

# Offset management plan

LAKE WALLACE STORAGE DAM AND ASSOCIATED INFRASTRUCTURE



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ABN: 31 124 444 622

suite 1, 216 carp st (po box 470) bega nsw 2550 australia t 61 2 6492 8333

[www.nghenvironmental.com.au](http://www.nghenvironmental.com.au) e [ngH@nghenvironmental.com.au](mailto:ngH@nghenvironmental.com.au)

po box 434  
bathurst nsw 2795 australia  
0488 820 748

unit 18, level 3, 21 mary st  
surry hills nsw 2010 australia  
t (02) 8202 8333

unit 17, 27 yallourn st (po box 1037)  
fyshwick act 2609 australia  
t (02) 6280 5053

suite 1, 39 fitzmaurice st (po box 5464)  
wagga wagga nsw 2650 australia  
t (02) 6971 9696

37 peron ave (po box 1037)  
dunsborough wa 6281 australia  
(08) 9759 1985

# CONTENTS

<b>1</b>	<b>INTRODUCTION.....</b>	<b>1</b>
1.1	BACKGROUND .....	1
1.2	PURPOSE AND SCOPE.....	3
1.3	CORE OBJECTIVES.....	4
<b>2</b>	<b>OFFSET SITE ASSESSMENT.....</b>	<b>5</b>
2.1	OFFSET SITE DESCRIPTION .....	5
2.1.1	Physical characteristics .....	5
2.1.2	Vegetation and habitats .....	5
2.1.3	Social and cultural factors.....	6
2.2	ENDANGERED ECOLOGICAL COMMUNITIES .....	6
2.2.1	Snow Gum – Candlebark Woodland EEC.....	7
2.2.2	Natural Temperate Grassland EEC (Wet Tussock Grassland) .....	7
<b>3</b>	<b>STATE AND COMMONWEALTH EEC OFFSETS .....</b>	<b>8</b>
3.1	LOCATION AND SIZE OF OFFSETS.....	8
3.2	ADEQUACY OF OFFSET SITES.....	8
3.2.1	Quality .....	8
3.2.2	Area .....	9
<b>4</b>	<b>LEGAL CONTEXT .....</b>	<b>12</b>
4.1	LAKE WALLACE PROJECT COMMITMENTS.....	12
4.2	APPROVAL AND CONCURRENCE CONDITIONS .....	13
4.2.1	Commonwealth approval conditions.....	13
4.2.2	NSW Department of Planning approval conditions.....	13
4.3	LEGISLATION .....	15
<b>5</b>	<b>SUMMARY OF KEY MANAGEMENT ACTIONS AND GUIDELINES .....</b>	<b>16</b>
<b>6</b>	<b>MANAGEMENT STRATEGY .....</b>	<b>23</b>
6.1	MANAGEMENT ZONES .....	23
6.2	MANAGEMENT ACTIONS AND GUIDELINES.....	24
6.2.1	Perimeter fencing, access and signage .....	24
6.2.2	Riparian zone, woodland and Small Snake Orchid protection.....	24
6.2.3	Stock Management Plan .....	28
6.2.4	Fire management.....	32
6.2.5	Slashing .....	34

6.2.6	Weed control .....	38
6.2.7	Pest animal control .....	39
6.2.8	Track upgrading, erosion and sedimentation control .....	43
6.2.9	Fauna habitat and vegetation management .....	46
6.2.10	Aboriginal cultural heritage protection .....	47
<b>7</b>	<b>INSPECTION AND COMPLIANCE .....</b>	<b>50</b>
<b>8</b>	<b>MONITORING, REVIEW AND REPORTING .....</b>	<b>51</b>
8.1	CONDITION MONITORING .....	51
8.1.1	Indicators and targets .....	51
8.1.2	Methods .....	51
8.2	MANAGEMENT REVIEW AND ADAPTIVE RESPONSE .....	54
8.2.1	Management review .....	54
8.2.2	Corrective actions and contingency measures .....	54
8.3	PLAN REVIEW .....	55
<b>9</b>	<b>MANAGEMENT RESPONSIBILITY AND FUNDING .....</b>	<b>55</b>
<b>10</b>	<b>OFFSET SITE TENURE AND SECURITY .....</b>	<b>56</b>
<b>11</b>	<b>REFERENCES .....</b>	<b>57</b>
<b>APPENDIX A</b>	<b>FLORA SPECIES LISTS .....</b>	<b>A-1</b>
<b>APPENDIX B</b>	<b>RARE AND GRAZING-SENSITIVE FLORA .....</b>	<b>B-1</b>

## TABLES

Table 1-1	Estimated area of vegetation clearing required by the Lake Wallace project (ha) .....	1
Table 1-2	Commonwealth Natural Temperate Grassland Management Plan requirements and the relevant sections of the Offset Management Plan .....	4
Table 3-1	EEC offset requirements and offset areas within the offset sites .....	9
Table 6-1	Maximum distance of water flow along road surfaces and table drains (from OEH 2012) .....	43
Table 8-1	Condition indicators, targets and achievement timeframes for monitoring at the offset sites .....	51

## FIGURES

Figure 1-1	Lake Wallace block and southern blocks offsets sites on the whole property .....	2
Figure 3-1	Lake Wallace block offset site vegetation communities, EEC offsets, management zones and fencing .....	10

