once Council has adopted the strategy, it will be used to guide changes to the GLEP, including use of the Environmental Protection Zones, and the design of additional controls in either the LEP or DCP to assist in control, management and promotion of the strategy.

The Strategy will involve:

1. The identification and classification of remnant vegetation in the Griffith LGA and an assessment of the significance of these areas. An overview assessment of the wider region and the relationship between the Griffith LGA and the wider region will also be conducted.
2. The identification and assessment of land that is contiguous, adjoining, or nearby to remnant vegetation lands and that would be suitable for rehabilitation using endemic species. Such lands should enhance the habitat value of identified remnant vegetation areas. This would include the identification of wildlife requirements, acceptable paths for movement between remnant areas and other factors governing the viability of native flora and fauna within the local

government area. Consideration would also be given actions to reduce the impact of pest species.

3. The development of a comprehensive environmental enhancement strategy including plans, implementation and funding. This will involve recommending acquisition of private land and the appropriation of Crown land for environmental management and rehabilitation. The strategy will also aim to protect and rehabilitate private land where the owners are willing to participate in the strategy and rezone land as Environmental Protection where appropriate.

The offset strategy and Griffith LGA Environmental Strategy will target different levels or aspects of biodiversity conservation, yet implementation and ongoing management of both strategies should be complementary of the other.

10.4 Options for Establishing Enduring Offsets

A key requirement of an offset is ensuring long term and enforceable protection and there are a number of tools available to Council to meet this requirement. Generally, one tool would be used in conjunction with another to provide a more rigorous framework for protection. The following section provides a brief description of each tool, and the benefits and any short comings.

Providing ongoing protection for offsets is required for the life of the impacts associated with the proposed development, including the period of monitoring and rehabilitation that follows the closure of the quarry and landfill. Ensuring ongoing protection requires a framework that incorporates a quality assurance system. The purpose of such a system would be to audit the performance of Council in relation to establishing and managing offsets, and make certain measures are in place to prevent inappropriate development.

10.4.1 Rezoning

The offsets proposed by Council in the initial appraisal cover a range of different zonings. A map and table indicating the current zones of proposed offsets is provided in **Appendix C**.

Rezoning land is allowable under Section 54 of the *EP&A Act* and requires approval from the Minister of Planning. As part of the assessment process for rezoning an environmental study must be undertaken and consultation with the public and government agencies sought for each parcel of land. Private land can be rezoned without the permission of the landholder, although Council must show fair consideration to consultation prior to Ministerial approval. There are two methods available to Council to rezone:

- **Strategic Rezoning**

Strategic rezoning involves a revision of the Griffith Local Environmental Plan (GLEP) and takes into consideration the strategic objectives of zoning across the whole region. GLEP revisions are usually scheduled every five years to correct anomalies, reflect changing circumstances and new information, and refine and update the planning provisions it contains. The current GLEP has been operational for seven years and is

currently under internal review in anticipation of a revision by the Department of Planning (Cilliers, pers. comm. 2007).

To strategically rezone under a GLEP review, selected areas for revision are subject to an environmental study and contaminated site review. Consultation is also undertaken with the community, landholders and other government agencies, which is taken into consideration by the Minister of Planning prior to a determination. The process for strategic rezoning is lengthy and can take several years.

A revised GLEP could be certified under the 'biodiversity certification' scheme administered by DECC as an environmental planning instrument that seeks to 'improve and maintain' biodiversity values, particularly for threatened species as this is the key purpose of offsets.

▪ **Spot Rezoning**

Spot rezoning involves a revision of a parcel of land independent of the GLEP and the land use objectives of the surrounding region. The process is the same as strategic rezoning; however, as it does not require consideration of strategic land use planning objectives of the whole shire, it can be completed relatively quickly once consultation has been completed.

Council has indicated that rezoning offsets to 7(v) Environmental Protection (scenic) will offer the highest level of long term protection at the local government level (Cilliers, pers. comm. 2007). As rezoning requires State government approval, the threat of rezoning offsets from 7(v) Environment Protection (scenic) to allow development in the future is minimised if appropriate planning tools are put in place to ensure the government agencies are aware offsets are to be comprehensively protected and managed.

Regardless of whether strategic or spot rezoning is adopted, due consideration must be given to landholders. Several large potential offsets to the north of the proposed development site are privately owned. In the event that losing the opportunity to develop is against the wishes of a landholder, Council will need to negotiate with the landholder to come to an agreement that is beneficial for both parties, to ensure appropriate offsets are established and protected.

Rezoning should be used in conjunction with other options to ensure offsets are protected from inception and to make certain Council delivers positive management actions on selected offsets, regardless of land tenure.

10.4.2 Development Control Plans

Development Control Plans (DCPs) support land use planning documents such as Regional Environment plans and Local Environment Plans by providing detailed guidelines for the determination of development applications. The *EP&A Act* allows for the preparation of DCPs and confers a legal responsibility to planning authorities to consider them in the determination of development applications (Fallding *et al.*, 2001).

DCPs outline the criteria by which an application for development is assessed. In relation to offsets, development control plans would notify the public of the purpose of

offsets and ensure landholders, developers and Council staff, are alerted, if a development application is submitted that may potentially affect an offset.

The onus is on Council to ensure the conditions set down in DCPs are upheld. The effectiveness of DCPs may be undermined by the lack of redundancy with other environmental and planning agencies. As Council is able to repeal DCPs, other agencies must be made aware of the existence of a DCP related to an offset and if an application for development is submitted for the parcel of land in question. A formal framework would therefore be necessary for the lifetime of the offsets.

10.4.3 Conditional Approval

Conditional approval may be given by the Department of Planning, whereby ensuring long term protection for offsets would be a condition under which the proposed development is approved. Conditional approval would require a legally binding framework that is both robust and appropriate to ensure offsets are protected beyond the lifespan of the proposed development.

10.4.4 Acquisition

The proposed offsets cover a range of land tenures. Some of the remnant vegetation identified is on Crown land, which Council custodian of or it is leased to private landholders for grazing and cropping purposes. Council may be able to acquire the leases attached to crown land and implement environmental management practices consistent with an offset.

To the north of Tharbogang, several large offsets are privately owned. Acquiring land through purchase negates the need to negotiate with a private landholder or government agency in order to establish, protect and manage offsets. The acquisition of land would allow Council to have full control over offsets, allowing further measures such as rezoning to be implemented without the need to negotiate with landholders. However the upfront cost of acquiring land would be significant.

Acquiring land is executed through an agreement or a compulsory process under the *Local Government Act 1993* or *Roads Act 1993*. Compulsory acquisition requires prior approval by the Department of Lands or the Department of Infrastructure, in addition to approval from the Governor of NSW on the recommendation of the Minister for Local Government. An acquisition is not finalised until just compensation is provided and it is advertised in the Government Gazette.

Compulsory acquisition of land is applicable to private tenure and crown land and must include just terms of compensation. Just compensation takes into account market value, special financial value, losses attributable to severance and disturbance of acquisition, and compensation for non-financial disadvantage. Negotiating a sale agreement is generally less costly and time consuming than compulsory acquisition.

10.4.5 Covenants and Easements

A registered covenant can be attached to a property title relatively quickly, in some cases within a few weeks. Once a registered covenant is entered into Council would be able to identify the land as being part of an offset and therefore subject to development restrictions, so long as effective governance is in place.

Establishing offsets by utilising covenants provides interim protection from development until more rigorous and enforceable protection can be afforded, for example rezoning or a conservation agreement (see section 10.5.4) both of which can take considerable time to formalise. By making use of covenants Council would demonstrate a commitment to protecting the conservation values of offsets in the short term. In addition, a covenant would stay on the title for the life of the offset and provide supplementary protection.

Having the support of landholders is a key factor in making certain a covenant or easement on privately held land is effective. Council is able to place a covenant on private land without the permission of the landholder or the input of other government agencies, however, due consideration through a process of consultation should be undertaken to engage with landholders and secure ongoing support for offsets.

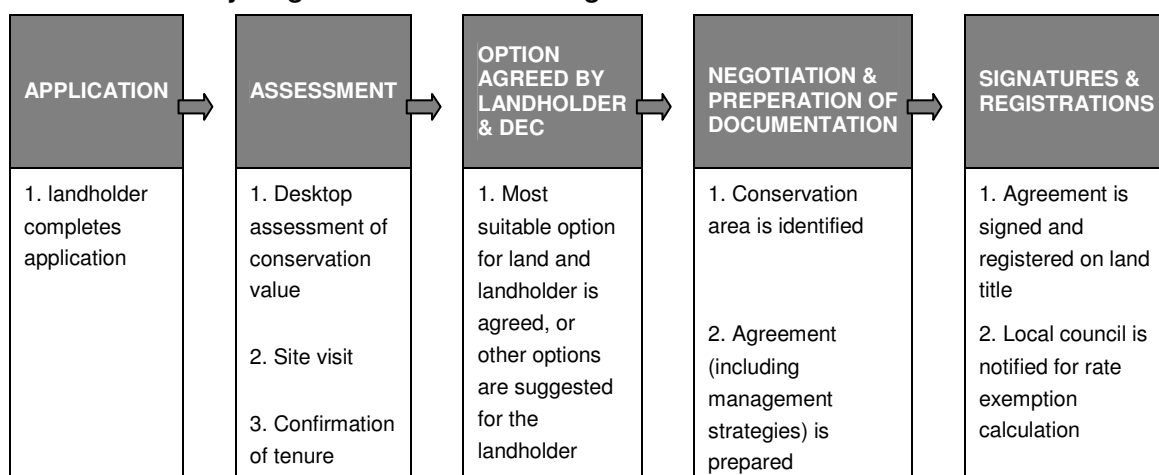
10.4.6 Conservation Agreements

A conservation agreement is a joint agreement between landholders and the Environment Minister NSW for permanent protection for special features on a privately owned property. It is a voluntary agreement which is registered on the land title ensuring long term protection if the land is sold and generally appeals to landholders with a strong environmental ethic who want the special features of their property protected after they leave it. The area under the agreement is registered on the title of the land ensuring that if the land is sold, the agreement and management requirements remain in place.

Although the landholder is responsible for ongoing management of the land, assistance is often provided in the form of planning advice, surveying and assessment assistance, practical advice about conservation strategies, links and contacts with likeminded people, signage, access to education programs and assistance programs to support implementation, and tax and/or rate relief.

Conservation agreements are administered and managed by NPWS under the *National Parks and Wildlife (NPW) Act 1974*. NPWS assess the environmental values of the proposed area and will enter into an agreement if those values are compatible with their conservation objectives. An agreement can be made over any land tenure, such as private, state forest, council and crown land. The key stages of establishing a conservation agreement are outlined in **Table 10.3**.

Table 10.3: Key stages of a conservation agreement



For a conservation agreement to be effective, the landholder must independently agree to the terms of the agreement as laid down by NPWS, and be committed to, and take responsibility for, managing the land. An agreement is binding to the landholder and enforced under the *NPW Act*, with judiciary sanction through the *Lands and Environment Court*, and is attached to the property title. It would only be removed in extreme cases where both the owner and Minister agree (Bennett, 2000).

10.4.7 Incentives

Incentives acknowledge the important contribution towards the conservation of biodiversity by private landholders. Encouraging good land management practices that conserve native vegetation and habitat in the long term, and in accordance with the objectives of offsets, will likely require the use of incentives. Grants, rebates, technical support, community recognition, development bonuses, management agreements, and special rates may encourage private landholders to participate in protecting offsets in the event Council is unable to acquire selected offsets.

The use of incentives is voluntary and requires the support of the landholder, much like a conservation agreement, and a package of different incentive measures is more likely to be effective than one measure applied in isolation. The emphasis of incentives depends on who should bear the cost of biodiversity initiatives and who will benefit (Fallding *et al.* 2007). With regards to protecting offsets Council, as proponent of the proposed development, is required to demonstrate its financial commitment for the benefit of the wider region.

Incentive measures complement regulatory controls and need to be integrated with other mechanisms to ensure a framework is in place that will control development and monitor ongoing management.

10.5 Options for Ongoing Management

A requirement of establishing offsets is implementing management actions to 'improve and maintain' vegetation condition and habitat quality. Enhancing the landscape will increase biodiversity values and overall condition of a remnant and have positive flow-on effects for all fauna (Freudenberger, 2001). Choosing an appropriate schedule of ongoing management practices should focus on achieving positive outcomes from management with due consideration given to the timeframe and resources available.

The vegetation management plan will also involve the consultation of adjacent landholders to help ensure that adjacent land use practices do not negatively impact on offsets, or if they do, that they can be mitigated.

10.5.1 Management Plan

A management plan is essential to ensure ongoing management actions are effective. It lays down the measures that need to be undertaken to manage vegetation and human activities. The objectives and actions of the plan would be incorporated into the provisions of the GLEP, giving it a framework for implementation. Consultation with affected landholders should also be undertaken as part of the development of a management plan to ensure adjacent and/or nearby land use practices do not negatively impact on offsets, or if they do, that they can be mitigated.

10.5.1.1 Regeneration and Enhancement

A number of the 54 potential offsets put forward by Council are degraded roadside and paddock corridors, cleared paddocks and low quality patches of remnant vegetation. Although the priority for selecting offsets is to protect and manage existing remnants of high quality Bimble Box-Pine, some degraded land will also be set aside for revegetation and enhancement to improve the connectivity between valuable offsets and other protected remnants.

Areas selected as offsets that are cleared of vegetation and have not experienced natural revegetation will require intensive revegetation, including the collection of seeds endemic to the area, cultivation of seedlings, replanting, control of pests and native browsers, weed control, watering and monitoring of progress. Revegetating cleared land is labour intensive, slow to establish and not always successful, particularly in arid and semi arid regions such as Griffith (Grabham, pers. comm. 2007).

10.5.1.2 Grazing Control

Grazing control and strategic stock exclusion is a key management action in the grassy woodlands of Western NSW. Remnants in this region have been extensively grazed by domestic stock since European settlement. Over grazing will reduce seedling regeneration, root growth, biomass and nutrient uptake by groundcovers (Eldridge *et al.* 2003).

Stock exclusion allows natural regeneration of understorey species such as grasses, shrubs and perennials. The implementation of stock exclusion in areas within the region has shown some improvement in vegetation quality. In Cocoparra National Park stock exclusion and regeneration works have resulted in a progressive increase in vegetation density (NPWS 1996).

In certain circumstances, strategic grazing can protect and enhance existing vegetation as it stimulates plant growth through mobilisation and redistribution of resources. Stock numbers would need to be strictly controlled if grazing was to continue and grazing exclusion plots should be established to monitor the ongoing effects of controlled grazing.

Grazing is currently undertaken in a number of potential offsets, including private, Council and Crown land (see table provided in **Appendix B**). Due consideration to pastoral rights will be necessary to negotiate effective stock exclusion in a selected offsets and fencing may be required to ensure stock in adjacent lots do not graze within the offset.

10.5.1.3 Targeted Weed Control

Environmental and noxious weeds greatly reduce the quality of native remnants and are an ongoing problem in the region. The edges of remnants are hotspots for the establishment and spread of weeds, and as they dry off in the summer weeds become a significant fire hazard (Toscan, 2000). The removal of noxious weeds such as Boxthorn and Horehound should be a priority in selected offsets.

10.5.1.4 Vermin Control

Vermin predate on native fauna and browse on native flora. Controlling vermin is difficult as even if species are eradicated from an area, it is quickly recolonised. Further, the successful eradication of one introduced species may reduce predation and increase the population of another introduced species. Despite the limitations, Council is still obliged to control vermin.

Barrier fencing combined with control techniques such as baiting, trapping and shooting has proven to be effective for feral cat *felis catus* and European fox *Vulpes vulpes*. In large and disperse remnants such as the proposed offsets, fencing is not necessarily an option and therefore these control techniques will have limited impact on populations of feral predators.

In areas where threatened species have been identified, greater effort should be put into the control of feral predators, with ongoing monitoring of numbers and the impact of control measures on vegetation and native species.

10.5.1.5 Browser Control

Native browsers, such as kangaroos, naturally inhabit remnant vegetation with an established, tall grassy understorey. Mature remnants provide adequate foraging opportunities for a diversity of fauna. In contrast, newly revegetated areas may encourage over grazing by native browsers as a significant food source without the competition for habitat with other species, particularly in drought conditions.

Appropriate and adequate measures will need to be put in place to control grazing by native browsers in newly revegetated patches and/or corridors that form part of an offset, to ensure seedlings have an opportunity to re-establish.

10.5.1.6 Managing Salinity

Rising water tables and salinity in the Murrumbidgee Catchment is a significant issue, causing tree death and salt scads to form in some areas (Toscan 2000). Extensive land clearing for agriculture in conjunction with irrigation and seepage from irrigation channels are the root causes of salinity and tree loss.

Although some of the offsets proposed by Council are on rocky outcrops or the ridgeline of McPhersons Range, others are on flat arable land and surrounded by agriculture. Tree loss from salinisation is therefore a concern in low lying offsets that should be managed to ensure the biodiversity values are maintained. Managing water tables and groundwater recharge is imperative. In selected offsets suffering from, or prone, to salinity maintaining existing vegetation and / or planting salt resistance native plants will provide groundcover and a root system that can utilise water before it recharges groundwater.

10.5.1.7 Fire Management

Ecological fire management is a key management action for maintaining biodiversity values over extended periods. Fire is a management tool that can be used to control exotic pasture species and promote regeneration of some indigenous flora species (DSE 2005). The intensity and frequency of burns are critical as the tolerance of plants differs considerably.

A fire management regime will need to be implemented on all offsets across all tenures and guidelines of fire management should be built at a property scale so it can be specifically tailored to the vegetation onsite. A fire management plan for selected offsets should be consistent with the principles and objectives of regional bushfire plans and have the support of landholders and relevant government agencies, including emergency services.