Figure 3-2 Southern blocks offset site vegetation communities, EEC offsets, management zones and fencing .....	11
Figure 6-1 Location of the proposed hardened stock crossing over Pigring Creek at the southern blocks offset site (not to scale) .....	26
Figure 6-2 Existing stock and vehicle crossing over Pigring Creek (southern blocks offset site) .....	26
Figure 6-3 Threatened, rare and grazing-sensitive flora records at the Lake Wallace offset site .....	36
Figure 6-4 Threatened, rare and grazing-sensitive flora records at the southern blocks offset site.....	37
Figure 6-5 Observed erosion sites and pest plant and animal occurrences at the Lake Wallace offset site.....	41
Figure 6-6 Observed erosion sites and pest plant and animal occurrences at the southern blocks offset site .....	42
Figure 6-7 Rollover design and dimensions (OEH 2012).....	43
Figure 6-8 Wet drainage line in Lake Wallace block requiring pipe culvert crossing .....	44
Figure 6-9 Eroded track surface on slope in Lake Wallace block requiring resurfacing and drainage .....	44
Figure 6-10 Lake Wallace block erosion site 1 (706491 5950589).....	44
Figure 6-11 Southern blocks erosion site 2 (706839 5949709) .....	44
Figure 6-12 Southern blocks erosion site 3 (706884 5949711) .....	45
Figure 6-13 Southern blocks erosion site 4 (707730 5949096) .....	45
Figure 6-14 Aboriginal cultural heritage sites and no harm areas at the offset sites.....	49

# 1 INTRODUCTION

## 1.1 BACKGROUND

Cooma Monaro Shire Council's construction of a 320 megalitre water storage dam on Pigring Creek (Lake Wallace) was approved under the NSW *Environmental Planning and assessment Act 1979* and the Commonwealth *Environmental Protection Biodiversity Conservation Act 1999*.

As a condition of State and Commonwealth approval, Council was required to establish direct offset sites to compensate for the impacts of the project, as detailed in the Biodiversity Offset Strategy (nghenvironmental 2013a). Direct biodiversity offsets are areas of land similar and generally close to the area impacted by a proposal which are set aside permanently and managed for conservation.

The Lake Wallace project involved the clearing of native vegetation, including two Endangered Ecological Communities (EECs). The areas of each vegetation unit affected by the works are summarised in Table 1-1 below.

Table 1-1 Estimated area of vegetation clearing required by the Lake Wallace project (ha)

Vegetation unit	Permanent loss	Rehabilitation
Snow Gum – Candlebark Woodland (NSW EEC)	3.3208	nil
Snow Gum – Candlebark Woodland secondary grassland – high quality (NSW EEC)	1.9307	nil
Snow Gum – Candlebark Woodland secondary grassland – low quality (NSW EEC)	0.3117	0.3913
River Tussock – Tall Sedge – Kangaroo Grass Moist Grassland - high quality (Commonwealth EEC)	1.8802	nil
River Tussock – Tall Sedge – Kangaroo Grass Moist Grassland - low quality	0.1190	0.2798
Snow Gum – Candlebark Shrubby Open Forest	0.1259	nil
Ribbon Gum – Snow Gum Grassy Open Forest	0.0658	nil
Riparian Herbfield	0.3934	nil
<b>Total</b>	<b>8.1475</b>	<b>0.6711</b>

The Lake Wallace block and southern blocks offset sites protect vegetation belonging to the following EECs affected by the Lake Wallace project:

- NSW Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland in the South Eastern Highlands, Sydney Basin, South East Corner and NSW South Western Slopes Bioregions EEC ('Snow Gum - Candlebark Woodland EEC'), and the
- Commonwealth Natural Temperate Grassland of the Southern Tablelands of NSW and the Australian Capital Territory EEC (Wet Tussock Grassland association).

The offset sites are located on Pigring Creek, upstream of the dam and approximately 6 kilometres south of Nimmitabel; refer Figure 1-1. The Lake Wallace block and southern blocks offset sites originally formed part of an 860 hectare freehold property used for commercial grazing. Cooma-Monaro Shire Council has purchased the land required to establish the offset sites. A Conservation Property Vegetation Plan will be prepared to legally establish and regulate the management of the offset sites (refer section 10).



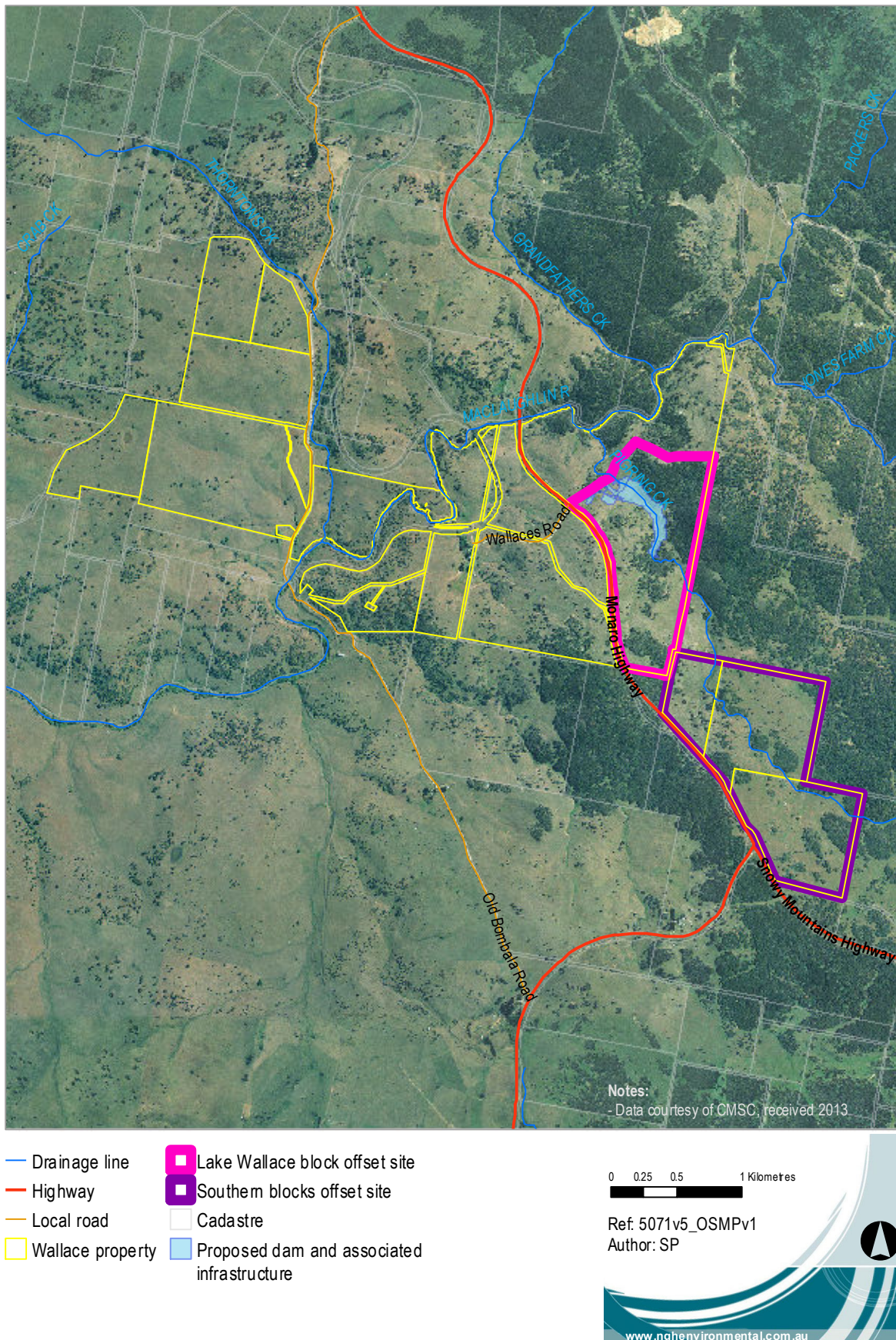


Figure 1-1 Lake Wallace block and southern blocks offsets sites on the whole property

## 1.2 PURPOSE AND SCOPE

The purpose of the Offset Management Plan is to give effect to the offsetting commitments and approval conditions associated with the Lake Wallace development. These commitments and conditions require the establishment of legally secure and adequate direct offset sites, and their management to protect or enhance the condition of EECs and other ecological values.

The Offset Management Plan provides objectives, outcomes, actions and guidelines covering:

- perimeter fencing, access and signage
- riparian zone and woodland protection
- stock grazing management (stock management plan)
- fire management
- slashing
- weed control
- pest animal control
- track upgrading, erosion and sedimentation control
- fauna habitat and vegetation management
- cultural heritage protection.

The content of the plan has been tailored to the management requirements of the offset sites, including active threatening processes. The scope of the plan covers matters included in the BioBanking and Offsets Scheme management actions template (OEH 2011) and the commitments in the Lake Wallace Biodiversity Offsets Strategy (ngghenvironmental 2013a).

The plan also provides for the monitoring of vegetation condition, regular review of management performance and review of the plan. The plan identifies management responsibilities, implementation timeframes and the legal mechanism used to protect the offset sites.

### Natural Temperate Grassland Management Plan

The Commonwealth approval for the project requires Council to prepare a Natural Temperate Grassland Management Plan, which must be approved in writing by the Minister before commencement of the action. The Natural Temperate Grassland Management Plan must include, but not be limited to:

- a. a textual description of the offset site, including offset attributes, shapefiles, and a map clearly defining the location and boundaries of the offset site
- b. a detailed description of management actions designed to protect and improve the ecological quality of Natural Temperate Grassland on the offset site
- c. key milestones, performance indicators and timeframes for management actions
- d. a monitoring program to determine the success of the management actions
- e. corrective actions and contingency measures to be implemented where monitoring of the offset site shows that management actions are not effectively achieving key milestones or prescribed performance indicators are not being met or unlikely to be met.

This Offset Management Plan is intended to meet the Commonwealth requirements for a Natural Temperate Grassland Management Plan. The sections in the Plan directly relevant to the Commonwealth requirements for a Natural Temperate Grassland Management Plan are summarised in Table 1-2 below.



Table 1-2 Commonwealth Natural Temperate Grassland Management Plan requirements and the relevant sections of the Offset Management Plan

Commonwealth requirement	Relevant section in the plan
A textual description of the site, including offset attributes, shapefiles and a map clearly defining the location and site boundaries.	Detailed in the Offset Site Assessment report (ngnenvironmental 2013b). Summarised in section 2 of the plan. Location map: Figure 1-1 Management maps: section 6
A detailed description of the management actions designed to protect and improve the ecological quality of the Natural Temperate Grassland on the offset site.	Action schedule – section 5 Management - section 6: Fencing – sections 6.2.1, 6.2.2 Riparian protection - section 6.2.2 Grazing – section 6.2.3 Fire management – section 6.2.4 Slashing – section 6.2.5 Weeds – section 6.2.6 Pest animals – section 6.2.7
Key milestones, performance indicators and timeframes for management actions.	General objectives – section 1.3 Specific objectives, outcomes (with indicators) and guidelines – section 8 Implementation schedule in section 5.
A monitoring program to determine the success of the management actions.	Section 7, based on condition indicators and outcomes detailed in section 6.
Corrective actions and contingency measures to be implemented where monitoring shows that management actions are not effectively achieving key milestones or prescribed performance indicators are not being met or unlikely to be met.	Section 8.2

### 1.3 CORE OBJECTIVES

The core objectives of the Offset Management Plan are to:

- protect and enhance the condition of Snow Gum – Candlebark Woodland (secondary grassland and structural woodland) and Natural Temperate Grassland (Wet Tussock Grassland) at the offset sites
- manage herbaceous groundcover biomass to the optimal level necessary to protect and enhance habitat values, native species richness and resilience
- protect and enhance soil stability, landscape function and water quality
- protect and enhance woodland fauna habitat values
- control and minimise the impacts of threatening processes including soil erosion, invasive weeds and pest animals.

The conservation of biodiversity values in perpetuity is the over-riding management priority for the sites. Stock grazing will be used as a management tool to control grass biomass in Snow Gum – Candlebark Woodland secondary grassland areas.

Specific management objectives, outcomes actions and guidelines are provided for various aspects of management covered by the plan in section 6. The schedule in section 5 identifies responsibilities and timeframes for implementation. The figures in section 3 map existing and new fencing, gates, access tracks, stock crossing and water points, and recorded noxious weed and soil erosion locations.