10.5.1.8 Managing Human Use

Managing human use is an important aspect of a management plan. Individuals and groups may utilise selected offsets for recreation, research, special interests, or commercial interests. Acquiring the support of stakeholders is essential if they are to conform to the overarching aim of offsets. Consultation throughout the implementation of offsets will be necessary, as will ongoing support to stakeholders involved with management.

The capacity of semi arid to arid regions to sustain heavy visitor use is low as vegetation is slow to regenerate due to the dry climate (NPWS 1996). It is therefore important that regulatory controls are adhered to through compliance and enforcement measures. Complementary measures include appropriate signage, education, encouraging voluntary codes of practice for recreational use, incentives to landholders, and engaging with school groups and special interest groups to promote biodiversity values.

10.5.2 Monitoring

A long term monitoring program will be implemented as part of Council's statement of commitments to protecting and managing offsets. The following indicators, at least, should be monitored in selected offsets:

- Threatened species populations and available habitat
- Indicator species
- Revegetated areas for signs of distress
- Grazing
- Weed infestations and spread
- Vermin and native browser (if applicable) populations and impacts
- Fuel loads
- Human activities and impacts

The provision of compliance and enforcement measures should be considered.

11 Recommendations

The following recommendations form the basis of Council's commitment to identifying, protecting and managing selected offsets:

- 1 Offsets are to be secured to achieve an 'improve and maintain' outcome, which is currently considered to be 27ha of Bimble Box-Pine and 10.6ha of Dwyers Red Gum-Currawang
- 2 Offsets will be 'like for like' with regards to vegetation type and condition, unless the conservation value of the vegetation is higher than what will be cleared
 - a. If the vegetation condition of the offset is of lesser quality than the proposed development, the size of the offset will need to increase proportionally
- 3 Revegetation is to be considered where it will significantly improve connectivity and/or the condition of riparian areas and wetlands
- 4 Offsets are to be implemented progressively and proportionally in line with the stages of the proposed development
- 5 Flora and fauna assessments are to be undertaken following project approval to determine the most appropriate offset sites for each stage of the proposed development
- 6 Enduring protection for offsets will be sought through rezoning and/or agreements, in conjunction with other short term protection measures
- 7 Royalties are to be utilised to fund the flora and fauna assessments, implement selected offsets and provide ongoing management including monitoring
- 8 The Griffith LGA Environmental Strategy is to be implemented to support a city wide approach to vegetation maintenance and management

These recommendations will be adopted by Council and have been incorporated into the Statement of Commitments of the *Tharbogang Quarry and Landfill Environmental Assessment* (Section 11).

12 Conclusion

The proposed quarry and landfill development at Tharbogang will provide a long term solution for sourcing road base and construction gravel and disposing of waste in the Griffith LGA. Site design and impact mitigation measures have been incorporated into the project and have considerably reduced the development footprint. Nevertheless, 37.5ha of vegetation will need to be removed to access the quarry resource and will be appropriately offset to maintain and improve the biodiversity values of the region.

The ratio for offsetting has been adopted from the *PVP Developer* results. Offsets will be delivered at a ratio of 1:10ha for Dwyers Red Gum-Currawang communities and 1:12.5ha for Bimble Box-Pine communities. This would equate to the protection and ongoing management of at least 443.5ha of 'like for like' remnant vegetation in the Griffith region, a significant area in a largely cleared landscape.

Council will select offsets on the basis of flora and fauna surveys and in accordance with the principles of offsetting and the priorities of the Murrumbidgee CAP (2006). The focus of offsets will be protecting existing 'like for like' vegetation that is able to support the threatened species identified by the *PVP Developer*. Improving connectivity between existing remnants will also be taken into consideration. Linkages will be enhanced and/or revegetation and incorporated as offsets, although their value as an offset will be low.

The delivery of offsets will be progressive in line with the stages of the proposed development and will be funded through the use of royalties from future gravel extraction. Offsets will be established in a manner that will provide enduring protection and Council will be responsible for negotiating development controls and incorporating those controls into the offset framework to achieve this. The final selection of offsets will be protected and managed by Council to bring about an 'improve and maintain' outcome for the Griffith region.

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Important information about your **Balance** Report

These notes have been prepared by Balance to help you interpret and understand the limitations of your report. They are additional to any limitations noted within the report.

Your report is based on project specific criteria

Your report has been developed on the basis of Balance's understanding of your unique, project-specific requirements, and applies only to the project investigated. If there are any changes to the project subsequent to the date of the report, the report should not be used without first asking Balance to assess how the changes affect the report's recommendations. Balance cannot accept responsibility for problems that may occur due to changed factors if they are not consulted.

Circumstances can change

Because a report is based on conditions which existed at the time of the study, decisions should not be based on a report that may have been rendered inadequate by the passage of time. Consult Balance to be advised how time may have impacted on the project.

Your report will only give preliminary recommendations for proposed developments

Assumptions made during a preliminary assessment cannot be substantiated until project implementation has commenced and therefore your report recommendations can only be regarded as preliminary. Only Balance is fully familiar with the background information needed to assess whether or not the report's recommendations are valid and

whether or not changes should be considered as the project develops. If another party undertakes the implementation of the recommendations of this report there is a risk that the report will be misinterpreted and Balance cannot be held responsible for such misinterpretation.

Your report is prepared for specific purposes and persons

To avoid misuse of the information contained in your report it is recommended that you confer with Balance before passing your report on to another party who may not be familiar with the background and the purpose of the report. Your report should not be applied to any project other than that originally specified at the time the report was issued.

Interpretation by other professionals

Costly problems can occur when other consultants develop their plans based on misinterpretations of a report. To help avoid misinterpretations, retain Balance to work with other project design professionals who are affected by the report. Have Balance explain the report implications to design professionals affected by them and then review plans and specifications produced to see how Balance's report findings have been incorporated.

Important information about your **Balance** Report

Data should not be separated from the report

The report as a whole presents the findings of the study and the report should not be copied in part or altered in any way. Figures, drawings etc. are customarily included in our reports and are developed by our consultants based on their interpretation of the circumstances. This information should not, under any circumstances, be redrawn for inclusion in other documents or separated from the report in any way.

Rely on Balance for additional assistance

Balance is familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties involved with a project, from design through to development. It is common that not all approaches will necessarily be examined in your report due to concepts proposed at that time. If problems are encountered as the project progresses through design toward development, speaking with Balance about alternative approaches may be of genuine benefit both in terms of time and cost.

Third party and client data

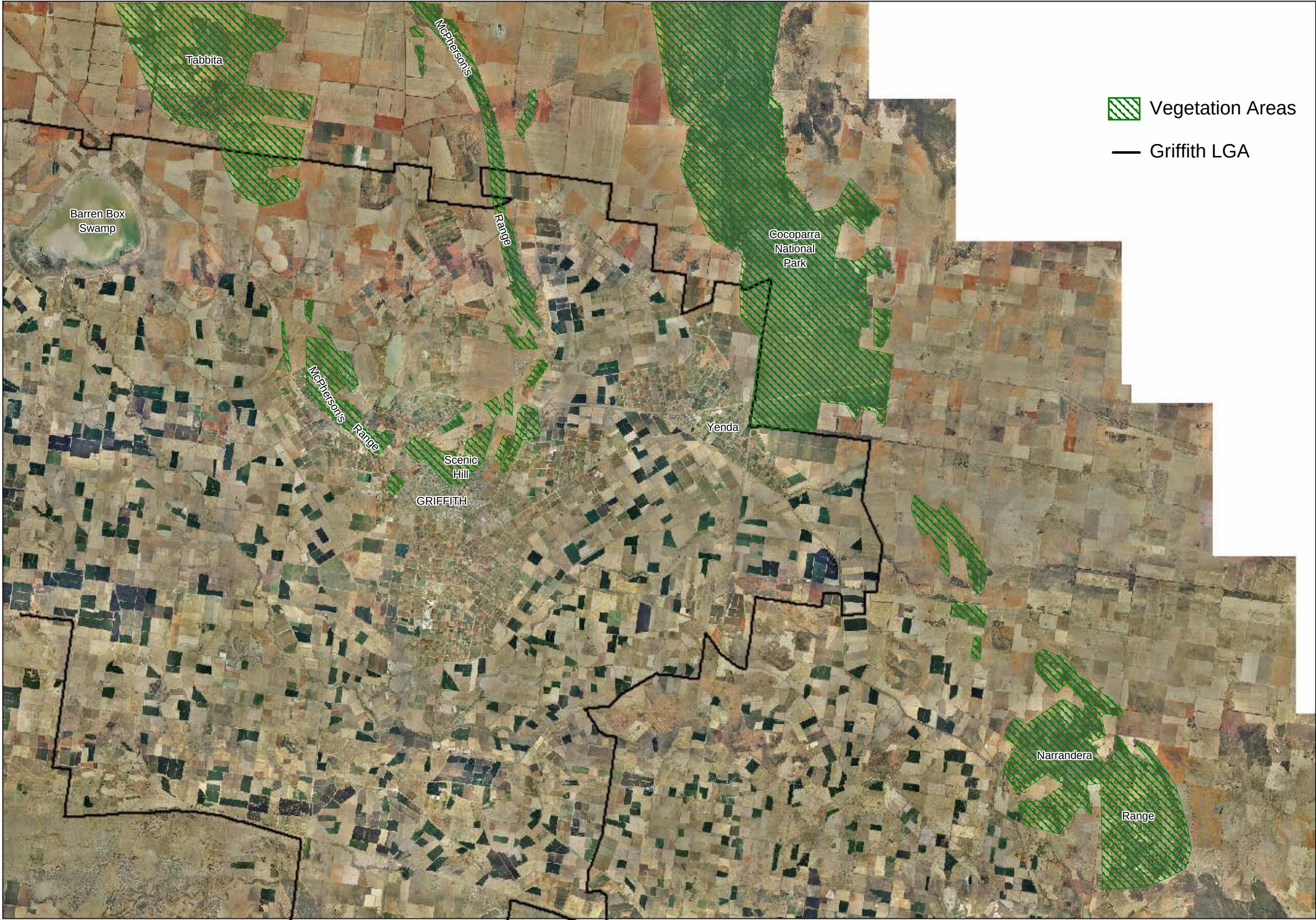
Balance may have used or relied upon information provided by the client or by third parties. Unless specifically included in Balance's scope of services, Balance has not checked or verified the accuracy of such information.

Responsibility

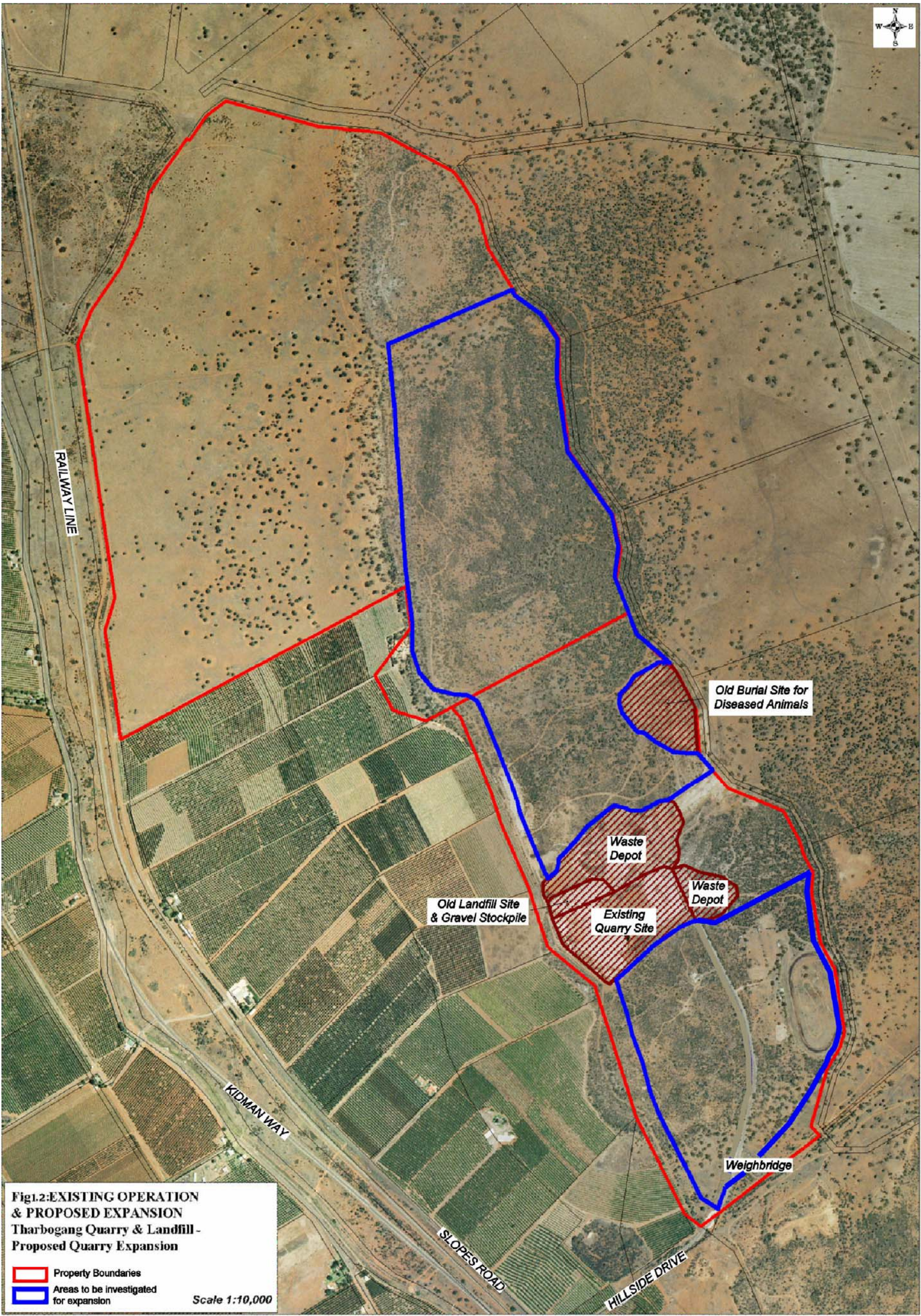
Reporting relies on interpretation of factual information based on judgement and opinion, and has a level of uncertainty attached to it that makes it far less exact than the design disciplines. This has often resulted in unfounded claims being lodged against consultants. To help prevent this problem, a number of clauses have been developed for use in contracts, reports and other documents. Responsibility clauses do not transfer appropriate liabilities from Balance to other parties but are included to identify where Balance's responsibilities begin and end.

Their use is intended to help all parties involved to recognise their individual responsibilities. Read all documents from Balance closely and do not hesitate to ask any questions you may have.