The works-based and condition-based outcomes are time-framed and auditable. Regular monitoring and review will be used to evaluate the achievement of objectives and outcomes and adapt management as required.

## 2 OFFSET SITE ASSESSMENT

An Offset Site Assessment of the Lake Wallace block and southern blocks offset sites has been undertaken to:

- document field survey findings relating to the condition of Snow Gum - Candlebark Woodland and Wet Tussock Grassland at the offset sites
- demonstrate that the area and quality requirements in relation to EEC offsets have been met
- provide a working information base for the Offset Management Plan.

The Offset Site Assessment report (**ngh**environmental 2013b) incorporates vegetation survey data and mapping for the offset sites compiled by Eco Logical Australia (2011, 2012), and additional survey and assessment work undertaken by **ngh**environmental. The assessment report provides survey data and mapping relating to EEC vegetation units, significant flora, major weeds and soil erosion. The assessment report also contains summary information on the physical, biological and social/cultural characteristics of the offset sites. Vegetation communities mapped at the offset sites are shown on Figure 3-1 and Figure 3-2. The following provides a summary of findings in the Offset Site Assessment report.

### 2.1 OFFSET SITE DESCRIPTION

#### 2.1.1 *Physical characteristics*

The Lake Wallace block and southern blocks offset sites are located in the Pigring Creek - Lake Wallace catchment. The fourth-order Pigring Creek forms part of the MacLaughlin River and Snowy River catchments. The creek is incised in places and runoff efficiency from the catchment is likely to have increased since European settlement. The sites occur on granitic soils derived from granodiorite and adamellite (from the Glenbog Suite, part of the Devonian Bega Batholith). The soils are non-dispersive (SMEC 2010) and are characterised by medium- to coarse-grained clayey sands with a thin topsoil of clayey silt. The topography includes a narrow alluvial floodplain and undulating sideslopes, at around 1000 metres above sea level.

#### 2.1.2 *Vegetation and habitats*

The offset sites support riparian and aquatic vegetation, native grasslands, grassy woodland, and both grassy and shrubby open forest communities, including:

- Snow Gum – Candlebark Woodland and secondary grassland
- River Tussock – Tall Sedge – Kangaroo Grass Moist Grassland
- Snow Gum – Candlebark Shrubby Open Forest
- Ribbon Gum – Snow Gum Grassy Open Forest
- Riparian Herbfield.

The offset sites have been grazed by both cattle and sheep using a set stocking regime, rather than rotational grazing (A. Wallace, land owner, pers. comm). Grazing affects natural ecosystems through herbivory, soil impacts and nutrient concentration. Long term grazing impacts are likely to include:

- a decline in the diversity of native forb species
- the replacement of tall warm-season grasses species with shorter cool-season grasses
- increasing dominance by introduced annual species with higher grazing intensity
- soil compaction and disturbance (Eddy 2002, Dorrough *et al.*, 2004, Lunt *et al.* 2007).

Grazing over a long period is likely to have removed or reduced the abundance of sensitive flora such as shrubs, legumes and geophytes. Increased phosphorous through the use of fertiliser results in a progressive loss of native plant diversity (Dorrough *et al.* 2008, Dorrough 2012); no superphosphate fertiliser has been applied to the offset sites in the last 30 years (A. Wallace, land owner, pers. comm).

At the time of survey the southern blocks site showed signs of selective grazing of Kangaroo Grass (*Themeda triandra*), with this species grazed low over much of the site and reduced to a patchy sward between *Poa labillardierei* tussocks in the east of the southern blocks site. However, *Themeda triandra* generally remains widespread and dominant in grassland and a range of grazing-sensitive and quality indicator species are present at both offset sites.

Tree cover at the sites includes remnant forest, woodland patches comprising mature older trees and surrounding regrowth of varying ages, and mature paddock trees. Hollow-bearing trees are sparsely scattered at the sites. Woodland and forest patches generally have abundant fallen logs and litter. Embedded granitic boulders provide some reptile habitat and refugia for grazing-sensitive plants. Pigging Creek and farm dams provide water sources and aquatic habitat for fauna.

### **2.1.3 Social and cultural factors**

The offset sites have a long history of continuous commercial grazing (cattle and sheep). All vegetation communities at the sites have been affected by grazing, including the two EECs at both sites.

The offset sites are zoned 1(a) (Rural Zone) in the Cooma Monaro Shire Local Environmental Plan Cooma-Monaro Local Environment Plan 1999 – (Rural). The sites have been purchased by Council. Crown road reserves along the boundaries of the southern blocks offset site will be included in the offset site and managed in accordance with this plan. These Crown roads will be purchased by Council in the coming years. Land use within the Pigging Creek catchment is predominantly forest and grazing. The catchment contains ten land lots and portions of sixteen additional land lots, involving 10 owners. The Monaro Highway and Snowy Mountain Highway run along the western boundary of the sites. Both offset sites are visible from the highways.

Small low density Aboriginal artefact scatters and isolated artefacts manufactured from quartz, silcrete, chert and quartzite were recorded at the Lake Wallace block (nghenvironmental 2013). The waterhole on Pigging Creek in the south of the Lake Wallace block is a possible birthing site and has cultural value (On site CHM 2013).

## **2.2 ENDANGERED ECOLOGICAL COMMUNITIES**

The detailed survey results for Endangered Ecological Communities at the offset sites are contained in the Offset Site Assessment Report (nghenvironmental 2013b), and the Offset Monitoring Report (nghenvironmental 2015). Flora species lists for each condition class of the Snow Gum – Candlebark

Woodland EEC and Natural Temperate Grassland EEC extracted from the monitoring report are provided in Appendix A.

### **2.2.1 Snow Gum – Candlebark Woodland EEC**

This EEC occupies an estimated total area of 14,100 hectares which is estimated to be a 72% decline in area since European settlement (Tozer *et al.* 2010). The corresponding BioMetric vegetation type Snow Gum - Candlebark Woodland on Broad Valley Flats of the Tablelands and Slopes, South Eastern Highlands has a clearing estimate of 95% (DECCW 2008a). Clearing for agriculture has also fragmented the community. Less than 4,000 hectares is currently represented in conservation reserves in NSW (Crooks in litt. 2009 in NSW Scientific Committee 2011). The community is threatened by climate change, clearing, fragmentation, fertilizers, tree dieback, trampling and grazing by domestic livestock, weed invasion and altered fire regimes (NSW Scientific Committee 2011).

Priday (2007) notes that Snow Gum Woodlands have been extensively modified, cleared and fragmented in Cooma Monaro Shire. Tozer *et al.* (2006) map more than 4,000 hectares of Southern Tablelands Flats Forest to the immediate north and south of the study area, some of which is likely to comprise the local occurrence of the EEC (Eco Logical Australia 2011). There are 860 hectares of the Southern CRA community 146 Tableland Dry Herb/Grass Woodland in the CMSC LGA, which is likely to be one of the communities making up the EEC (OACE 2008). This community is vulnerable and poorly reserved in the LGA (OACE 2008).

Preliminary vegetation mapping of the Wallace property undertaken by Eco Logical Australia (2012) maps approximately 169 hectares of Snow Gum – Candlebark Woodland EEC as structural woodland, 27 hectares as high quality secondary grassland and 261 hectares as low quality secondary grassland. The EEC is likely to extend along the Pigging Creek and MacLaughlin River valleys, and adjacent valley areas.

### **2.2.2 Natural Temperate Grassland EEC (Wet Tussock Grassland)**

The Wet Tussock Grassland form of the Commonwealth Natural Temperate Grassland EEC occupies colluvial footslopes, and alluvial drainage lines, depressions and flats and is dominated by *Poa labillardierei*, *Juncus* spp, *Themeda triandra*, *Rytidosperma* spp, *Carex appressa* and *Microlaena stipoides* (Rehwinkel 2007b in DSEWPAC 2012b).

The pre-European and current extent of the Wet Tussock Grassland association is not known (Rehwinkel pers comm. 2010 in Eco Logical Australia 2011). The association corresponds to the BioMetric Vegetation Type River Tussock - Tall Sedge - Kangaroo Grass Moist Grasslands of the South Eastern Highlands (DECCW 2008), Benson's (1994) Community 8 and the OEH (2011) community r2: River Tussock - Kangaroo Grass - Rush Wet Tussock Grassland of Footslopes, Drainage Lines and Flats of the South Eastern Highlands Bioregion.

For the Southern CRA region, Gellie (2005) estimates a pre-1750 area of 11,700 hectares, an extant area of 2,500 ha, percentage cleared 79% and 85 ha (1%) in conservation reserves for Vegetation Group 148 Tableland Tussock Grassland/Sedgeland. The BioMetric vegetation type River Tussock - Tall Sedge - Kangaroo Grass Moist Grasslands of the South Eastern Highlands has a clearing estimate of 95% (DECCW 2008a). The association occurs at Reedy Creek TSR, Logans TSR and Rosewood TSR, Wet Lagoon and Mulligans Flat. It is reserved in Deua NP, Tinderry NR and Yaouk NR, with very minor occurrence at Turallo NR. It is also found on Nature Conservation Trust covenanted land in the upper Shoalhaven River, and at the Scottsdale Bush Heritage Reserve near Cooma (OEH 2011). The 2008 Regional State of the Environment report indicates that there are 340 hectares of the analogous Southern CRA community 148 Tableland

Tussock Grassland/Sedgeland/Woodland in the CMSC LGA (OACE 2008). This community is vulnerable and poorly reserved in the LGA (OACE 2008).

The size and distribution of the local occurrence of the EEC is similarly not known, but appears likely to extend along the Pigring Creek and MacLaughlin River valleys, and other valley areas in the locality. Preliminary vegetation mapping shows that there are approximately 15 hectares of the Wet Tussock Grassland association on the Wallace property (Eco Logical Australia 2012).

## 3 STATE AND COMMONWEALTH EEC OFFSETS

### 3.1 LOCATION AND SIZE OF OFFSETS

The 107.63 hectare Lake Wallace block and 150.74 hectare southern blocks offset sites contain areas of the NSW Snow Gum Woodland EEC which are included in the NSW offset. The combined total area of the EEC in both sites is 110.24 hectares; the area in each condition class is shown in Table 3-1.

The Commonwealth offset area used for the calculation of offset adequacy in the Biodiversity Offset Strategy for the Lake Wallace project (ngnenvironmental 2013a) is based on the occurrence of the community in the southern blocks offset site. The Natural Temperate Grassland EEC in this case comprises 9.71 hectares of the Wet Tussock Grassland association. A small area (0.57 hectares) of the Commonwealth EEC is also present in the Lake Wallace block. These areas together comprise the Commonwealth EEC offset, and will be managed for biodiversity conservation and riparian protection. The Commonwealth EEC offset is indicated on Figure 3-1 and Figure 3-2.

The offset sites also contain (non-EEC) forest vegetation belonging to other communities which will be affected by the Lake Wallace project (refer section 2.1.2).

### 3.2 ADEQUACY OF OFFSET SITES

#### 3.2.1 Quality

Both offset sites retain native vegetation cover, and major structural and functional flora species. Both EECs at both offset sites are in equivalent or better condition compared to the EEC vegetation impacted by the Lake Wallace development.

The offset site assessment found that the extensive areas of high quality secondary grassland at the offset sites are dominated by Kangaroo Grass with high Floristic Site Value scores (up to 37). Woodland remnants at the sites also have high diversity. Snow Gum - Candlebark Woodland and secondary grassland at the sites support a range of significant flora species including the NSW-listed threatened Small Snake Orchid (*Diuris pedunculata* sens lat) and the nationally rare shrub Australian Anchor Plant (*Discaria pubescens*); refer Figure 6-3 and Figure 6-4. Woodland patches and rock outcrops operate as refugia for grazing-sensitive flora species at the sites. The Snow Gum - Candlebark woodland at both offset sites meets native species richness, native groundcover and shrub cover BioMetric benchmarks.