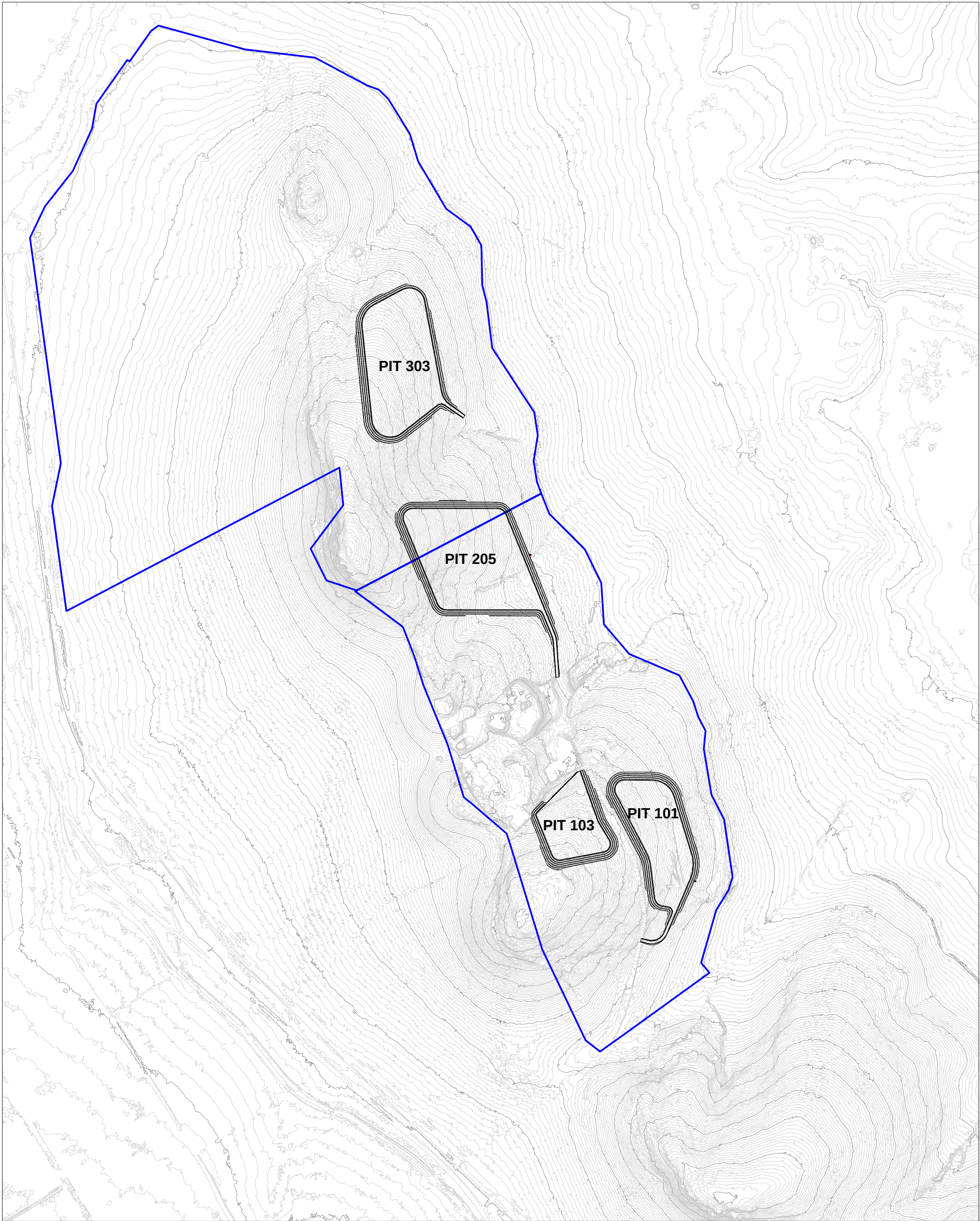
Figures



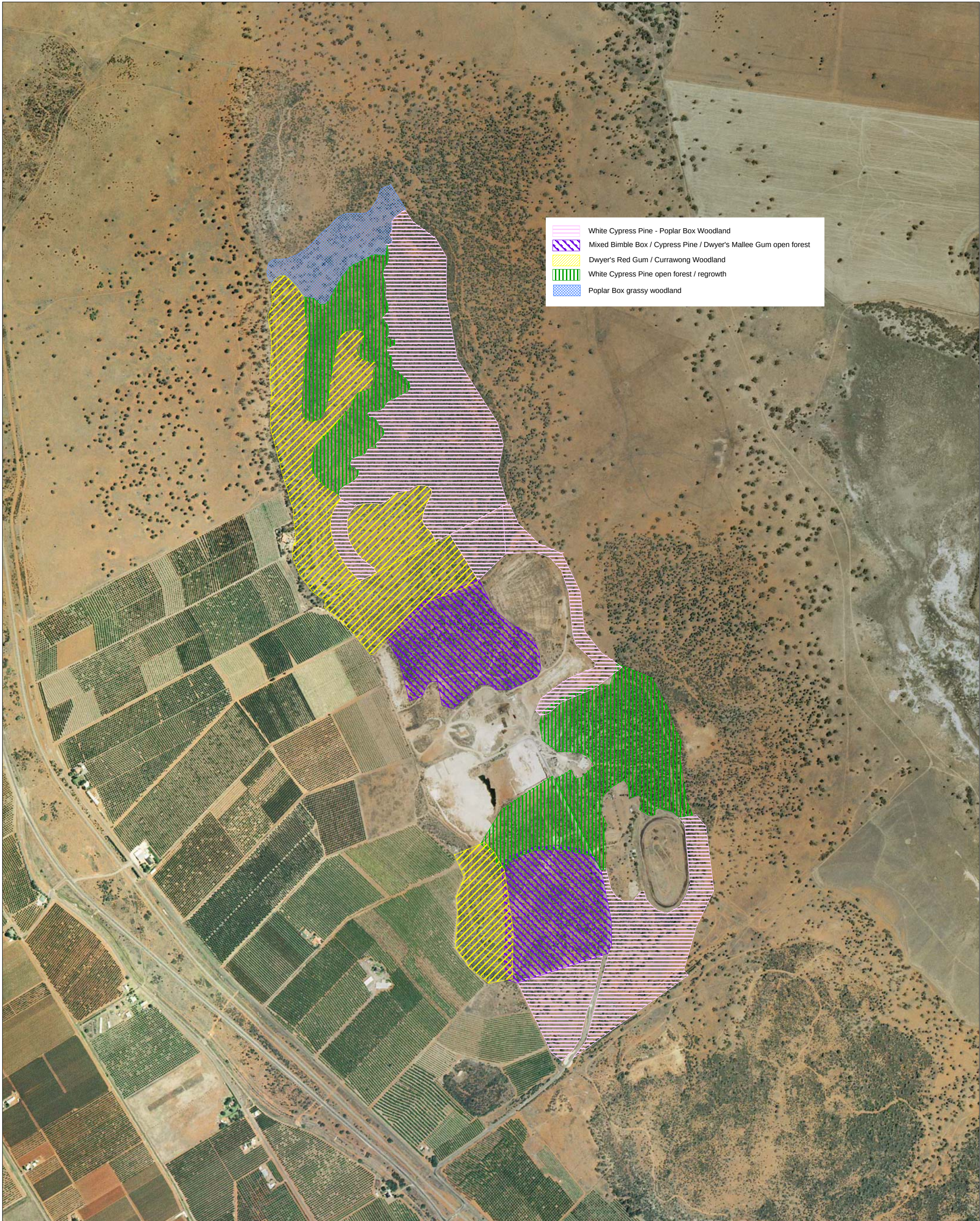
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						JP		project:	THARBOGANG QUARRY & LANDFILL PROPOSED QUARRY EXPANSION	
						12.09.07		title:	VEGETATION AREAS OF GRIFFITH LGA	
						Not to scale		project no:	HE00002/01	figure no: FIGURE 4.2
						A4				



drawn	MH	balance SPECIALISTS IN RISK AND OPPORTUNITY MANAGEMENT	client:	GRIFFITH CITY COUNCIL	
approved	JP		project:	THARBOGANG QUARRY & LANDFILL PROPOSED QUARRY EXPANSION	
date	08.02.08		title:	PROPOSED DEVELOPMENT SITE	
scale	NTS		project no:	BALANTWN00002BA	figure no: FIGURE 5.1
original size	A3				



drawn	MH	balance SPECIALISTS IN RISK AND OPPORTUNITY MANAGEMENT	client:	GRIFFITH CITY COUNCIL	
approved	JP		project:	THARBOGANG QUARRY & LANDFILL PROPOSED QUARRY EXPANSION	
date	26.02.08		title:	DEVELOPMENT FOOTPRINT	
scale	NTS		project no:	BALANTWN00002BA	figure no:
original size	A3				FIGURE 5.2

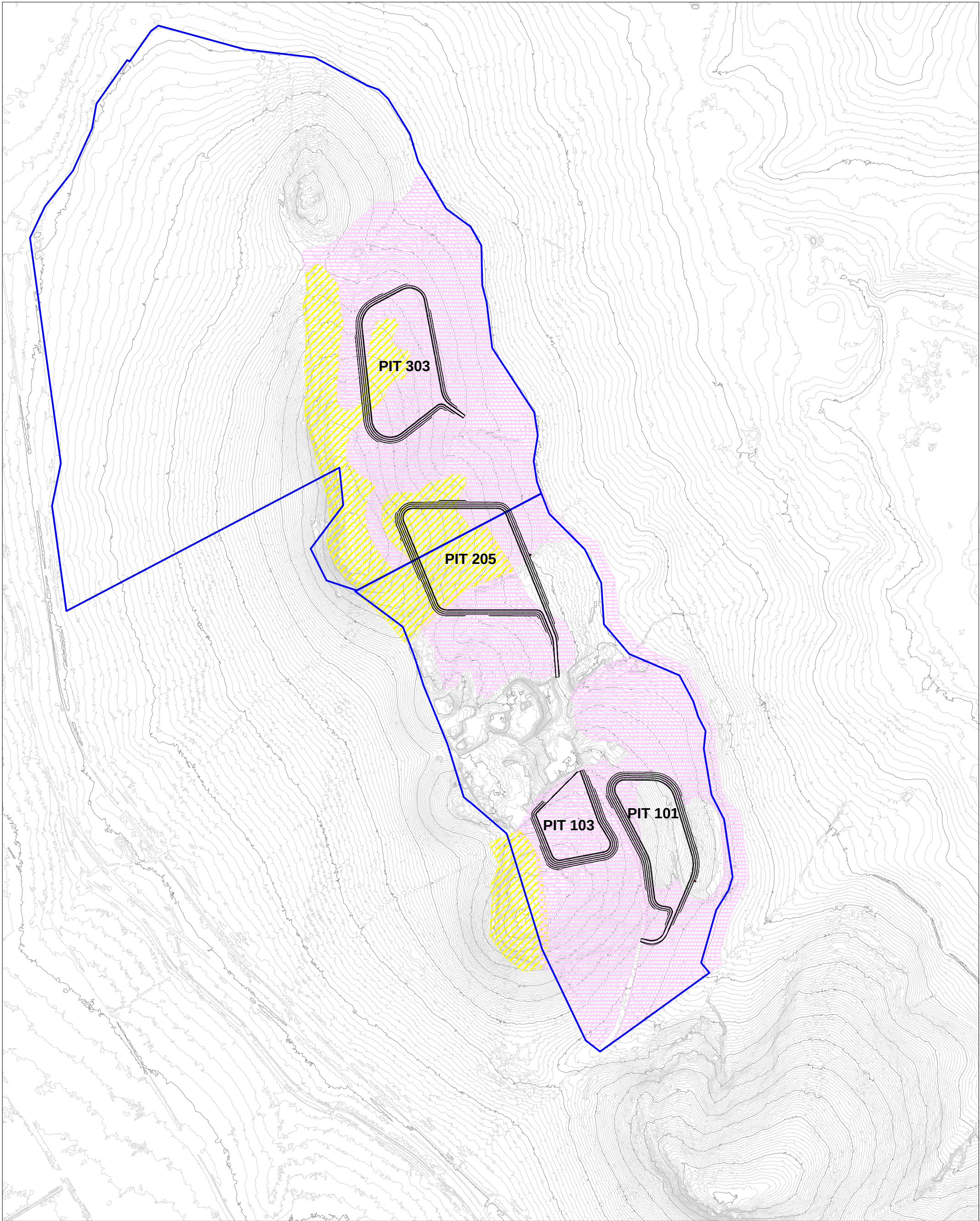


drawn	MH
approved	JP
date	15/01/08
scale	NTS
original size	A3

balance

SPECIALISTS IN RISK AND
OPPORTUNITY MANAGEMENT

client:	GRIFFITH CITY COUNCIL	
project:	THARBOGANG QUARRY & LANDFILL PROPOSED QUARRY EXPANSION	
title:	VEGETATION TYPES	
project no:	HE00002/01	figure no: FIGURE 6.1



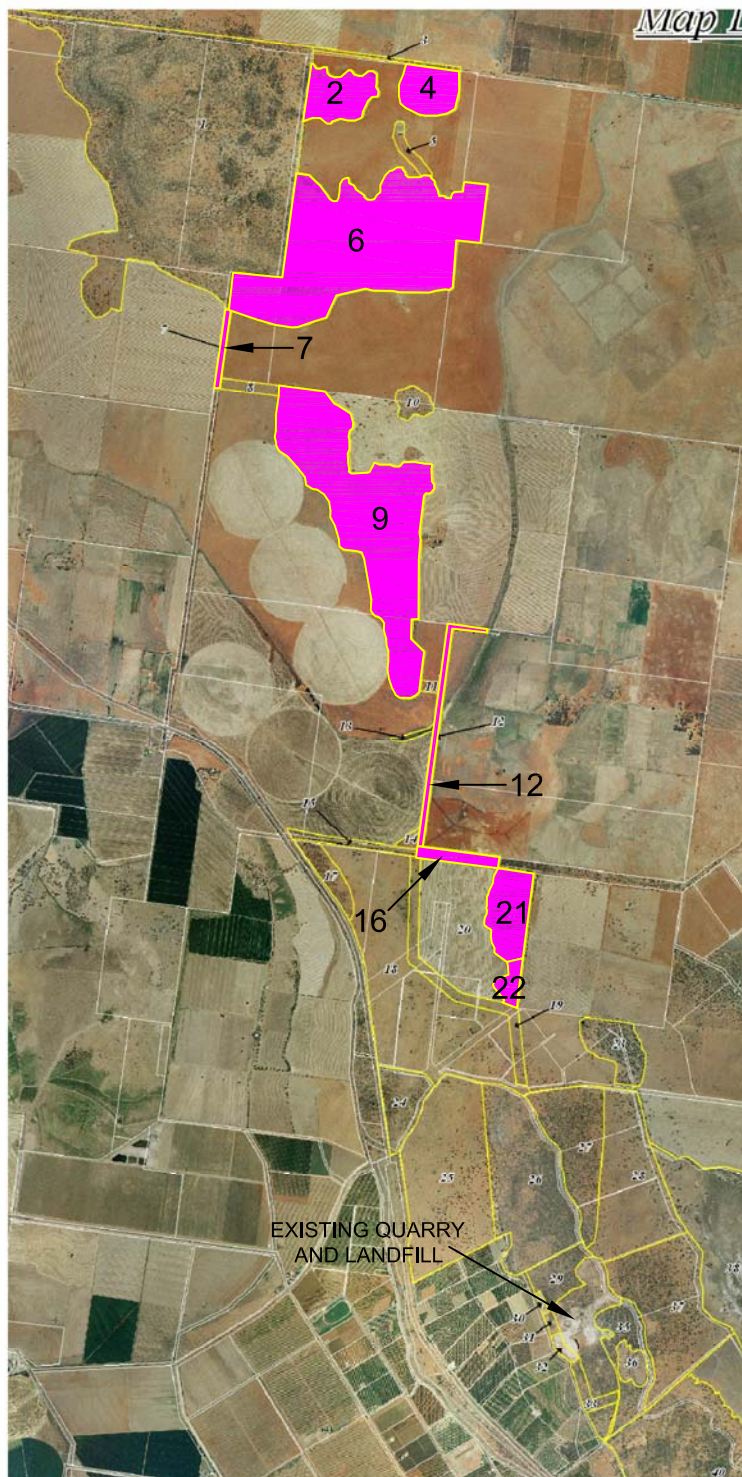
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approved	JP
date	26.02.08
scale	NTS
original size	A3

balance



SPECIALISTS IN RISK AND
OPPORTUNITY MANAGEMENT

client: GRIFFITH CITY COUNCIL	
project: THARBOGANG QUARRY & LANDFILL PROPOSED QUARRY EXPANSION	
title: DEVELOPMENT FOOTPRINT AND VEGETATION COMMUNITIES	
project no: BALANTWN00002BA	figure no: FIGURE 8.1



drawn	MH	balance  SPECIALISTS IN RISK AND OPPORTUNITY MANAGEMENT	client:	GRIFFITH CITY COUNCIL	
approved	JP		project:	THARBOGANG QUARRY & LANDFILL OFFSET STRATEGY	
date	20.12.07		title:	SITES PROPOSED FOR FLORA AND FAUNA ASSESSMENTS	
scale	1:50 000		project no:	BALANTWN0002AA	figure no: FIGURE 10.1
original size	A4				

Appendix A

PVP Developer Results and Assumptions

Threatened Species Assessment Tool - Development PVP

Version 1.9 profile_2-0.mdb

Mode of operation:

Case number:

Choose CMA Region:

(select from drop-down box)

Enter number of separate
vegetation zones to be cleared:

Prepare and print field data sheet(s)

Tharbogang (Veg IRH)

Murrumbidgee

MR

1

Choose a sub-region name and enter the details for each vegetation zone.

Choose CMA Sub-Region:

Lachlan Plains

773

(select from drop-down box after identifying sub-region using PVP Mapper tool & CMA sub-region spatial layer)

**Vegetation Zone
Poly ID**

IRH

Vegetation Type

#Inland Rocky Hill Woodlands#

#N/A

Condition

Moderate to
good condition

Printable data sheet for Threatened Species for Clearing. Case Number: Tharbogang (Veg IRH) Zone: IRH

CMA: Murrumbidgee

CMA Sub-region: Lachlan Plains

Recorder/s _____

Date of assessment: _____

Present / absent	Habitat attribute	Relevant vegetation types	Relevant species	Notes
	Allocasuarina or Casuarina	Inland Rocky Hill Woodlands	Glossy Black-cockatoo Riverina Population	
	as for breeding and in globular bird nests or possum dreys	Inland Rocky Hill Woodlands	Brush-tailed Phascogale	
	As per breeding habitat with foodplants such as (but not limited to) Acacia, Cassia, Beyeria and Bossiaea	Inland Rocky Hill Woodlands	Malleefowl	
	As per veg types and upto 250 m from these in grasslands	Inland Rocky Hill Woodlands	Barking Owl	
	As per veg types with 5 or more mistletoes per hectare	Inland Rocky Hill Woodlands	Painted Honeyeater	
	As per veg types with more than 5 mistletoes per ha	Inland Rocky Hill Woodlands	Painted Honeyeater	
	As per veg types with native grassy understorey or adjoining native grassland. Not within grasslands which are further than 1.5 km from trees or woodland.	Inland Rocky Hill Woodlands	Diamond Firetail	
	As per veg types with relatively intact understorey	Inland Rocky Hill Woodlands	Malleefowl	
	As per veg types, but requires some small patches of shrubs.	Inland Rocky Hill Woodlands	Diamond Firetail	
	As per vegetation types where trees are present.	Inland Rocky Hill Woodlands	Inland Forest Bat	
	Eremophilas, grevilleas, mistletoes, chenopods with succulent fruit	Inland Rocky Hill Woodlands	Pied Honeyeater	
	Forages among and under spinifex clumps and shrubs and in open areas	Inland Rocky Hill Woodlands	Chestnut Quail-thrush	
	Hollows >3 cm wide in live trees or in dead standing or fallen timber	Inland Rocky Hill Woodlands	White-browed Treecreeper Endangered Population	
	Hollows greater than 5 cm diameter in living or dead trees, hollow logs, fence posts or stumps that are no more than 100 m from vegetation that has a canopy cover of not less than 50% of the mean benchmark for that Vegetation Type.	Inland Rocky Hill Woodlands	Turquoise Parrot	
	In trees - under bark, in fissures and creases or in hollows.	Inland Rocky Hill Woodlands	Greater Long-eared Bat (south eastern form)	
	Includes mallee on sandy soils that has been burnt as recently as four years ago through to old-growth.	Inland Rocky Hill Woodlands	Chestnut Quail-thrush	
	Likely to be as per roosting habitat	Inland Rocky Hill Woodlands	Inland Forest Bat	
	Living or dead trees with hollows >20 cm diameter that are > 4 m above the ground.	Inland Rocky Hill Woodlands	Barking Owl	
	Living trees	Inland Rocky Hill Woodlands	Barking Owl	
	Mallee or woodland with shrubby understorey, or shrubland as per veg types. Also in Callitris woodland.	Inland Rocky Hill Woodlands	Gilbert's Whistler	