The Wet Tussock Grassland vegetation surveyed during the offset site assessment meets the BioMetric benchmarks at both sites. The communities at the offset sites show good potential for recovery and improvement in condition over time.



The offset sites meet relevant quality criteria for offsetting NSW and Commonwealth EEC vegetation.

### 3.2.2 Area

The area requirements for offsetting the impacts of the Lake Wallace project are specified in the Biodiversity Offset Strategy (ngnhenvironmental 2013a). The Strategy nominates offset ratios in the range 4:1–10:1 for the Snow Gum –Candlebark Woodland and Natural Temperate Grassland EECs. The capacity for the offset sites to meet these requirements is summarised in Table 3-1. The two offset sites meet the NSW EEC offset requirements for the project in terms of area.

Table 3-1 EEC offset requirements and offset areas within the offset sites

EEC	Offset requirement (ha)	Lake Wallace block (ha) <sup>1</sup>	Southern blocks (ha)	Requirements met?
<b>Snow Gum – Candlebark Woodland</b>				
secondary grassland high quality	7.72-19.30	13.52	42.40	Yes
secondary grassland low quality	1.24-3.10	20.84	39.78	Yes
structural woodland	13.28-33.21	23.06	28.06	Yes
<b>Natural Temperate Grassland - Wet Tussock Grassland association</b>	7.52-18.80	0.57	9.71	Yes

<sup>1</sup>excluding proposal impact area

### Commonwealth Offsets Assessment Guide

The offset sites meet Commonwealth offset requirements for the Natural Temperate Grassland EEC using the Commonwealth Offsets Assessment Guide (ngnhenvironmental 2013b). The guide is a decision support spreadsheet used to estimate impacts and offsets for threatened species and ecological communities. The overarching test of the EPBC Act environmental offsets policy and the Offsets Assessment Guide is that offsets must deliver an overall conservation outcome that improves or maintains the viability of the relevant protected matter (DSEWPAC 2012b). The Offsets Assessment Guide has been applied to the Lake Wallace project and two offset sites for the Natural Temperate Grassland EEC (Wet Tussock Grassland association). The guide indicates that the Lake Wallace block and southern blocks sites offset over 100% of the impacts of the Lake Wallace project, and therefore meet the ‘maintain or improve’ test.



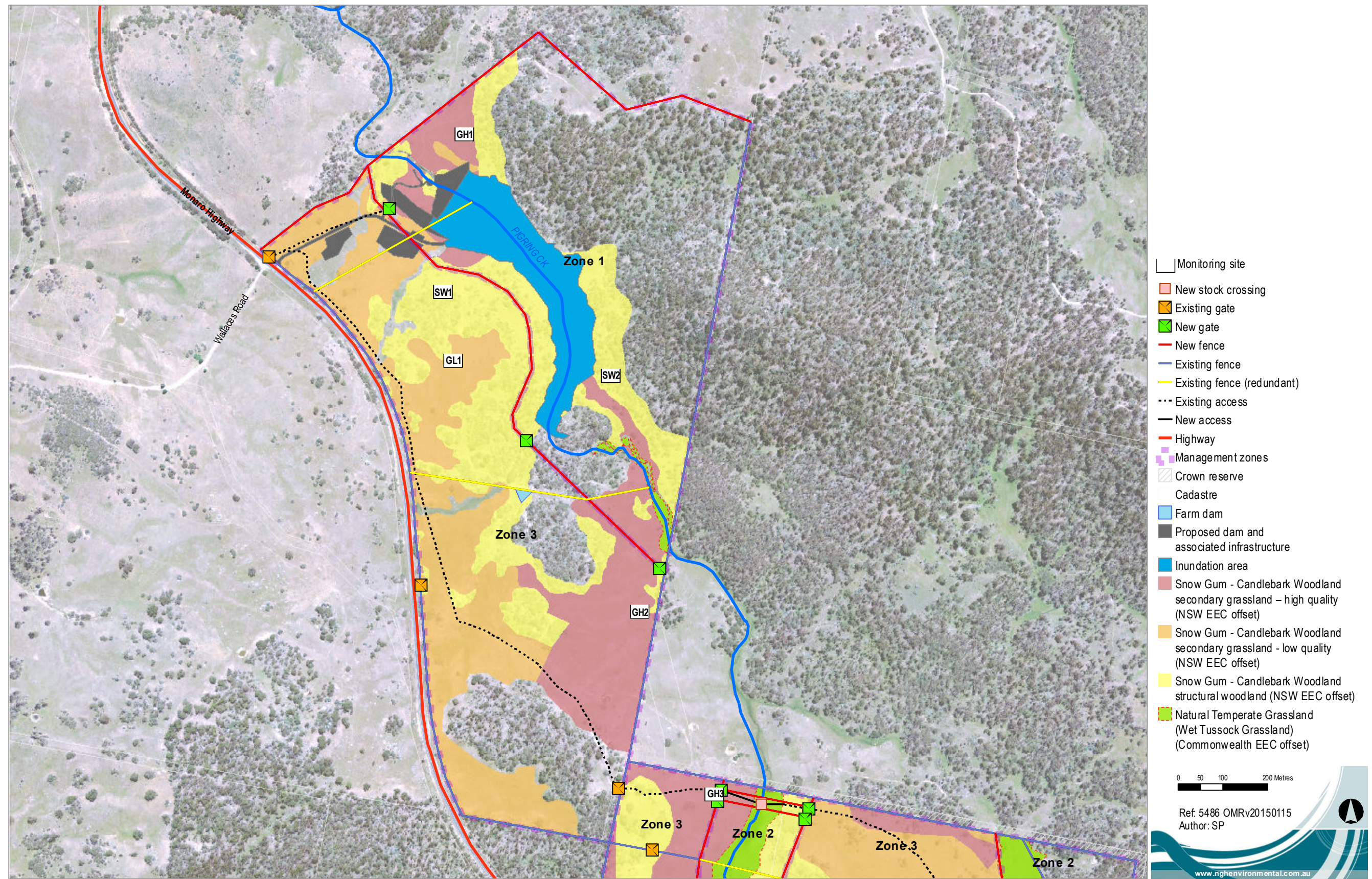


Figure 3-1 Lake Wallace block offset site vegetation communities, EEC offsets, management zones and fencing



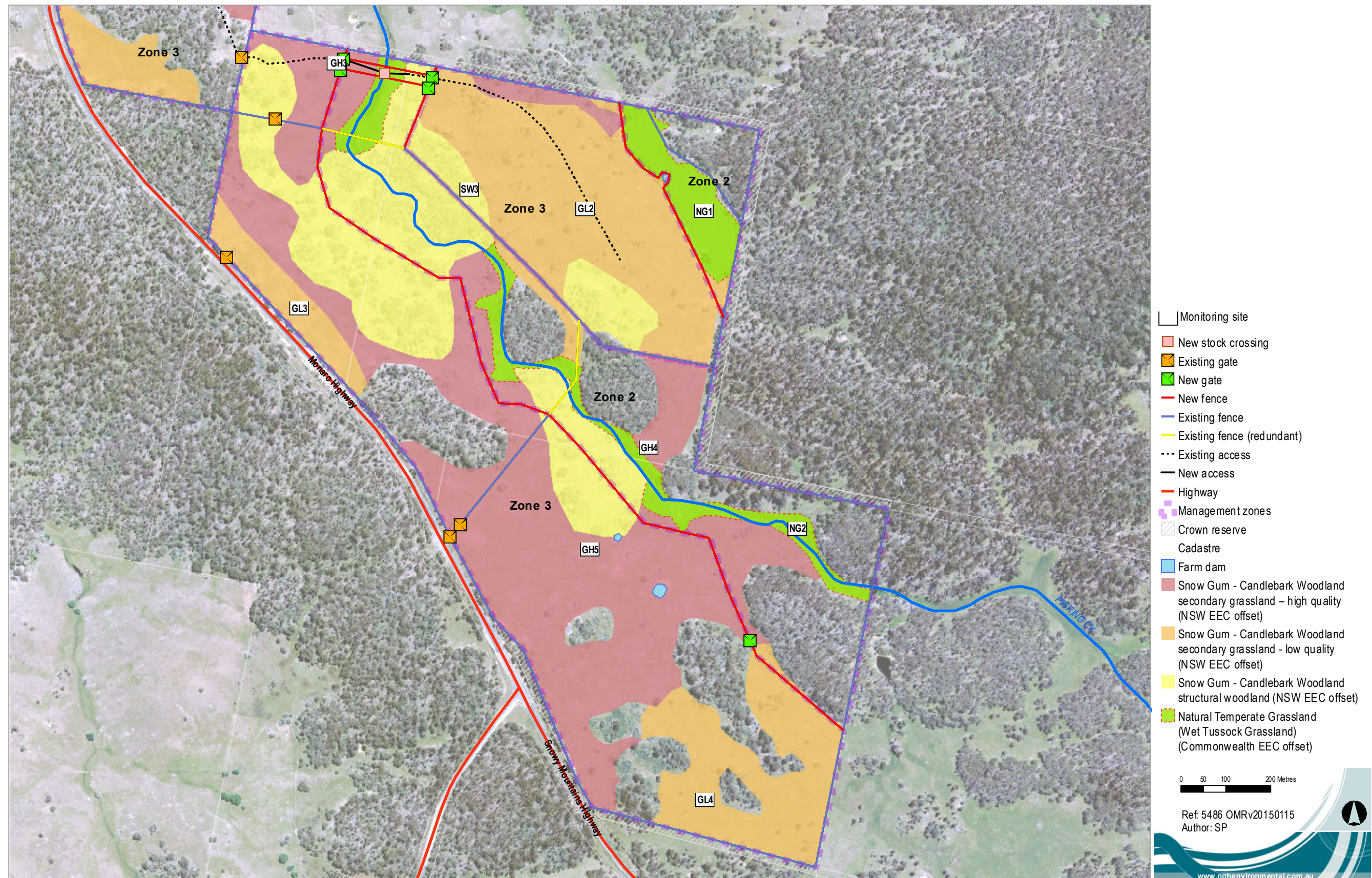


Figure 3-2 Southern blocks offset site vegetation communities, EEC offsets, management zones and fencing



## 4 LEGAL CONTEXT

### 4.1 LAKE WALLACE PROJECT COMMITMENTS

The Lake Wallace project has been approved under Part 5 of the NSW *Environmental Planning and Assessment Act 1979* and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. Relevant commitments contained in the Review of Environmental Factors (REF) and Species Impact Statement (SIS) (with Biodiversity Offset Strategy) submitted for the project (nghenvironmental 2013c, 2013a) are summarised below.

#### REF and SIS

The immediate catchment of the water storage should be included in the proposed Biodiversity Offset Strategy and Offset Management Plan. The offset site would be managed to protect ecological values, including the Snow Gum - Candlebark Woodland and Natural Temperate Grassland EECs and Small Snake Orchid population.

The Offset Management Plan would contain specific monitoring and management measures to ensure these values and overall ecological function are maintained or improved within the offset sites.

The alternative access designated for future access to the women's waterhole described in On site CHM (2013) should be included in the appropriate operational management documentation for the proposed dam, if this access is suitable to all parties (Registered Aboriginal Parties, private land holder and Cooma Monaro Shire Council).

#### Biodiversity Offset Strategy

The offset sites would form part of a multi-use property with a continuing commercial grazing component. The two offset sites on the property would be managed to enable the property as a whole to meet biodiversity conservation, water storage and agricultural objectives.

The majority of the cleared parts of the offset sites would remain available for stock grazing under a conservation management regime. A stock management plan (section 6.2.3) would be prepared as part of the Offset Management Plan which is designed to protect and improve biodiversity at the sites.