	Only breeds in Murrumbidgee, Murrumbidgee, Upper Slopes & Lower Slopes Sub-regions. Text is lengthy - see circulated hard copy or DECC CoP Website for details of breeding habitat.	Inland Rocky Hill Woodlands	Superb Parrot	
	open forest or woodland as per veg. type; prefer large trees (>60 cm DBH); uses patches <1 ha if within 150 m of other patches in floodplain box & riverine woodlands; landscape sizes >25ha in dry forests and ridges	Inland Rocky Hill Woodlands	Brush-tailed Phascogale	
	Open grassy woodland with fallen dead timber, leaf litter as per veg types	Inland Rocky Hill Woodlands	Bush Stone-curlew	
	Open woodland with fallen or standing dead timber	Inland Rocky Hill Woodlands	White-browed Treecreeper Endangered Population	
	Roost in hollows, fissures or cracks in live or dead trees (including trees less than 5m tall); also roost in buildings.	Inland Rocky Hill Woodlands	Inland Forest Bat	
	Roosts in trees under bark, in fissures and creases and in hollows.	Inland Rocky Hill Woodlands	Greater Long-eared Bat (south eastern form)	
	Text is lengthy - see circulated hard copy or DECC CoP Website for details.	Inland Rocky Hill Woodlands	Superb Parrot	
	Tree hollow with minimum diameter of 15 cm	Inland Rocky Hill Woodlands	Glossy Black-cockatoo Riverina Population	
	Tree hollow with minimum entrance diameter of 10 cm and located more than 2 m above the ground.	Inland Rocky Hill Woodlands	Pink Cockatoo	
	Tree hollows, fissures or cracks, buildings, powerpoles, fenceposts, caves, cliff crevices, mine shafts, tunnels, for roosting.	Inland Rocky Hill Woodlands	Little Pied Bat	
	Tree hollows, fissures or cracks, buildings, powerpoles, fenceposts, caves, cliff crevices, mine shafts, tunnels.	Inland Rocky Hill Woodlands	Little Pied Bat	
	Tree hollows, logs or stumps with entrances > 2.5 cm wide for nesting and sheltering; most abundant where there are > 2 trees per ha > 60cm DBH; nest trees are typically large (>80 cm DBH) but can be as small as 25cm DBH	Inland Rocky Hill Woodlands	Brush-tailed Phascogale	
	Trees for roosting	Inland Rocky Hill Woodlands	Malleefowl	
	Trees with stick and twig nests. Mature trees within 100 m of permanent and ephemeral watercourses.	Inland Rocky Hill Woodlands	Square-tailed Kite	
	Trees, dead or alive, containing stick nests such as those of raptors, crows and ravens.	Inland Rocky Hill Woodlands	Grey Falcon	
	Woodland or open forest and adjoining open areas including grassland and shrubland up to 250 m from vegetation that has a canopy cover of not less than 50% of the mean benchmark for that Vegetation Type.	Inland Rocky Hill Woodlands	Turquoise Parrot	
	Woodland, mallee or open forest with occasional to frequent patches of trees or shrubs with open areas of native grasses and fallen or standing dead timber.	Inland Rocky Hill Woodlands	Hooded Robin (south-eastern form)	

Threatened Species Assessment Tool - Development PVP

Version 1.9 profile_2-0.mdb

Mode of operation:

Case number:

Choose CMA Region:

(select from drop-down box)

Enter number of separate
vegetation zones to be cleared:

Prepare and print field data sheet(s)

Tharbogang (Veg BB-CP)

Murrumbidgee

MR

1

Choose a sub-region name and enter the details for each vegetation zone.

Choose CMA Sub-Region:

Lachlan Plains

773

(select from drop-down box after identifying sub-region using PVP Mapper tool & CMA sub-region spatial layer)

Vegetation Zone

Poly ID

BB-CP

Vegetation Type

#Western Peneplain Woodlands#

#N/A

Condition

Moderate to
good condition

Printable data sheet for Threatened Species for Clearing. Case Number: Tharbogang (Veg BB-CP) Zone: BB-CP

CMA: MurrumbidgeeCMA Sub-region: Lachlan Plains

Recorder/s _____Date of assessment: _____

Present / absent	Habitat attribute	Relevant vegetation types	Relevant species	Notes
	Allocasuarina or Casuarina	Western Peneplain Woodlands	Glossy Black-cockatoo Riverina Population	
	As per breeding habitat with foodplants such as (but not limited to) Acacia, Cassia, Beyeria and Bossiaea	Western Peneplain Woodlands	Malleefowl	
	As per veg types and upto 250 m from these in grasslands	Western Peneplain Woodlands	Barking Owl	
	As per veg types with 5 or more mistletoes per hectare	Western Peneplain Woodlands	Painted Honeyeater	
	As per veg types with more than 5 mistletoes per ha	Western Peneplain Woodlands	Painted Honeyeater	
	As per veg types with native grassy understorey or adjoining native grassland. Not within grasslands which are further than 1.5 km from trees or woodland.	Western Peneplain Woodlands	Diamond Firetail	
	As per veg types with relatively intact understorey	Western Peneplain Woodlands	Malleefowl	
	As per veg types, but requires some small patches of shrubs.	Western Peneplain Woodlands	Diamond Firetail	
	As per vegetation types where trees are present.	Western Peneplain Woodlands	Inland Forest Bat	
	Forages among and under spinifex clumps and shrubs and in open areas	Western Peneplain Woodlands	Chestnut Quail-thrush	
	Hollows >3 cm wide in live trees or in dead standing or fallen timber	Western Peneplain Woodlands	White-browed Treecreeper Endangered Population	
	Hollows greater than 5 cm diameter in living or dead trees, hollow logs, fence posts or stumps that are no more than 100 m from vegetation that has a canopy cover of not less than 50% of the mean benchmark for that Vegetation Type.	Western Peneplain Woodlands	Turquoise Parrot	
	In trees - under bark, in fissures and creases or in hollows.	Western Peneplain Woodlands	Greater Long-eared Bat (south eastern form)	
	Includes mallee on sandy soils that has been burnt as recently as four years ago through to old-growth.	Western Peneplain Woodlands	Chestnut Quail-thrush	
	Includes open bare ground, shrubs or grass tussocks	Western Peneplain Woodlands	Australian Bustard	
	Likely to be as per roosting habitat	Western Peneplain Woodlands	Inland Forest Bat	
	Living or dead trees with hollows >20 cm diameter that are > 4 m above the ground.	Western Peneplain Woodlands	Barking Owl	
	Living trees	Western Peneplain Woodlands	Barking Owl	
	Mallee or woodland with shrubby understorey, or shrubland as per veg types. Also in Callitris woodland.	Western Peneplain Woodlands	Gilbert's Whistler	
	Only breeds in Murrumbateman, Murrumbidgee, Upper Slopes & Lower Slopes Sub-regions. Text is lengthy - see circulated hard copy or DECC CoP Website for details of breeding habitat.	Western Peneplain Woodlands	Superb Parrot	

	Open grassy woodland with fallen dead timber, leaf litter as per veg types	Western Peneplain Woodlands	Bush Stone-curlew	
	Open woodland with fallen or standing dead timber	Western Peneplain Woodlands	White-browed Treecreeper Endangered Population	
	Roost in hollows, fissures or cracks in live or dead trees (including trees less than 5m tall); also roost in buildings.	Western Peneplain Woodlands	Inland Forest Bat	
	Roosts in trees under bark, in fissures and creases and in hollows.	Western Peneplain Woodlands	Greater Long-eared Bat (south eastern form)	
	Text is lengthy - see circulated hard copy or DECC CoP Website for details.	Western Peneplain Woodlands	Superb Parrot	
	Tree hollow with minimum diameter of 15 cm	Western Peneplain Woodlands	Glossy Black-cockatoo Riverina Population	
	Tree hollow with minimum entrance diameter of 10 cm and located more than 2 m above the ground.	Western Peneplain Woodlands	Pink Cockatoo	
	Tree hollows, fissures or cracks, buildings, powerpoles, fenceposts, caves, cliff crevices, mine shafts, tunnels, for roosting.	Western Peneplain Woodlands	Little Pied Bat	
	Tree hollows, fissures or cracks, buildings, powerpoles, fenceposts, caves, cliff crevices, mine shafts, tunnels.	Western Peneplain Woodlands	Little Pied Bat	
	Trees for roosting	Western Peneplain Woodlands	Malleefowl	
	Trees with stick and twig nests. Mature trees within 100 m of permanent and ephemeral watercourses.	Western Peneplain Woodlands	Square-tailed Kite	
	Trees, dead or alive, containing stick nests such as those of raptors, crows and ravens.	Western Peneplain Woodlands	Grey Falcon	
	Woodland or open forest and adjoining open areas including grassland and shrubland up to 250 m from vegetation that has a canopy cover of not less than 50% of the mean benchmark for that Vegetation Type.	Western Peneplain Woodlands	Turquoise Parrot	
	Woodland, mallee or open forest with occasional to frequent patches of trees or shrubs with open areas of native grasses and fallen or standing dead timber.	Western Peneplain Woodlands	Hooded Robin (south-eastern form)	

Threatened Species Assessment Tool - Development PVP

Version 1.9 profile_2-1.mdb

Mode of operation:

Case number:

Choose CMA Region:
(select from drop-down box)

Enter number of separate
vegetation zones to be cleared:

Assessment
Proposal 1
Murrumbidgee
2

MR

Choose a sub-region name and enter the details for each vegetation zone.

Choose CMA Sub-Region:

Lachlan Plains

773

(select from drop-down box after identifying sub-region using PVP Mapper tool & CMA sub-region spatial layer)

Vegetation Zone
Poly ID

WP33h
IRH18h

Vegetation Type

Western Peneplain Woodlands
Inland Rocky Hill Woodlands

MR32

MR12

Condition

Moderate to good condition
Moderate to good condition

Zone WP33h of development area - Habitat Filters

Veg Type: Western Peneplain Woodlands

Species	Common Name	Geographic constraints	Within specified geographic constraints?	Seasons in which species can be identified	Flora identifiable at this time?	Found during site inspection? (search only required for flora)	Leave in list?
Austrostipa metatoris	A spear-grass	None identified	N/A	When in flower or fruit – generally after rain		No	No
Diuris tricolor	Pine Donkey Orchid	None identified	N/A	For a few weeks when in flower in spring		No	No
Ardeotis australis	Australian Bustard	None identified	N/A	All Year	N/A	N/A	Yes
Ninox connivens	Barking Owl	None identified	N/A	All year	N/A	N/A	Yes
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	None identified	N/A	All Year	N/A	N/A	Yes
Burhinus grallarius	Bush Stone-curlew	None identified	N/A	Spring-Summer	N/A	N/A	Yes
Cinclosoma castanotus	Chestnut Quail-thrush	None identified	N/A	Spring-Summer	N/A	N/A	Yes
Stagonopleura guttata	Diamond Firetail	None identified	N/A	All year	N/A	N/A	Yes
Pachycephala inornata	Gilbert's Whistler	None identified	N/A	All Year	N/A	N/A	Yes
Calyptorhynchus lathami - endangered population	Glossy Black-cockatoo Riverina Population	Only within Bland, Carrathool, Griffith & Narrandera LGAs, west of longitude 146 degrees 40 mins		All Year, but Autumn-Winter best	N/A	N/A	Yes
Nyctophilus timoriensis	Greater Long-eared Bat (south eastern form)	None identified	N/A	Spring, Summer, Autumn	N/A	N/A	Yes
Falco hypoleucos	Grey Falcon	None identified	N/A	All Year	N/A	N/A	Yes
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	None identified	N/A	All Year	N/A	N/A	Yes
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	None identified	N/A	All year	N/A	N/A	Yes
Vespadelus baverstocki	Inland Forest Bat	None identified	N/A	Spring, Summer, Autumn	N/A	N/A	Yes
Chalinolobus picatus	Little Pied Bat	None identified	N/A	Spring, Summer, Autumn	N/A	N/A	Yes
Leipoa ocellata	Malleefowl	None identified	N/A	All Year	N/A	N/A	Yes
Grantiella picta	Painted Honeyeater	None identified	N/A	Spring-Summer	N/A	N/A	Yes
Cacatua leadbeateri	Pink Cockatoo	None identified	N/A	All Year	N/A	N/A	Yes
Hylacola cauta	Shy Heathwren	None identified	N/A	All Year	N/A	N/A	Yes
Pyrrholaemus sagittatus	Speckled Warbler	None identified	N/A	All year, though is shy and cryptic	N/A	N/A	Yes
Lophoictinia isura	Square-tailed Kite	None identified	N/A	All Year	N/A	N/A	Yes
Polytelis swainsonii	Superb Parrot	None identified	N/A	Spring-Summer	N/A	N/A	Yes
Neophema pulchella	Turquoise Parrot	None identified	N/A	All Year	N/A	N/A	Yes
Tiliqua occipitalis	Western Blue-tongued Lizard	None identified	N/A	Spring, Summer, Autumn	N/A	N/A	Yes
Climacteris affinis - endangered population	White-browed Treecreeper Endangered Population	None identified	N/A	All Year	N/A	N/A	Yes

Zone WP33h of development area - Habitat Filters 2												
Veg Type: Western Peneplain Woodlands												
Species	Common Name	Extent of landscape fragmentation that can support species (Fauna only)	Are you in a landscape with at least the minimum extent of vegetation specified? (Auto-populated)	Required patch size (Fauna only)	Are you in a patch of vegetation of at least the minimum size specified? (Auto-populated)	Important Breeding Habitat (Fauna), or Essential habitat features (Flora)	Are these features present?	Important Foraging Habitat (Fauna only)	Are these features present?	Important shelter/roosting/refuge requirements (Fauna only)	Are these features present?	Leave in list?
Austrostipa metatorie	A-spear-grass		N/A		N/A	Unknown			N/A		N/A	No
Diuris trigolor	Pine-Donkey Orchid		N/A		N/A	As per vegetation type	Yes		N/A		N/A	No
Ardeotis australis	Australian Bustard	3. fragmented (between 11 and 30 % habitat retained)	Yes	a) < 5 ha	Yes	Includes open bare ground, shrubs or grass tussocks		As per vegetation type	Yes	As per breeding and foraging habitat		Yes
Ninox connivens	Barking Owl	3. fragmented (between 11 and 30 % habitat retained)	Yes	e) 25 – 100 ha	Yes	Living or dead trees with hollows >20 cm diameter that are > 4 m above the ground.	No	As per veg types and upto 250 m from these in grasslands	No	Living trees	No	No
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	3. fragmented (between 11 and 30 % habitat retained)	Yes	b) 5 - 25 ha	Yes	As per vegetation type	Yes	As per vegetation type	Yes	As per vegetation type	Yes	Yes
Burhinus grallarius	Bush Stone-curlew	4. relictual (with 10% or less habitat retained)	Yes	a) < 5 ha	Yes	Open grassy woodland with fallen dead timber, leaf litter as per veg types	No	As per breeding habitat	No	As per breeding and foraging habitat	no	No
Cinclosoma castanotus	Chestnut Quail thrush	3. fragmented (between 11 and 30 % habitat retained)	Yes	e) 25 – 100 ha	Yes	Includes mallee on sandy soils that has been burnt as recently as four years ago through to old growth.	No	Forages among and under spinifex clumps and shrubs and in open areas	No	As per breeding and foraging habitat	No	No
Stagonopleura guttata	Diamond Firetail	3. fragmented (between 11 and 30 % habitat retained)	Yes	a) < 5 ha	Yes	As per veg types, but requires some small patches of shrubs.		As per veg types with native grassy understorey or adjoining native grassland. Not within grasslands which are further than 1.5 km from trees or woodland.		As per breeding and foraging habitat		Yes
Pachycephala inornata	Gilbert's Whistler	3. fragmented (between 11 and 30 % habitat retained)	Yes	b) 5 – 25 ha	Yes	Mallee or woodland with shrubby understorey, or shrubland as per veg types—Also in Callitrie woodland.	No	As per breeding habitat	No	As per breeding and foraging habitat	No	No
Calyptorhynchus lathamii - endangered population	Glossy Black-cockatoo Riverina Population	3. fragmented (between 11 and 30 % habitat retained)	Yes	a) < 5 ha	Yes	Tree hollow with minimum diameter of 15 cm		Allocasuarina or Casuarina		As per breeding and foraging habitat		Yes
Nyctophilus timoriensis	Greater Long-eared Bat (south eastern form)	3. fragmented (between 11 and 30 % habitat retained)	Yes	b) 5 - 25 ha	Yes	In trees - under bark, in fissures and creases or in hollows.		As per vegetation type	Yes	Roosts in trees under bark, in fissures and creases and in hollows.		Yes
Falco hypoleucos	Grey Falcon	3. fragmented (between 11 and 30 % habitat retained)	Yes	d) > 100 ha	Yes	Trees, dead or alive, containing stick nests such as those of raptors, crows and ravens.		As per vegetation type	Yes	As per vegetation type	Yes	Yes
Pomastotomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	4. relictual (with 10% or less habitat retained)	Yes	a) < 5 ha	Yes	As per vegetation type	Yes	As per foraging habitat		As per breeding and foraging habitat		Yes
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	3. fragmented (between 11 and 30 % habitat retained)	Yes	b) 5 - 25 ha	Yes	Woodland, mallee or open forest with occasional to frequent patches of trees or shrubs with open areas of native grasses and fallen or standing dead timber.		As per breeding habitat		As per breeding and foraging habitat		Yes
Vespadelus baverstocki	Inland Forest Bat	4. relictual (with 10% or less habitat retained)	Yes	a) < 5 ha	Yes	Likely to be as per roosting habitat		As per vegetation types where trees are present.		Roost in hollows, fissures or cracks in live or dead trees (including trees less than 5m tall); also roost in buildings.		Yes
Chalinolobus picatus	Little Pied Bat	4. relictual (with 10% or less habitat retained)	Yes	a) < 5 ha	Yes	Tree hollows, fissures or cracks, buildings, powerpoles, fenceposts, caves, cliff crevices, mine shafts, tunnels.		As per vegetation type	Yes	Tree hollows, fissures or cracks, buildings, powerpoles, fenceposts, caves, cliff crevices, mine shafts, tunnels, for roosting.		Yes
Leipoa ocellata	Malleefowl	3. fragmented (between 11 and 30 % habitat retained)	Yes	d) > 100 ha	Yes	As per veg types with relatively intact understorey		As per breeding habitat with foodplants such as (but not limited to) Acacia, Cassia, Beyeria and Bossiaea		Trees for roosting		Yes
Grantiella picta	Painted Honeyeater	3. fragmented (between 11 and 30 % habitat retained)	Yes	a) < 5 ha	Yes	As per veg types with 5 or more mistletoes per hectare		As per veg types with more than 5 mistletoes per ha		As per breeding and foraging habitat		Yes

Cacatua leadbeateri	Pink Cockatoo	4. relictual (with 10% or less habitat retained)	Yes	a) < 5 ha	Yes	Tree hollow with minimum entrance diameter of 10 cm and located more than 2 m above the ground.		As per vegetation type	Yes	As per breeding and foraging habitat		Yes
Hylaeola cauta	Shy-Heathwren	2. variegated (between 31 and 70% habitat retained)	No	e) 25 – 100 ha	Yes	Mallee with shrubs and heath, burnt between 4- and 40 years ago; Callitric and Ironbark woodland		As per breeding habitat		As per breeding and foraging habitat		No
Pyrholaemus sagittatus	Speckled Warbler	3. fragmented (between 11 and 30 % habitat retained)	Yes	b) 5 - 25 ha	Yes	As per vegetation type	Yes	As per vegetation type	Yes	As per vegetation type	Yes	Yes
Lophoietinia leura	Square-tailed Kite	3. fragmented (between 11 and 30 % habitat retained)	Yes	e) 25 – 100 ha	Yes	Trees with stick and twig nests. Mature trees within 100 m of permanent and ephemeral watercourses.	No	As per vegetation type	No	As per vegetation type	No	No
Polytelis swainsonii	Superb Parrot	4. relictual (with 10% or less habitat retained)	Yes	a) < 5 ha	Yes	Only breeds in Murrumbateman, Murrumbidgee, Upper Slopes & Lower Slopes Sub-regions. Text is lengthy - see circulated hard copy or DECC CoP Website for details of breeding habitat.		Text is lengthy - see circulated hard copy or DECC CoP Website for details.		As per vegetation type	Yes	Yes
Neophema pulchella	Turquoise Parrot	3. fragmented (between 11 and 30 % habitat retained)	Yes	a) < 5 ha	Yes	Hollows greater than 5-cm diameter in living or dead trees, hollow logs, fence posts or stumps that are no more than 100 m from vegetation that has a canopy cover of not less than 50% of the mean benchmark for that Vegetation Type.	No	Woodland or open forest and adjoining open areas including grassland and shrubland up to 250 m from vegetation that has a canopy cover of not less than 50% of the mean benchmark for that Vegetation Type.	No	Woodland or open forest and adjoining open areas including grassland and shrubland up to 250 m from vegetation that has a canopy cover of not less than 50% of the mean benchmark for that Vegetation Type.	No	No
Tiliqua occipitalis	Western Blue-tongued Lizard	4. relictual (with 10% or less habitat retained)	Yes	a) < 5 ha	Yes	As per vegetation type	Yes	As per vegetation type	Yes	As per vegetation type	Yes	Yes
Climacteris affinis - endangered population	White-browed Treecreeper Endangered Population	3. fragmented (between 11 and 30 % habitat retained)	Yes	b) 5 - 25 ha	Yes	Hollows >3 cm wide in live trees or in dead standing or fallen timber		Open woodland with fallen or standing dead timber		n/a	N/A	Yes

Zone WP33h of development area - Loss under this proposal														
Veg Type: Western Peneplain Woodlands														
Species	Common Name	Description of Breeding habitat present (fauna) or Description of Essential habitat (flora) present	Will the proposal cause a loss of Breeding habitat (fauna) or loss of actual plants (flora)? (Yes or No)	Size of loss	Unit of measure	Description of Foraging habitat present	Will the proposal cause a loss of Foraging habitat? (Yes or No)	Size of loss	Unit of measure	Description of Shelter / roosting / refuge habitat present	Will the proposal cause a loss of this habitat? (Yes or No)	Size of loss	Unit of measure	Include in Loss Summary?
Ardeotis australis	Australian Bustard	Includes open bare ground, shrubs or grass tussocks				As per vegetation type				As per breeding and foraging habitat				Yes
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	As per vegetation type				As per vegetation type				As per vegetation type				Yes
Stagonopleura guttata	Diamond Firetail	As per veg types, but requires some small patches of shrubs.				As per veg types with native grassy understorey or adjoining native grassland. Not within grasslands which are further than 1.5 km from trees or woodland.				As per breeding and foraging habitat				Yes
Calyptrorhynchus lathamii - endangered population	Glossy Black-cockatoo Riverina Population	Tree hollow with minimum diameter of 15 cm				Allocasuarina or Casuarina				As per breeding and foraging habitat				Yes
Nyctophilus timoriensis	Greater Long-eared Bat (south eastern form)	In trees - under bark, in fissures and creases or in hollows.				As per vegetation type				Roosts in trees under bark, in fissures and creases and in hollows.				Yes
Falco hypoleucos	Grey Falcon	Trees, dead or alive, containing stick nests such as those of raptors, crows and ravens.				As per vegetation type				As per vegetation type				Yes
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	As per vegetation type				As per foraging habitat				As per breeding and foraging habitat				Yes
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	Woodland, mallee or open forest with occasional to frequent patches of trees or shrubs with open areas of native grasses and fallen or standing dead timber.				As per breeding habitat				As per breeding and foraging habitat				Yes
Vespadelus baverstocki	Inland Forest Bat	Likely to be as per roosting habitat				As per vegetation types where trees are present.				Roost in hollows, fissures or cracks in live or dead trees (including trees less than 5m tall); also roost in buildings.				Yes
Chalinolobus picatus	Little Pied Bat	Tree hollows, fissures or cracks, buildings, powerpoles, fenceposts, caves, cliff crevices, mine shafts, tunnels.				As per vegetation type				Tree hollows, fissures or cracks, buildings, powerpoles, fenceposts, caves, cliff crevices, mine shafts, tunnels, for roosting.				Yes
Leipoa ocellata	Malleefowl	As per veg types with relatively intact understorey				As per breeding habitat with foodplants such as (but not limited to) Acacia, Cassia, Beyeria and Bossiaea				Trees for roosting				Yes
Grantiella picta	Painted Honeyeater	As per veg types with 5 or more mistletoes per hectare				As per veg types with more than 5 mistletoes per ha				As per breeding and foraging habitat				Yes
Cacatua leadbeateri	Pink Cockatoo	Tree hollow with minimum entrance diameter of 10 cm and located more than 2 m above the ground.				As per vegetation type				As per breeding and foraging habitat				Yes
Pyrrholaemus sagittatus	Speckled Warbler	As per vegetation type				As per vegetation type				As per vegetation type				Yes

Polytelis swainsonii	Superb Parrot	Only breeds in Murrumbateman, Murrumbidgee, Upper Slopes & Lower Slopes Sub-regions. Text is lengthy - see circulated hard copy or DECC CoP Website for details of breeding habitat.				Text is lengthy - see circulated hard copy or DECC CoP Website for details.				As per vegetation type				Yes
Tiliqua occipitalis	Western Blue-tongued Lizard	As per vegetation type				As per vegetation type				As per vegetation type				Yes
Climacteris affinis - endangered population	White-browed Treecreeper Endangered Population	Hollows >3 cm wide in live trees or in dead standing or fallen timber				Open woodland with fallen or standing dead timber				N/A	N/A	0	N/A	Yes

Zone IRH18h of development area - Habitat Filters

Veg Type: Inland Rocky Hill Woodlands

Species	Common Name	Geographic constraints	Within specified geographic constraints?	Seasons in which species can be identified	Flora identifiable at this time?	Found during site inspection? (search only required for flora)	Leave in list?
Ninox connivens	Barking Owl	None identified	N/A	All year	N/A	N/A	Yes
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	None identified	N/A	All Year	N/A	N/A	Yes
Phascogale tapoatafa	Brush-tailed Phascogale	None identified	N/A	All year	N/A	N/A	Yes
Burhinus grallarius	Bush Stone-curlew	None identified	N/A	Spring-Summer	N/A	N/A	Yes
Cinclosoma castanotus	Chestnut Quail-thrush	None identified	N/A	Spring-Summer	N/A	N/A	Yes
Stagonopleura guttata	Diamond Firetail	None identified	N/A	All year	N/A	N/A	Yes
Pachycephala inornata	Gilbert's Whistler	None identified	N/A	All Year	N/A	N/A	Yes
Calyptorhynchus lathami - endangered population	Glossy Black-cockatoo Riverina Population	Only within Bland, Carrathool, Griffith & Narrandera LGAs, west of longitude 146 degrees 40 mins		All Year, but Autumn-Winter best	N/A	N/A	Yes
Nyctophilus timoriensis	Greater Long-eared Bat (south eastern form)	None identified	N/A	Spring, Summer, Autumn	N/A	N/A	Yes
Falco hypoleucos	Grey Falcon	None identified	N/A	All Year	N/A	N/A	Yes
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	None identified	N/A	All Year	N/A	N/A	Yes
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	None identified	N/A	All year	N/A	N/A	Yes
Vespadelus baverstocki	Inland Forest Bat	None identified	N/A	Spring, Summer, Autumn	N/A	N/A	Yes
Chalinolobus picatus	Little Pied Bat	None identified	N/A	Spring, Summer, Autumn	N/A	N/A	Yes
Leipoa ocellata	Malleefowl	None identified	N/A	All Year	N/A	N/A	Yes
Grantiella picta	Painted Honeyeater	None identified	N/A	Spring-Summer	N/A	N/A	Yes
Certhionyx variegatus	Pied Honeyeater	None identified	N/A	winter-spring in drought years	N/A	N/A	Yes
Cacatua leadbeateri	Pink Cockatoo	None identified	N/A	All Year	N/A	N/A	Yes
Hylacola cauta	Shy Heathwren	None identified	N/A	All Year	N/A	N/A	Yes
Drymodes brunneopygia	Southern Scrub-robin	None identified	N/A	All Year	N/A	N/A	Yes
Pyrrholaemus sagittatus	Speckled Warbler	None identified	N/A	All year, though is shy and cryptic	N/A	N/A	Yes
Lophoictinia isura	Square-tailed Kite	None identified	N/A	All Year	N/A	N/A	Yes
Polytelis swainsonii	Superb Parrot	None identified	N/A	Spring-Summer	N/A	N/A	Yes
Neophema pulchella	Turquoise Parrot	None identified	N/A	All Year	N/A	N/A	Yes
Tiliqua occipitalis	Western Blue-tongued Lizard	None identified	N/A	Spring, Summer, Autumn	N/A	N/A	Yes
Climacteris affinis - endangered population	White-browed Treecreeper Endangered Population	None identified	N/A	All Year	N/A	N/A	Yes

Zone 1RH18h of development area - Habitat Filters 2

Veg Type: Inland Rocky Hill Woodlands

Species	Common Name	Extent of landscape fragmentation that can support species (Fauna only)	Are you in a landscape with at least the minimum extent of vegetation specified? (Auto-populated)	Required patch size (Fauna only)	Are you in a patch of vegetation of at least the minimum size specified? (Auto-populated)	Important Breeding Habitat (Fauna), or Essential habitat features (Flora)	Are these features present?	Important Foraging Habitat (Fauna only)	Are these features present?	Important shelter/roosting/refuge requirements (Fauna only)	Are these features present?	Leave in list?
Ninox connivens	Barking Owl	3. fragmented (between 11 and 30 % habitat retained)	Yes	e) 25 – 100 ha	Yes	Living or dead trees with hollows > 20 cm diameter that are > 4 m above the ground.	No	As per veg types and upto 250 m from these in grasslands	No	Living trees	No	No
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	3. fragmented (between 11 and 30 % habitat retained)	Yes	b) 5 - 25 ha	Yes	As per vegetation type	Yes	As per vegetation type	Yes	As per vegetation type	Yes	Yes
Phaeogale tapoatafa	Brush-tailed Phaeogale	4. relictual (with 10% or less habitat retained)	Yes	a) < 5 ha	Yes	Tree hollows, logs or stumps with entrances > 2.5 cm wide for nesting and sheltering; most abundant where there are > 2 trees per ha > 60cm DBH; nest trees are typically large (> 80 cm DBH) but can be as small as 25cm DBH	No	open forest or woodland as per veg. type; prefer large trees (> 60 cm DBH); uses patches < 1 ha if within 150 m of other patches in floodplain box & riverine woodlands; landscape sizes > 25ha in dry forests and ridges	No	as for breeding and in globular bird nests or pessum dreys	No	No
Burhinus grallarius	Bush Stone-curlew	4. relictual (with 10% or less habitat retained)	Yes	a) < 5 ha	Yes	Open grassy woodland with fallen dead timber, leaf litter as per veg types	No	As per breeding habitat	No	As per breeding and foraging habitat	No	No
Cinelosoma castanotus	Chestnut-Quail thrush	3. fragmented (between 11 and 30 % habitat retained)	Yes	e) 25 – 100 ha	Yes	Includes mallee on sandy soils that has been burnt as recently as four years ago through to old growth.	No	Forages among and under spinifex clumps and shrubs and in open areas	No	As per breeding and foraging habitat	No	No
Stagonopleura guttata	Diamond Firetail	3. fragmented (between 11 and 30 % habitat retained)	Yes	a) < 5 ha	Yes	As per veg types, but requires some small patches of shrubs.		As per veg types with native grassy understorey or adjoining native grassland. Not within grasslands which are further than 1.5 km from trees or woodland.		As per breeding and foraging habitat		Yes
Pachycephala inornata	Gilbert's Whistler	3. fragmented (between 11 and 30 % habitat retained)	Yes	b) 5 – 25 ha	Yes	Mallee or woodland with shrubby understorey, or shrubland as per veg types. Also in Callitris woodland.	No	As per breeding habitat	No	As per breeding and foraging habitat	No	No
Calyptorhynchus lathami - endangered population	Glossy Black-cockatoo Riverina Population	3. fragmented (between 11 and 30 % habitat retained)	Yes	a) < 5 ha	Yes	Tree hollow with minimum diameter of 15 cm		Allocasuarina or Casuarina		As per breeding and foraging habitat		Yes
Nyctophilus timoriensis	Greater Long-eared Bat (south eastern form)	3. fragmented (between 11 and 30 % habitat retained)	Yes	b) 5 - 25 ha	Yes	In trees - under bark, in fissures and creases or in hollows.		As per vegetation type	Yes	Roosts in trees under bark, in fissures and creases and in hollows.		Yes
Falco hypoleucos	Grey Falcon	3. fragmented (between 11 and 30 % habitat retained)	Yes	d) > 100 ha	Yes	Trees, dead or alive, containing stick nests such as those of raptors, crows and ravens.		As per vegetation type	Yes	As per vegetation type	Yes	Yes
Pomastotomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	4. relictual (with 10% or less habitat retained)	Yes	a) < 5 ha	Yes	As per vegetation type	Yes	As per foraging habitat		As per breeding and foraging habitat		Yes
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	3. fragmented (between 11 and 30 % habitat retained)	Yes	b) 5 - 25 ha	Yes	Woodland, mallee or open forest with occasional to frequent patches of trees or shrubs with open areas of native grasses and fallen or standing dead timber.		As per breeding habitat		As per breeding and foraging habitat		Yes
Vespadelus baverstocki	Inland Forest Bat	4. relictual (with 10% or less habitat retained)	Yes	a) < 5 ha	Yes	Likely to be as per roosting habitat		As per vegetation types where trees are present.		Roost in hollows, fissures or cracks in live or dead trees (including trees less than 5m tall); also roost in buildings.		Yes
Chalinolobus picatus	Little Pied Bat	4. relictual (with 10% or less habitat retained)	Yes	a) < 5 ha	Yes	Tree hollows, fissures or cracks, buildings, powerpoles, fenceposts, caves, cliff crevices, mine shafts, tunnels.		As per vegetation type	Yes	Tree hollows, fissures or cracks, buildings, powerpoles, fenceposts, caves, cliff crevices, mine shafts, tunnels, for roosting.		Yes
Leipoa ocellata	Malleefowl	3. fragmented (between 11 and 30 % habitat retained)	Yes	d) > 100 ha	Yes	As per veg types with relatively intact understorey		As per breeding habitat with foodplants such as (but not limited to) Acacia, Cassia, Beyeria and Bossiaea		Trees for roosting		Yes

Grantiella picta	Painted Honeyeater	3. fragmented (between 11 and 30 % habitat retained)	Yes	a) < 5 ha	Yes	As per veg types with 5 or more mistletoes per hectare		As per veg types with more than 5 mistletoes per ha		As per breeding and foraging habitat		Yes
Certhionyx variegatus	Pied Honeyeater	3. fragmented (between 11 and 30 % habitat retained)	Yes	a) < 5 ha	Yes	As per vegetation type	Yes	Eremophilas, grevilleas, mistletoes, chenopods with succulent fruit		As per breeding and foraging habitat		Yes
Cacatua leadbeateri	Pink Cockatoo	4. relictual (with 10% or less habitat retained)	Yes	a) < 5 ha	Yes	Tree hollow with minimum entrance diameter of 10 cm and located more than 2 m above the ground.		As per vegetation type	Yes	As per breeding and foraging habitat		Yes
Hylacola cauta	Shy Heathwren	2. variegated (between 31 and 70% habitat retained)	No	e) 25 – 100 ha	Yes	Mallee with shrubs and heath, burnt between 4 and 40 years ago; Callitric and Ironbark woodland		As per breeding habitat		As per breeding and foraging habitat		No
Drymodes brunneopygia	Southern Scrub-robin	2. variegated (between 31 and 70% habitat retained)	No	e) 25 – 100 ha	Yes	Mallee or paperbark or Allocasuarina shrubland; less commonly in eucalypt woodland or Acacia shrubland or Lignum or heath and tea-tree thickets; areas burnt between 4 and 80 years ago		As per breeding habitat		As per breeding and foraging habitat		No
Pyrrholaemus sagittatus	Speckled Warbler	3. fragmented (between 11 and 30 % habitat retained)	Yes	b) 5 - 25 ha	Yes	As per vegetation type	Yes	As per vegetation type	Yes	As per vegetation type	Yes	Yes
Lephoictinia isura	Square-tailed Kite	3. fragmented (between 11 and 30 % habitat retained)	Yes	e) 25 – 100 ha	Yes	Trees with stick and twig nests. Mature trees within 100 m of permanent and ephemeral watercourses.	No	As per vegetation type	No	As per vegetation type	No	No
Polytelis swainsonii	Superb Parrot	4. relictual (with 10% or less habitat retained)	Yes	a) < 5 ha	Yes	Only breeds in Murrumbateman, Murrumbidgee, Upper Slopes & Lower Slopes Sub-regions. Text is lengthy - see circulated hard copy or DECC CoP Website for details of breeding habitat.		Text is lengthy - see circulated hard copy or DECC CoP Website for details.		As per vegetation type	Yes	Yes
Neophema pulchella	Turquoise Parrot	3. fragmented (between 11 and 30 % habitat retained)	Yes	a) < 5 ha	Yes	Hollows greater than 5 cm diameter in living or dead trees, hollow logs, fence posts or stumps that are no more than 100 m from vegetation that has a canopy cover of not less than 50% of the mean benchmark for that Vegetation Type.	No	Woodland or open forest and adjoining open areas including grassland and shrubland up to 250 m from vegetation that has a canopy cover of not less than 50% of the mean benchmark for that Vegetation Type.	No	Woodland or open forest and adjoining open areas including grassland and shrubland up to 250 m from vegetation that has a canopy cover of not less than 50% of the mean benchmark for that Vegetation Type.	No	No
Tiliqua occipitalis	Western Blue-tongued Lizard	4. relictual (with 10% or less habitat retained)	Yes	a) < 5 ha	Yes	As per vegetation type	Yes	As per vegetation type	Yes	As per vegetation type	Yes	Yes
Climacteris affinis - endangered population	White-browed Treecreeper Endangered Population	3. fragmented (between 11 and 30 % habitat retained)	Yes	b) 5 - 25 ha	Yes	Hollows >3 cm wide in live trees or in dead standing or fallen timber		Open woodland with fallen or standing dead timber		n/a	N/A	Yes

Pyrrholaemus sagittatus	Speckled Warbler	As per vegetation type				As per vegetation type				As per vegetation type				Yes
Polytelis swainsonii	Superb Parrot	Only breeds in Murrumbateman, Murrumbidgee, Upper Slopes & Lower Slopes Sub-regions. Text is lengthy - see circulated hard copy or DECC CoP Website for details of breeding habitat.				Text is lengthy - see circulated hard copy or DECC CoP Website for details.				As per vegetation type				Yes
Tiliqua occipitalis	Western Blue-tongued Lizard	As per vegetation type				As per vegetation type				As per vegetation type				Yes
Climacteris affinis - endangered population	White-browed Treecreeper Endangered Population	Hollows >3 cm wide in live trees or in dead standing or fallen timber				Open woodland with fallen or standing dead timber				N/A	N/A	0	N/A	Yes

Summary of expected total loss for all vegetation zones to be cleared																
Species	Common Name	Description of Breeding habitat / Essential habitat (flora) present	Total size of loss	Total population size (plants) or total estimated size of Breeding Habitat on this property	Ability to sustain a temporary reduction in the population/habitat on this property	Is the temporary loss of Breeding habitat sustainable under the current proposal? (Yes or No)	Description of Foraging habitat present	Total size of loss	Total estimated size of Foraging habitat on this property	Ability to sustain a temporary reduction in the population/habitat on this property	Is the temporary loss of Foraging habitat sustainable under the current proposal? (Yes or No)	Description of Shelter habitat present	Total size of loss	Is an offset appropriate for this species?	Total loss to be offset	Units
Ardeotis australis	Australian Bustard	Includes open bare ground, shrubs or grass tussocks		Not required	yes	Yes	As per vegetation type		Not required	yes	Yes	As per breeding and foraging habitat		Yes	33	ha
Cacatua leadbeateri	Pink Cockatoo	Tree hollow with minimum entrance diameter of 10 cm and located more than 2 m above the ground.		Not required	Yes - 10% of foraging habitat, No loss of breeding habitat	Yes	As per vegetation type		Not required	Yes - 10% of foraging habitat, No loss of breeding habitat	N/A	As per breeding and foraging habitat		Yes	51	ha
Calyptorhynchus lathami - endangered population	Glossy Black-cockatoo Riverina Population	Tree hollow with minimum diameter of 15 cm		Not required	No	Yes	Allocasuarina or Casuarina		Not required	No	N/A	As per breeding and foraging habitat		Yes	51	ha
Certhionyx variegatus	Pied Honeyeater	As per vegetation type		Not required	Yes - 10% loss of foraging habitat	Yes	Eremophilas, grevilleas, mistletoes, chenopods with succulent fruit		Not required	Yes - 10% loss of foraging habitat	N/A	As per breeding and foraging habitat		Yes	18	ha
Chalinolobus picatus	Little Pied Bat	Tree hollows, fissures or cracks, buildings, powerpoles, fenceposts, caves, cliff crevices, mine shafts, tunnels.		Not required	Yes	Yes	As per vegetation type		Not required	Yes	Yes	Tree hollows, fissures or cracks, buildings, powerpoles, fenceposts, caves, cliff crevices, mine shafts, tunnels, for roosting.		Yes	51	ha
Climacteris affinis - endangered population	White-browed Treecreeper Endangered Population	Hollows >3 cm wide in live trees or in dead standing or fallen timber		Not required	yes - foraging, no - breeding	Yes	Open woodland with fallen or standing dead timber		Not required	yes - foraging, no - breeding	N/A	N/A	0 N/A	Yes	51	ha
Falco hypoleucos	Grey Falcon	Trees, dead or alive, containing stick nests such as those of raptors, crows and ravens.		Not required	No loss of trees containing stick nests such as those of raptors, crows and ravens. No loss of foraging habitat within riparian zone. Up to 10% loss of foraging habitat elsewhere.	Yes	As per vegetation type		Not required	No loss of trees containing stick nests such as those of raptors, crows and ravens. No loss of foraging habitat within riparian zone. Up to 10% loss of foraging habitat elsewhere.	N/A	As per vegetation type		Yes	51	ha
Grantiella picta	Painted Honeyeater	As per veg types with 5 or more mistletoes per hectare		Not required	Yes - up to 10% loss	Yes	As per veg types with more than 5 mistletoes per ha		Not required	Yes - up to 10% loss	N/A	As per breeding and foraging habitat		Yes	51	ha
Leipoa ocellata	Malleefowl	As per veg types with relatively intact understorey		Not required	Yes - 5% loss, but no loss of mallee in swales and no loss of connectivity and no reduction in corridor width to less than 100 m wide	Yes	As per breeding habitat with foodplants such as (but not limited to) Acacia, Cassia, Beyeria and Bossiaea		Not required	Yes - 5% loss, but no loss of mallee in swales and no loss of connectivity and no reduction in corridor width to less than 100 m wide	N/A	Trees for roosting		Yes	51	ha
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	Woodland, mallee or open forest with occasional to frequent patches of trees or shrubs with open areas of native grasses and fallen or standing dead timber.		Not required	Yes - 5% loss but no loss of connectivity	Yes	As per breeding habitat		Not required	Yes - 5% loss but no loss of connectivity	N/A	As per breeding and foraging habitat		Yes	51	ha
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	As per vegetation type		Not required	Yes - up to 5% loss, as long as clearing proposal will not reduce subject vegetation zone below 5 ha	Yes	As per vegetation type		Not required	Yes - up to 5% loss, as long as clearing proposal will not reduce subject vegetation zone below 5 ha	N/A	As per vegetation type		Yes	33	ha
Nyctophilus timoriensis	Greater Long-eared Bat (south eastern form)	In trees - under bark, in fissures and creases or in hollows.		Not required	Up to 10% loss of foraging habitat. Up to 10% loss of hollow bearing trees.	Yes	As per vegetation type		Not required	Up to 10% loss of foraging habitat. Up to 10% loss of hollow bearing trees.	N/A	Roosts in trees under bark, in fissures and creases and in hollows.		Yes	51	ha
Polytelis swainsoni	Superb Parrot	Only breeds in Murrumbateman, Murrumbidgee, Upper Slopes & Lower Slopes Sub-regions. Text is lengthy - see circulated hard copy or DECC CoP Website for details of breeding habitat.		Not required	Yes. Text is lengthy - see circulated hard copy or DECC CoP Website for details of protection requirements.	Yes	Text is lengthy - see circulated hard copy or DECC CoP Website for details.		Not required	Yes. Text is lengthy - see circulated hard copy or DECC CoP Website for details of protection requirements.	N/A	As per vegetation type		Yes	51	ha
Pomastolomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	As per vegetation type		Not required	Yes- upto 10% loss of habitat, but no loss of connectivity	Yes	As per foraging habitat		Not required	Yes- upto 10% loss of habitat, but no loss of connectivity	N/A	As per breeding and foraging habitat		Yes	51	ha
Pyrrholaemus sagittatus	Speckled Warbler	As per vegetation type		Not required	Yes - up to 5% loss of habitat but no loss of connectivity	Yes	As per vegetation type		Not required	Yes - up to 5% loss of habitat but no loss of connectivity	N/A	As per vegetation type		Yes	33	ha
Slogonopleura guttata	Diamond Firetail	As per veg types, but requires some small patches of shrubs.		Not required	Yes - upto 10% loss but no loss of riparian habitats	Yes	As per veg types with native grassy understorey or adjoining native grassland. Not within grasslands which are further than 1.5 km from trees or woodland.		Not required	Yes - upto 10% loss but no loss of riparian habitats	N/A	As per breeding and foraging habitat		Yes	51	ha
Tiliqua occipitalis	Western Blue-tongued Lizard	As per vegetation type		Not required	Yes	Yes	As per vegetation type		Not required	Yes	Yes	As per vegetation type		Yes	51	ha

Vespadelus baverstocki	Inland Forest Bat	Likely to be as per roosting habitat		Not required	Up to 10% loss of foraging habitat. Up to 10% loss of hollow bearing trees.	Yes	As per vegetation types where trees are present.		Not required	Up to 10% loss of foraging habitat. Up to 10% loss of hollow bearing trees.	N/A	Roost in hollows, fissures or cracks in live or dead trees (including trees less than 5m tall); also roost in buildings.		Yes	51	ha
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Proposed offset areas

Enter number of separate vegetation zones:

Vegetation Zone
Poly ID

Prop 1 IRH

1

Vegetation type

Riverine Sandhill Woodlands

Condition

Moderate to good condition

MR17

Offset Zone Prop 1 IRH Possible Management Actions								
Veg Type: Riverine Sandhill Woodlands								
Species	Common Name	Population size or area of habitat or amount of a key habitat feature confirmed or predicted in proposed offset	Units of measure	List of possible management actions	Description	Expected level of response by population for each action for offset (% increase). Moderate to good condition Veg.	Expected increase in population size or habitat area or amount of key habitat feature in offset	Total loss
Ardeotis australis	Australian Bustard	425	ha	Domestic stock grazing exclusion		11	46.75	33
		425	ha	Feral and/or native herbivore control/exclusion fencing		11	46.75	33
Cacatua leadbeateri	Pink Cockatoo	425	ha	Domestic stock grazing exclusion		11	46.75	51
		425	ha	Exclusion of fire		5	21.25	51
		425	ha	Feral and/or native herbivore control/exclusion fencing		6	25.5	51
		425	ha	Retention of all dead timber (standing and fallen)		8	34	51
			ha	Strategic stock grazing		2	0	51
		425	ha	Supplementary planting (for use in "Moderate to good condition" vegetation)		2	8.5	51
Calyptorhynchus lathami - endangered population	Glossy Black-cockatoo Riverina Population		ha	Application of ecological fire management		1	0	51
		425	ha	Domestic stock grazing exclusion	remove stock from Allocasuarina foraging habitat	10	42.5	51
		425	ha	Exclusion of fire	avoid intensive and extensive wildfire through mosaic burning	10	42.5	51
		425	ha	Retention of all dead timber (standing and fallen)	retain dead standing trees for nesting habitat	1	4.25	51
			ha	Strategic stock grazing		10	0	51
Certhionyx variegatus	Pied Honeyeater	425	ha	Domestic stock grazing exclusion		10	42.5	18
		425	ha	Exclude commercial apiary site from property		1	4.25	18
		425	ha	Feral and/or native herbivore control/exclusion fencing	exclude feral goats	2	8.5	18
			ha	Strategic stock grazing	remove stock during breeding season	5	0	18

		425	ha	Supplementary planting (for use in "Moderate to good condition" vegetation)	plant shrubs such as Eremophilas and chenopods with succulent fruits	2	8.5	18
Chalinolobus picatus	Little Pied Bat	425	ha	Domestic stock grazing exclusion		10	42.5	51
			ha	Maintain or re-introduce natural flow regimes to wetlands		3	0	51
		425	ha	Retention of all dead timber (standing and fallen)		15	63.75	51
		425	ha	Retention of rocks		1	4.25	51
			ha	Strategic stock grazing	manage grazing to allow for canopy and midstorey species regeneration	2	0	51
		425	ha	Supplementary planting (for use in "Moderate to good condition" vegetation)		5	21.25	51
Climacteris affinis - endangered population	White-browed Treecreeper Endangered Population	425	ha	Domestic stock grazing exclusion	Exclusion area must be greater than 5 hectares; grazing permitted in high rainfall years to reduce biomass and/or for weed control	10	42.5	51
		425	ha	Exclusion of fire		1	4.25	51
		425	ha	Retention of all dead timber (standing and fallen)	Retain all standing and fallen dead timber, particularly those with hollows.	1	4.25	51
			ha	Strategic stock grazing	remove stock during breeding season in remnants greater than 5 hectares	10	0	51
Falco hypoleucos	Grey Falcon	425	ha	Domestic stock grazing exclusion		15	63.75	51
		425	ha	Feral and/or native herbivore control/exclusion fencing		11	46.75	51
			ha	Maintain or re-introduce natural flow regimes to wetlands		4	0	51
		425	ha	Retention of all dead timber (standing and fallen)		6	25.5	51
			ha	Strategic stock grazing		16	0	51
Grantiella picta	Painted Honeyeater	425	ha	Domestic stock grazing exclusion		5	21.25	51
		425	ha	Exclude commercial apiary site from property		2	8.5	51
		425	ha	Exclude miscellaneous feral species	Remove feral bee colonies	1	4.25	51

		425	ha	Feral and/or native herbivore control/exclusion fencing	exclude feral goats	1	4.25	51
			ha	Strategic stock grazing	remove stock for several years and then seasonally exclude to allow regeneration of foraging tree species	5	0	51
		425	ha	Supplementary planting (for use in "Moderate to good condition" vegetation)	plant foraging tree species	5	21.25	51
Leipoa ocellata	Malleefowl		ha	Application of ecological fire management	avoid intensive and extensive wildfire through mosaic burns	10	0	51
		425	ha	Domestic stock grazing exclusion	remove stock grazing in areas greater than 20 hectares	10	42.5	51
		425	ha	Exclusion of fire	avoid intensive and extensive wildfire through mosaic burns	10	42.5	51
		425	ha	Feral and/or native herbivore control/exclusion fencing	exclude feral goats	10	42.5	51
			ha	Strategic stock grazing	remove stock during breeding season in areas greater than 20 hectares	5	0	51
		425	ha	Supplementary planting (for use in "Moderate to good condition" vegetation)	use locally indigenous plant species in areas more than 20 hectares	2	8.5	51
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	425	ha	Domestic stock grazing exclusion	remnants must be greater than 10 hectares	10	42.5	51
		425	ha	Feral and/or native herbivore control/exclusion fencing	exclude feral goats	5	21.25	51
		425	ha	Retention of all dead timber (standing and fallen)		20	85	51
			ha	Strategic stock grazing	remove stock during breeding season in remnants greater than 10 hectares	10	0	51
		425	ha	Supplementary planting (for use in "Moderate to good condition" vegetation)	plant locally indigenous shrub species	2	8.5	51
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	425	ha	Domestic stock grazing exclusion		10	42.5	33
		425	ha	Exclude commercial apiary site from property		2	8.5	33

		425	ha	Exclude miscellaneous feral species	Remove feral bee colonies	1	4.25	33
			ha	Strategic stock grazing		5	0	33
		425	ha	Supplementary planting (for use in "Moderate to good condition" vegetation)	use foraging tree species	2	8.5	33
Nyctophilus timoriensis	Greater Long-eared Bat (south eastern form)	425	ha	Domestic stock grazing exclusion		5	21.25	51
		425	ha	Retention of all dead timber (standing and fallen)		15	63.75	51
			ha	Strategic stock grazing	manage grazing to allow for canopy and midstorey species regeneration	2	0	51
		425	ha	Supplementary planting (for use in "Moderate to good condition" vegetation)		5	21.25	51
Polytelis swainsonii	Superb Parrot	425	ha	Domestic stock grazing exclusion		5	21.25	51
		425	ha	Exclude miscellaneous feral species	Remove feral bee colonies	1	4.25	51
		425	ha	Retention of all dead timber (standing and fallen)	retain all dead standing trees with hollows	10	42.5	51
			ha	Strategic stock grazing		5	0	51
		425	ha	Supplementary planting (for use in "Moderate to good condition" vegetation)	plant foraging and nesting tree species	5	21.25	51
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	425	ha	Domestic stock grazing exclusion	Exclusion area must be greater than 10 hectares	10	42.5	51
		425	ha	Feral and/or native herbivore control/exclusion fencing	exclude feral goats	5	21.25	51
		425	ha	Retention of all dead timber (standing and fallen)		1	4.25	51
			ha	Strategic stock grazing	exclude grazing in breeding season in remnants greater than 10 hectares	10	0	51
		425	ha	Supplementary planting (for use in "Moderate to good condition" vegetation)	plant locally indigenous shrub species	5	21.25	51
Pyrrholaemus sagittatus	Speckled Warbler	425	ha	Domestic stock grazing exclusion	Exclusion area must be greater than 5 hectares	10	42.5	33
		425	ha	Retention of all dead timber (standing and fallen)		1	4.25	33

			ha	Strategic stock grazing	remove stock during breeding season in remnants greater than 5 hectares	5	0	33
		425	ha	Supplementary planting (for use in "Moderate to good condition" vegetation)	plant locally indigenous shrub species	2	8.5	33
Stagonopleura guttata	Diamond Firetail	425	ha	Domestic stock grazing exclusion	Exclusion area must be greater than 5 hectares	10	42.5	51
			ha	Strategic stock grazing	remove stock during breeding season in remnants greater than 5 hectares	10	0	51
		425	ha	Supplementary planting (for use in "Moderate to good condition" vegetation)	use locally-indigenous grass and shrub species	2	8.5	51
Tiliqua occipitalis	Western Blue-tongued Lizard	425	ha	Domestic stock grazing exclusion		18	76.5	51
		425	ha	Feral and/or native herbivore control/exclusion fencing		13	55.25	51
		425	ha	Retention of all dead timber (standing and fallen)		9	38.25	51
Vespadelus baverstocki	Inland Forest Bat	425	ha	Domestic stock grazing exclusion		5	21.25	51
		425	ha	Retention of all dead timber (standing and fallen)		15	63.75	51
			ha	Strategic stock grazing	manage grazing to allow for canopy and midstorey species regeneration	2	0	51
		425	ha	Supplementary planting (for use in "Moderate to good condition" vegetation)		10	42.5	51

Species	Common Name	Management Action	Units	Offset Zone Prop 1 IRH	Total Gain
Ardeotis australis	Australian Bustard	Domestic stock grazing exclusion	ha	46.75	46.75
		Feral and/or native herbivore control/exclusion fencing	ha	46.75	46.75
Cacatua leadbeateri	Pink Cockatoo	Domestic stock grazing exclusion	ha	46.75	46.75
		Exclusion of fire	ha	21.25	21.25
		Feral and/or native herbivore control/exclusion fencing	ha	25.5	25.5
		Retention of all dead timber (standing and fallen)	ha	34	34
		Strategic stock grazing	ha	0	0
		Supplementary planting (for use in "Moderate to good condition" vegetation)	ha	8.5	8.5
Calyptorhynchus lathami - endangered population	Glossy Black-cockatoo Riverina Population	Application of ecological fire management	ha	0	0
		Domestic stock grazing exclusion	ha	42.5	42.5
		Exclusion of fire	ha	42.5	42.5
		Retention of all dead timber (standing and fallen)	ha	4.25	4.25
		Strategic stock grazing	ha	0	0
Certhionyx variegatus	Pied Honeyeater	Domestic stock grazing exclusion	ha	42.5	42.5
		Exclude commercial apiary site from property	ha	4.25	4.25
		Feral and/or native herbivore control/exclusion fencing	ha	8.5	8.5
		Strategic stock grazing	ha	0	0
		Supplementary planting (for use in "Moderate to good condition" vegetation)	ha	8.5	8.5

Chalinolobus picatus	Little Pied Bat	Domestic stock grazing exclusion	ha	42.5	42.5
		Maintain or re-introduce natural flow regimes to wetlands	ha	0	0
		Retention of all dead timber (standing and fallen)	ha	63.75	63.75
		Retention of rocks	ha	4.25	4.25
		Strategic stock grazing	ha	0	0
		Supplementary planting (for use in "Moderate to good condition" vegetation)	ha	21.25	21.25
Climacteris affinis - endangered population	White-browed Treecreeper Endangered Population	Domestic stock grazing exclusion	ha	42.5	42.5
		Exclusion of fire	ha	4.25	4.25
		Retention of all dead timber (standing and fallen)	ha	4.25	4.25
		Strategic stock grazing	ha	0	0
Falco hypoleucos	Grey Falcon	Domestic stock grazing exclusion	ha	63.75	63.75
		Feral and/or native herbivore control/exclusion fencing	ha	46.75	46.75
		Maintain or re-introduce natural flow regimes to wetlands	ha	0	0
		Retention of all dead timber (standing and fallen)	ha	25.5	25.5
		Strategic stock grazing	ha	0	0
Grantiella picta	Painted Honeyeater	Domestic stock grazing exclusion	ha	21.25	21.25
		Exclude commercial apiary site from property	ha	8.5	8.5
		Exclude miscellaneous feral species	ha	4.25	4.25
		Feral and/or native herbivore control/exclusion fencing	ha	4.25	4.25
		Strategic stock grazing	ha	0	0

		Supplementary planting (for use in "Moderate to good condition" vegetation)	ha	21.25	21.25
Leipoa ocellata	Malleefowl	Application of ecological fire management	ha	0	0
		Domestic stock grazing exclusion	ha	42.5	42.5
		Exclusion of fire	ha	42.5	42.5
		Feral and/or native herbivore control/exclusion fencing	ha	42.5	42.5
		Strategic stock grazing	ha	0	0
		Supplementary planting (for use in "Moderate to good condition" vegetation)	ha	8.5	8.5
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	Domestic stock grazing exclusion	ha	42.5	42.5
		Feral and/or native herbivore control/exclusion fencing	ha	21.25	21.25
		Retention of all dead timber (standing and fallen)	ha	85	85
		Strategic stock grazing	ha	0	0
		Supplementary planting (for use in "Moderate to good condition" vegetation)	ha	8.5	8.5
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	Domestic stock grazing exclusion	ha	42.5	42.5
		Exclude commercial apiary site from property	ha	8.5	8.5
		Exclude miscellaneous feral species	ha	4.25	4.25
		Strategic stock grazing	ha	0	0
		Supplementary planting (for use in "Moderate to good condition" vegetation)	ha	8.5	8.5
Nyctophilus timoriensis	Greater Long-eared Bat (south eastern form)	Domestic stock grazing exclusion	ha	21.25	21.25

		Retention of all dead timber (standing and fallen)	ha	63.75	63.75
		Strategic stock grazing	ha	0	0
		Supplementary planting (for use in "Moderate to good condition" vegetation)	ha	21.25	21.25
Polytelis swainsonii	Superb Parrot	Domestic stock grazing exclusion	ha	21.25	21.25
		Exclude miscellaneous feral species	ha	4.25	4.25
		Retention of all dead timber (standing and fallen)	ha	42.5	42.5
		Strategic stock grazing	ha	0	0
		Supplementary planting (for use in "Moderate to good condition" vegetation)	ha	21.25	21.25
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	Domestic stock grazing exclusion	ha	42.5	42.5
		Feral and/or native herbivore control/exclusion fencing	ha	21.25	21.25
		Retention of all dead timber (standing and fallen)	ha	4.25	4.25
		Strategic stock grazing	ha	0	0
		Supplementary planting (for use in "Moderate to good condition" vegetation)	ha	21.25	21.25
Pyrrholaemus sagittatus	Speckled Warbler	Domestic stock grazing exclusion	ha	42.5	42.5
		Retention of all dead timber (standing and fallen)	ha	4.25	4.25
		Strategic stock grazing	ha	0	0
		Supplementary planting (for use in "Moderate to good condition" vegetation)	ha	8.5	8.5
Stagonopleura guttata	Diamond Firetail	Domestic stock grazing exclusion	ha	42.5	42.5
		Strategic stock grazing	ha	0	0

		Supplementary planting (for use in "Moderate to good condition" vegetation)	ha	8.5	8.5
<i>Tiliqua occipitalis</i>	Western Blue-tongued Lizard	Domestic stock grazing exclusion	ha	76.5	76.5
		Feral and/or native herbivore control/exclusion fencing	ha	55.25	55.25
		Retention of all dead timber (standing and fallen)	ha	38.25	38.25
<i>Vespadelus baverstocki</i>	Inland Forest Bat	Domestic stock grazing exclusion	ha	21.25	21.25
		Retention of all dead timber (standing and fallen)	ha	63.75	63.75
		Strategic stock grazing	ha	0	0
		Supplementary planting (for use in "Moderate to good condition" vegetation)	ha	42.5	42.5

Total expected gain in offsets compared to total loss due to clearing for each species						
		Total population or area of habitat, or amount of a key habitat feature to be gained	Total population or area of habitat, or amount of a key habitat feature to be lost	Nett gain	Units	Can we proceed? (Yes or No or N/A)
Species	Common Name					
Ardeotis australis	Australian Bustard	93.5	33	60.50	ha	Yes
Cacatua leadbeateri	Pink Cockatoo	136	51	85.00	ha	Yes
Calyptrorhynchus lathamii - endangered population	Glossy Black-cockatoo Riverina Population	89.25	51	38.25	ha	Yes
Certhionyx variegatus	Pied Honeyeater	63.75	18	45.75	ha	Yes
Chalinolobus picatus	Little Pied Bat	131.75	51	80.75	ha	Yes
Climacteris affinis - endangered population	White-browed Treecreeper Endangered Population	51	51	0.00	ha	Yes
Falco hypoleucos	Grey Falcon	136	51	85.00	ha	Yes
Grantiella picta	Painted Honeyeater	59.5	51	8.50	ha	Yes
Leipoa ocellata	Malleefowl	136	51	85.00	ha	Yes
Melanodryas cucullata cucullata	Hooded Robin (south- eastern form)	157.25	51	106.25	ha	Yes
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	63.75	33	30.75	ha	Yes
Nyctophilus timoriensis	Greater Long-eared Bat (south eastern form)	106.25	51	55.25	ha	Yes
Polytelis swainsonii	Superb Parrot	89.25	51	38.25	ha	Yes
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	89.25	51	38.25	ha	Yes
Pyrrholaemus sagittatus	Speckled Warbler	55.25	33	22.25	ha	Yes
Stagonopleura guttata	Diamond Firetail	51	51	0.00	ha	Yes
Tiliqua occipitalis	Western Blue-tongued Lizard	170	51	119.00	ha	Yes
Vespadelus baverstocki	Inland Forest Bat	127.5	51	76.50	ha	Yes

Appendix B

Map and Overview of Proposed Offsets

Offset Strategy

1. This patch is dominated by three main vegetation communities:
 - Open Woodland of Bimble Box (Flats, and drain lines)
 - Bimble Box/Cypress Pine (slopes)
 - Dwyers Mallee Gum/Currawang (ridgetop)

Other species include Senna, Hooked Needlewood, Wilga, Kurrajong, Butterbush, Deans Wattle. The site has a high diversity of species and a good age class mix with both mature and regeneration trees and shrubs. Groundcover is sparse which is probably due to grazing and historical surface quarrying of the site.

The site also includes Nelson Road vegetation which is of similar type and condition, though has a better groundcover.

Fence maintenance is needed.

This site is in better condition than those to the east. Grey Crown Babblers seen at the site in April.

It is recommended that a grazing management plan be developed and grazing cease in the short term. No revegetation works are required as the site is already quite diverse, though some enhancement of the understorey could be beneficial.

2. This site is dominated by a Bimble Box/Cypress Pine community. There are only a few mature Bimble Box & Cypress Pine at the site. The majority of the site is dominated by regenerating stands of Cypress Pine and Bimble Box with no other tree or shrub species visible from the road.

Fencing of this site is required such that grazing can be excluded and a grazing management strategy adopted.

3. Dickie Road is located on the boundary of Griffith and Carrathool LGA's. The road reserve is 20m wide with around ½ of this taken up by the road carriageway. The road is winding, which historically would have allowed for larger trees to remain. The upper storey vegetation is dominated by Bimble Box/Cypress Pine with understorey made up of regenerating Kurrajong, Currawang, Wilga and Senna, Bimble Box and Cypress Pine.

The upper storey vegetation is in good condition with a variety of ages and some hollows. Connectivity is reasonable though enhancement would improve this by connecting some of the open patches and improving diversity.

4. This site is dominated by a Bimble Box/Cypress Pine community. Some Currawang, Kurrajong and Buloke. This site has previously been surface quarried with some larger/deeper open patches. Mature Bimble Box are sparse with the majority are below being 3m in height. Only young Cypress Pine are present though some are up to 5m in height. Thick pine regeneration is clumped with large open areas in between. Groundcover includes some native grasses.

Enhancement of the understorey is recommended as is fencing to control grazing. It would be necessary to determine the proposed use of the site as a quarry prior to any works being undertaken.

Grey Crown Babblers seen at the site in April.

5. The dam is surrounded by some mature Bimble Box. There is also a thin line of revegetation (possible Bimble Box) on the drainage line to the dam, which may be enhanced if it were fenced off. The dam would be required for stock, but it may be possible to fence some of it off to allow stock access to a small area only.

If possible it is recommended that a 100m wide corridor be fenced off and enhanced to create a corridor from offset 4 to offset 6.

6. This site is dominated by a Bimble Box/Cypress Pine community with some Dwyers Mallee Gum/Currawang on the ridgetops. The lower slopes are dominated by pine regrowth with occasional mature Bimble Box. It appears that quarrying has operated in the past. Enhancement is needed to improve biodiversity. Fencing of the northern side is also required.
7. This site is dominated by a Bimble Box/Cypress Pine community. Other species include Kurrajong, Rosewood, Senna, Yarran, Wilga, Buloke and Deans Wattle. There is a good mix of age classes with other mature and regenerating stands of trees. Understorey is very weedy including Patterson's Curse, Nightshade and Boxthorn.

No work is required to enhance the corridor, though spraying of weeds especially Boxthorn should be carried out ASAP.

8. This site is currently a cropped paddock with no trees present. This should be planted to provide a corridor 100m wide between Nelson Road and Offset 9. This will require fencing on the southern side of the corridor.
9. This site is dominated by a Bimble Box/Cypress Pine community. The site has been recently fenced. Bimble Box dominates the upper storey with some regeneration of Bimble Box and Cypress pine. There is a stand of mature Cypress Pine at the southern end of the site. There are some other unidentifiable shrubs present. It is expected that fencing of the site will allow for better management of grazing and will allow greater regeneration of native species.
10. It was not possible to get close to this site, though it appears to be dominated by a Bimble Box/Cypress Pine community of similar characteristics to Offset 9.
11. This site is currently a cropped paddock with no trees present. This should be planted to provide a corridor 100m wide between the unnamed road and Offset 9. This will require fencing on both sides of the corridor.
12. This unnamed road has three distinct portions. The Northern dogleg end has a mix of mature Bimble Box/Cypress Pine though it has been ploughed and is part of the adjoining paddock. No regeneration is present. All fallen timber has been gathered up and is piled up ready to burn. This area should be fenced off and enhanced with understorey.

The middle section to the willows is dominated by Bimble Box/Cypress Pine, with many hollows present. Other species includes Yarran, Senna, Wilga, rosewood

and some patches of pine regeneration. Open areas could be enhanced to improve connectivity and diversity. There is also boxthorn present which needs spraying ASAP. The fence needs maintaining in places to keep stock from adjoining paddocks out.

South of the willows the road has much less existing vegetation. Mostly being pine of mixed ages. There is some nightshade and Boxthorn which needs spraying. The fence needs maintaining in places to keep stock from adjoining paddocks out. Enhancement of the roadside is required to improve connectivity and diversity.

Enhance native vegetation for length and width of entire road reserve (40m inc road). Advise landholder to the east that the firebreak is not to be maintained except by slashing. Spray noxious weeds.

13. This site is currently dominated by Poplars and Willows. These species should be removed and the site replanted with natives such as Cooba. This would provide an enhanced stopover point for movement of birds as the road corridor is only 40m wide.
14. This vacant triangle of land was planted with tube stock around the outer edge perhaps 1-2 years ago. The site should be fenced on the hypotenuse with fencing on the other two sides maintained. The entire site should be revegetated.
15. This roadside is dominated by Cypress Pine with Narrow Leaf Hopbush and Yarran also present. There is a mixed grassy understorey with some native grasses and nightshade. Gaps in the vegetation require enhancement to improve connectivity.
16. This roadside is dominated by Cypress Pine with Yarran and Grey Mistletoe also present. There is a good grassy native understorey. Upper storey layers have a good mix of ages though enhancement could improve diversity and connectivity.
17. This site is dominated by Yarran with Narrow Leaf Hopbush, Bimble Box and Senna present. This site is severely degraded due to heavy grazing by horse and sheep. There is quite a good diversity though some dieback probably due to drought and overstocking. It would most likely respond well to fencing and removal of grazing. Enhancement should include upper storey species.
18. This site has scattered paddock trees mainly including Bimble Box and Cypress Pine. There is also some Rosewood, yarran and Narrow Leaf Hopbush Present. The site has been heavily grazed. Enhancement plantings are needed. Removal of grazing would encourage some regeneration.
19. As for Offset 18 this site includes a 100m wide corridor to link the northern corridor (via Offset 12) to the well vegetated Offset 26. The only difference is that this site should have priority for fencing and enhancement plantings in the short term. This would be unnecessary if grazing is removed from Offsets 18 & 19 concurrently.
20. This site has scattered paddock trees mainly including Bimble Box and Cypress Pine with some Mallee and Yarran present. The area has been cropped. Fencing of the site to separate it from Offsets 21 & 22 is important such that they can be managed appropriately. Enhancement of vegetation would be of low priority.

21. This site is dominated by Mallee. The upper storey is in high condition, however the understorey is almost no-existent due to grazing. This site would benefit from fencing and removal of grazing. Even though this site can not be a direct offset as it is a different vegetation type, preservation is of high priority as it would provide alternative habitat and food sources for birds and other animals throughout the year. In addition, this is the largest patch of Mallee in the locality with the closest patch of similar value being 7.5km away.
22. It was not possible to get close to this site, though it appears to be dominated by a Bimble Box.
23. This site has a mix of two communities including Black Box in a shallow depression and Bimble Box on higher ground. Fencing and removal of grazing would be the only action needed at this site.
24. This site is dominated by shrub land of Yarran with Narrow Leaf Hopbush and Senna also covering large areas. This site has been extremely heavily grazed for at least the past year by horses and there is very little groundcover. Horses are also ringbarking the larger Yarran. Stock needs to be removed from this patch immediately. Enhancement of the upper storey species would be of benefit.
25. This site is dominated by scattered paddock trees of Wilga with some Bimble Box, Cypress Pine, Yarran and Senna. There is Fleshy Mistletoe on the Wilga. The site has been consistently grazed for a long period of time as it was a crown land parcel leased for this purpose. Since Council acquired this land, grazing has ceased, and this is evident by the slightly improved ground layer. The ground storey is quite sparse however, and it will be some time before a great improvement is shown. It is recommended that grazing not be allowed within this allotment with a grazing strategy adopted in a number of years once further regeneration has taken place. Some enhancement of the area would be beneficial including reseeding with native grasses. African Boxthorn and other weeds present at the site needs to be controlled ASAP. Fencing between this site and Offset 26 is not required unless Council chooses to manage the different vegetation communities in different ways.
26. This site is dominated by a Bimble Box/Cypress Pine community with Dwyer's Mallee Gum/Currawang on the ridge tops. As for Offset 25 this site has been heavily grazed for a number of years, and will benefit from exclusion of grazing. It is considered that no enhancement is necessary at this stage. Given the large areas of regenerating Cypress Pine, thinning could be of long term benefit. Grey Crowned Babblers were seen at this site on 29 June 2007
27. This site is dominated by Cypress Pine. The site is grazed by Cattle. Removal of grazing would encourage some regeneration, though thinning of pine may be necessary to develop a more open Pine Woodland.
28. This area is dominated by an open woodland of Bimblebox. Some of the area being quite open with no upper storey. Some enhancement would be beneficial to increase diversity and connectivity of the site with Tharbogang Swamp.
29. This site is dominated by a Bimble Box/Cypress Pine community with Dwyer's Mallee Gum/Currawang on the ridge top. No action is needed at this site.

30. This site has been quarried in the past. It would have been dominated by Dwyer's Mallee Gum/Currawang. It is recommended that the site have a this layer of soil placed over it and then be direct seeded with plants from this community.
31. As for Offset 30. This site is 100m wide to create a corridor on the ridgeline.
32. As for Offset 30 & 31.
33. This site is dominated by Dwyer's Mallee Gum/Currawang community and is 100m wide to create a corridor and buffer between the boundary of the Bimble Box/Cypress Pine community in the south. No action is required.
34. This site is dominated by Bimble Box/Cypress Pine community which becomes more open near the weighbridge. No action is required.
35. This site is dominated by Bimble Box/Cypress Pine community which becomes more open at the southern end. No action is required.
36. This site is dominated by open woodland of Bimble Box/Cypress Pine community. It has mostly been cleared to create the speedway and there are only a few mature trees. It is recommended that all infrastructure be removed and the site be revegetated to reduce the visual impact of the quarry and to improve diversity at the site. This will also remove a use which is incompatible with a quarry and landfill.
37. This site is dominated by Cypress Pine with some open areas of Bimble Box. The site is grazed by Cattle. Removal of grazing would encourage some regeneration, though thinning of pine may be necessary to develop a more open Pine Woodland. Some enhancement of the Bimble Box woodland would be beneficial to increase diversity and connectivity of the site with Tharbogang Swamp.
38. Tharbogang Swamp is fringed with Black Box on its northern end. The remainder of the site is open with a few Bimble Box paddock trees. This site has been subject to grazing and is extensively degraded. It is saline and has little vegetative groundcover. Revegetation of this area is essential to prevent further deterioration. Removal of grazing is also required. This area has a dam and would provide water to woodland birds when it is unavailable on the hills. There is a large number of dead trees in the swamp area, most likely Black Box killed by an unnatural water regime due to irrigation runoff in the past.
39. This patch is linked to Tharbogang Swamp and should be treated similarly. Vegetation is dominated by a stand of Bimble Box.
40. This site is dominated by a Bimble Box/Cypress Pine community with Dwyer's Mallee Gum/Currawang on the ridge top. The site is grazed by Cattle. Removal of grazing would encourage some regeneration. Some enhancement of the Bimble Box woodland would be beneficial to increase diversity. Fencing of the site is recommended such that grazing can be managed.
41. This site is an open grassland. It is likely that it would be dominated by Bimble Box/Cypress Pine, though has been cleared at some time. Revegetation is recommended. No fencing would be required as there are no stock in this area.

42. This site is currently an orchard. Whilst it is zoned 7(v) Environmental Protection, it is an essential linkage in the hill corridor. It is recommended that the citrus be removed and a vegetation corridor at least 100m wide be revegetated.
43. This site is also zoned 7(v) Environmental Protection. It has previously been cleared for citrus but it has more recently been cleared for rural residential development. It is recommended that the site be revegetated to increase the width of the range in this location, to improve biodiversity and to improve scenic qualities of the range.
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50. The surrounding area is dominated by Dwyer's Mallee Gum/Currawang. This area has a few stands of regenerating pine, wedge leaf hopbush and Currawang, though is predominantly open grassland. There is no need for fencing as there is no grazing pressure, however enhancement is recommended.
51. This area was historically the Jack Higgins Landfill. It has more recently been covered with a layer of soil (10-20 years ago) though it is unsure what is located within the landfill or how much soil cover has been provided. Land contaminated tests and a soil survey are required prior to any works taking place. Once this occurs, it is recommended that the entire site is levelled and revegetated with Bimble Box/Cypress Pine community.
52. The site is dominated by Dwyer's Mallee Gum/Currawang community. Remaining vegetation is in good condition and includes Bimble Box. This site is severely degraded as it has been used as an illegal soil dump (?). The soil needs to be levelled with weed control carried out. Rubbish removal is needed and relocating of rocks after levelling of soil. Once this is carried out, fence maintenance and a locked fire gate are recommended to prevent further dumping at this site.
53. This site is dominated by a Bimble Box/Cypress Pine community. Understorey plantings and fencing are required to increase the width of vegetation on the range.
54. This site is dominated by a Bimble Box/Cypress Pine community. This site appears to have a good diversity and age class mix. Some revegetation is required though to improve the width of vegetation of the range and provide a corridor linkage.
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Note: Fencing of these sites may impact on the movement of kangaroos and other wildlife, hence fencing of any area should be considered carefully. Similarly, removal of grazing by stock needs to be carefully monitored as this may allow for weed species to proliferate and have a negative impact on the use of some sites by some bird and animal species. In this case, control by spraying and reseedling of native grasses may be required for a number of years to reduce the seed stock of weed species.

Offset Actions for Tharrogang Quarry																				
Site No.	Size (Ha)	Min Width	Avg Width	Main Veg Type	Veg Condition	Habitat Features - Rocks	Habitat Features - Fallen Timber	Habitat Features - Hollow logs	Fencing existing	Fencing Needed	Remove Grazing	Replanting to provide corridor	Understorey Enhancement Required	Revegetation required	Current Zone	Suggested Rezone	Management Agreement or purchase	Ownership/Tenure	Comments/ Including offset action	Priority
1	554	1600	2000	Bimble Box/Pine	M/H	Y	Y	Y	Y	N	Y	N	Y	Y	1(a) / 1(b)	Possibly 7	No	Private		M
2	28.2	400	400	Bimble Box/Pine	M	Y	Y	Y	N	Y	Y	N	Y	Y	1(a)	Possibly 7	No	Private		M
3	4.8	40	40	Bimble Box/Pine	M	Y	Y	Y	Y	N	N	N	N	N	1(a)	N/A	No	Roadside		L
4	23.9	440	550	Bimble Box/Pine	M	Y	Y	Y	N	Y	Y	N	Y	Y	1(a)	Possibly 7	No	Private	Disused Quarry	M
5	6.1	100	100	Bimble Box	M	N	Y	?	N	?	?	N	Y	Y	1(a)	No	No	Private	Dam Needed for stock	L
6	216.1	880	1000	Bimble Box/Pine	M	Y	Y	?	N	Y	Y	N	Y	Y	1(a) / 1(b)	Possibly 7	No	Private		M
7	3.5	40	40	Bimble Box/Pine	M/H	Y	Y	Y	Y	N	N	N	N	N	1(b)	N/A	No	Roadside	Good Corridor	L
8	5.9	100	100	Vacant	None	N	N	N	N	Y	Y	Y	Y	N	1(b)	No	No	Private	Currently cereal crop	L
9	178.9	250	500	Bimble Box/Pine	M	Y	N	?	Y	N	Y	N	Y	N	1(b)	Possibly 7	No	Private	Fence looks new	M
10	8.7	300	300	Bimble Box/Pine	M	Y	N	?	N	Y	Y	N	Y	N	1(b)	Possibly 7	No	Private		L
11	1.9	100	100	Vacant	None	N	N	N	N	Y	Y	Y	Y	Y	1(b)	No	No	Private		L
12	10.6	40	40	Bimble Box/Pine	M/L	N	Y	Y	Y	N	N	Y	Y	Y	1(b)	N/A	No	Roadside		M
13	2	30	40	Willows	None	N	Y	N	N	Y	Y	N	Y	Y	1(b)	No	No	Private	Remove Willows	L
14	2.7	10	100	Vacant	None	N	N	N	N	Y	Y	N	Y	Y	1(b)	No	No	Private	Some tree planting already at site	L
15	9.6	60	60	Pine	M	N	Y	N	Y	N	N	N	Y	Y	1(b)	N/A	No	Roadside	Enhance	M
16	8.9	100	100	Pine	M	N	Y	N	Y	N	N	N	Y	Y	1(b)	N/A	No	Roadside	Enhance	M
17	14.3	70	160	Yarran	M/L	N	Y	Y	N	Y	Y	N	N	N	1(a)	Possibly 7	Yes	Crown		M/H
18	179.5	420	700	Bimble Box/Pine	L	N	N	Y	N	Y	Y	N	Y	Y	1(a) / 1(b)	No	Yes	Crown		L
19	27.9	100	100	Bimble Box/Pine	L	N	N	Y	N	Y	Y	Y	Y	Y	1(a) / 1(b)	No	Yes	Crown		H
20	85.7	600	700	Bimble Box/Pine	L	N	N	?	N	Y	Y	N	Y	Y	1(a)	No	Yes	Crown		L
21	31.4	120	410	Mallee	M	N	Y	Y	N	Y	Y	N	N	N	1(a)	Possibly 7	Yes	Crown	Remove Grazing	M/H
22	7.5	120	200	Bimble Box	M	?	?	?	N	Y	Y	N	Y	Y	1(a)	Possibly 7	Yes	Crown	Too far to see	H
23	26.3	180	300	Black Box/Bimble Box	M	N	Y	Y	N	Y	Y	N	N	N	1(a) / 1(b)	Possibly 7	Yes	Crown/Private	Remove Grazing	M
24	26.4	100	350	Yarran	L	N	Y	N	Y	N	Y	N	N	Y	1(a)	Possibly 7	Yes	Crown	Upperstorey needed	H
25	132.1	800	800	Wilga	L	N	Y	Y	N	N	Y	N	Y	Y	1(b) / 7(v)	Possibly 7 (to include all of site)	N/A	Council	Enhance understorey	H
26	111.6	400	600	Bimble Box/Pine	M	Y	Y	Y	N	N	Y	N	N	N	1(f) / 1(b) / 7(v)	Possibly 7 (to include all of site)	N/A	Council	Remove Grazing	H
27	61	100	400	Pine	M	N	Y	?	Y	N	Y	N	N	N	1(b)	Possibly 7	Yes	Private/Paper Road	Remove Grazing	H
28	89.7	300	600	Bimble Box	M/L	N	?	Y	Y	N	Y	N	Y	Y	1(b)	Possibly 7	Yes	Private/Paper Road	Remove Grazing	M
29	20	650	650	Bimble Box/Pine	M/H	Y	Y	Y	N	N	N	N	N	N	5(a) / 7(v)	Possibly 7 (to include all of site)	N/A	Council	As is	N/A
30	1.3	50	50	Vacant	L	Y	N	N	N	N	N	Y	Y	Y	7(v)	No	N/A	Council	Remove Grazing	H
31	2.3	100	100	Vacant	L	Y	N	N	N	N	N	Y	Y	Y	5(a) / 7(v)	Possibly 7 (to include all of site)	N/A	Council	Remove Grazing	H
32	3.3	100	100	Vacant	L	Y	N	N	N	N	N	Y	Y	Y	5(a) / 7(v)	Possibly 7 (to include all of site)	N/A	Council	Remove Grazing	H
33	7.5	100	100	Bimble Box/Pine	M/H	Y	Y	Y	N	N	N	N	N	Y	5(a) / 7(v)	Possibly 7 (to include all of site)	N/A	Council	100m corridor	H
34	5.7	100	200	Bimble Box/Pine	M/H	Y	Y	Y	N	N	N	N	N	Y	5(a) / 7(v)	Possibly 7 (to include all of site)	N/A	Council		H
35	31.2	20	300	Bimble Box/Pine	M/H	Y	Y	Y	N	N	N	N	N	Y	5(a)	Possibly 7	N/A	Council		H
36	9.5	250	250	Bimble Box/Pine	M/L	Y	N	Y	N	N	N	N	Y	Y	5(a)	Possibly 7	N/A	Council	Speedway	H
37	97.9	670	700	Pine	M	N	Y	?	Y	N	Y	N	Y	Y	1(b)	Possibly 7	Yes	Private/Paper Road		H
38	152.7	510	600	Black Box/Bimble Box	M/L	N	Y	Y	Y	N	Y	N	Y	Y	7 / 7(w)	No	N/A	Council as trustee	Reveg with salt tollerant species	M
39	16.1	340	340	Bimble Box	M/L	N	Y	Y	Y	N	Y	N	Y	Y	1(b)	Possibly 7	N/A	Council as trustee	Reveg with salt tollerant species	M
40	196.8	720	1000	Bimble Box/Pine	M/H	Y	Y	Y	Y	Y	Y	N	N	Y	7(v) / 7(c)	Possibly 7 (to include all of site)	Possibly	Private/Paper Road		M
41	2.8	110	110	Vacant	M/L	Y	N	N	N	N	N	N	Y	Y	7(v)	No	No	Crown		M
42	5.4	200	200	Vacant	L	N	N	N	N	N	N	Y	Y	Y	7(v)	No	Yes	Private		H
43	1.8	100	140	Vacant	L	N	N	N	N	N	N	N	Y	Y	7(v)	No	Yes	Private		H
50	8.5	50	90	Dwyers Gum/Currawang	M	N	N	N	N	N	N	Y	Y	Y	7(v)	No	No - protected b	Crown	Some patches of regen	M
51	5.8	50	100	Dwyers Gum/Currawang	L	Y	N	N	N	N	N	N	Y	Y	7(v)	No	No - protected b	Crown	Contaminated site	M
52	5.9	140	160	Dwyers Gum/Currawang	M/L	Y	Y	Y	Y	N	Y	N	Y	Y	7(v)	No	No - protected b	Crown	Soil Dump	H
53	4.4	50	110	Dwyers Gum/Currawang	M/L	N	Y	N	N	Y	Y	Y	Y	Y	7(v) / 1(b)	Rezone 7 to reflect vegetated areas	Yes	Crown		H
54	30.3	110	500	Bimble Box/Pine	M	Y	Y	Y	Y	N	Y	N	Y	Y	7(v) / 1(b)	Rezone 7 to reflect vegetated areas	Yes	Crown		M
55	14.8	300	300	Bimble Box/Pine	M	N	N	Y	N	Y	Y	N	Y	N	1(b)	Rezone 7 to reflect vegetated areas	No	Private		M
56	6.5	100	100	Vacant	L	N	N	N	N	Y	Y	Y	Y	Y	7(v) / 1(b)	No	No	Private		L
57	7.9	100	180	Bimble Box/Pine	M/L	Y	N	N	Y	N	N	N	Y	Y	7(v)	No	No - protected b	Council as trustee	Quarry	M
58	14.5	120	240	Bimble Box/Pine	M/L	Y	Y	Y	Y	N	N	N	Y	N	7(v)	No		Council as trustee		M
59	5.5	70	160	Bimble Box/Pine	M	N	Y	N	Y	N	N	N	Y	Y	7(v)	No	No - protected b	Council as trustee	Quarry	M
60	3.4	200	300	Bimble Box/Pine	M	Y	Y	Y	N	Y	N	N	Y	N	7(v)	No	No - protected b	Aboriginal Land Council		M

Map Depicting Offset Areas



Table showing offset areas and corresponding measured areas

ID	Area Ha
1	554.0
2	28.2
3	4.8
4	23.9
5	6.1
6	216.1
7	3.5
8	5.9
9	178.9
10	8.7
11	1.9
12	10.6
13	2.0
14	2.7
15	9.6
16	8.9
17	14.3
18	179.5
19	27.9
20	85.7
21	31.4
22	7.5
23	26.3
24	26.4
25	132.1
26	111.6
27	61.0
28	89.7
29	20.0
30	1.3
31	2.3
32	3.3
33	7.5
34	5.7
35	31.2
36	9.5
37	97.9
38	152.7
39	16.1
40	196.8
41	2.8
42	5.4
43	1.8
50	8.5
51	5.8
52	5.9
53	4.4
54	30.3
55	14.8
56	6.5
57	7.9
58	14.5
59	5.5
60	3.4



Appendix C

Current Zoning of Proposed Offsets

Map Showing LEP Zones and Offset Areas