Consistent with McIntyre *et al.* (2000), Lambeck (1999) and Fisheries advice to Council (T. Daly 12 August 2010), stock exclusion fencing would provide for a minimum 50 metre buffer along the top water level of the water storage and either side of Pigring Creek. Stock crossings and off-stream water points would be installed if required. Any internal fencing would be sited to avoid the need for tree clearing wherever practicable.

An Offset Management Plan containing a package of compensatory and management measures would be used to protect and manage the offset sites. The plan would:

- provide information and mapping to support management of the offset sites [*refer Offset Assessment report*]
- provide a site design for management zoning, existing and planned infrastructure and natural regeneration areas
- identify management guidelines and time-framed actions to protect and enhance biodiversity values
- identify monitoring, review and reporting procedures.

## **4.2 APPROVAL AND CONCURRENCE CONDITIONS**

### **4.2.1 Commonwealth approval conditions**

The Commonwealth Government granted approval for the Lake Wallace project under Part 9 of the EPBC Act on 30 June 2014. The approval is subject to the following conditions relevant to the management of the offset sites (summarised).

Council must provide for the protection of the southern blocks offset site through a legally binding conservation covenant consistent with the EPBC Act Offsets Policy.

Within two years of commencing the action, Council must provide evidence to the Commonwealth that the covenant has been implemented.

Council must submit for the Minister's approval a Natural Temperate Grassland Management Plan. The plan must be approved in writing prior to commencement of the action. The plan must be implemented.

The Natural Temperate Grassland Management Plan must include:

- A textual description of the site, including offset attributes, shapefiles and a map clearly defining the location and site boundaries
- A detailed description of the management actions designed to protect and improve the ecological quality of the Natural Temperate Grassland on the offset site
- Key milestones, performance indicators and timeframes for management actions
- A monitoring program to determine the success of the management actions
- Corrective actions and contingency measures to be implemented where monitoring shows that key milestones or performance indicators are not being met.

Council must provide the approved plan to members of the public within 14 days on request.

Council must maintain records substantiating activities related to the approval conditions, including implementation of the plan, available to the Commonwealth on request.

Within 3 months of each 12 month anniversary of commencement of the action, Council must publish on its website a compliance report addressing approval conditions, including implementation of the plan. Documentary evidence providing proof of the date of publication, and details of any non-compliance, must be provided to the Commonwealth at the same time as the compliance report is published.

Potential or actual contraventions of the conditions must be reported to the Commonwealth within 2 days of Council becoming aware of them, and included in the annual compliance report.

Any activity not in accordance with the plan will require approval from the Commonwealth.

Council must publish the plan on its website within 1 month of approval of the plan, and keep the plan on the website for the duration of the approval.

### **4.2.2 NSW Department of Planning approval conditions**

The NSW Office of Environment and Heritage granted concurrence for the Lake Wallace project under section 112C of the EP&A Act on 30 July 2014, subject to a number of concurrence conditions which have been incorporated into the NSW Department of Planning approval (conditions 40-43). The Department of Planning approved the proposal on 13 August 2014, subject to the implementation of the approved REF



and the following conditions relevant to the establishment and management of the offset sites (summarised):

**Condition 31**

Prior to construction, Council must secure the offset sites identified in the Biodiversity Offset Strategy under its management and control. The offset site must be managed in perpetuity in accordance with the Biodiversity Offset Strategy.

**Condition 38**

The water storage site must be managed in accordance with the OMP.

**Condition 39**

Stock are to be excluded from within 50 metres of the high water level of the dam.

**Condition 40**

An in perpetuity Biodiversity Offset Area must be created, as recommended in the Council Draft Determination, Offset Site Assessment report and Offset Management Plan report.

The offset areas are to be managed for the purpose of conservation of threatened species habitat and ecological community values. No development is to occur in the offset areas.

The management of the offset areas is to be funded by Council, in accordance with an OMP.

The OMP is to be developed in consultation with, and approved by, OEH.

The OMP must be completed within 12 months of the start of construction of the Lake Wallace facility.

*Correspondence from OEH subsequent to the concurrence advice (12 August 2014) has confirmed that sustainable grazing (and associated fencing, creek crossings and water points) are permissible in the offset areas, as long as it can be undertaken in a way that conserves threatened species habitat and the values of the ecological community. The grazing strategy is to be detailed in the offset management plan.*

**Condition 41**

An appropriate legal mechanism to guarantee the management of the offset sites in perpetuity must be applied, through registration of title, using a Bio-banking Agreement, a Conservation Property Vegetation Management Plan or a Trust Agreement.

**Condition 42**

The colony of Small Snake Orchids identified in the SIS must be protected through all stages of the project, including temporary fencing during construction.

The Site Environmental Officer must make personnel aware of the location and significance of the colony.

The colony must be monitored during the flowering period each year from project approval until the dam has been constructed and operating for 5 years.

Monitoring results must be provided to OEH within 2 months of the fieldwork. Monitoring must include the number of individuals present, photographs of the colony and an assessment of whether there have been any impacts to the colony.

Any new Small Snake Orchid records at the site must be submitted to OEH and Bionet.

#### **Condition 43**

The proponent must not clear more than 5.56 hectares of the Snow Gum Woodland EEC.

### **4.3 LEGISLATION**

The ongoing environmental management of the offset sites is regulated by the following Commonwealth and State legislation:

#### ***Environment Protection and Biodiversity Conservation Act 1999***

- approval from the Federal Minister for the Environment is required if an action will or is likely to have a significant impact on matters of national environmental significance (such as the Natural Temperate Grassland EEC)

#### ***Native Vegetation Act 2003***

- vegetation clearing carried out by a private landholder, which is not exempt or related to identified routine agricultural management activities, is likely to require an approval under this Act
- in assessing the application, the approving authority would have regard to the presence of Endangered Ecological Communities and the requirements of the *Threatened Species Conservation Act 1995*

#### ***Water Act 1912, Water Management Act 2000***

- the *Water Management Act 2000* regulates what works and activities can occur within riparian corridors on waterfront land through the issuing of controlled activity approvals by the NSW Office of Water. The fourth-order Pigring Creek riparian corridor is 40 metres either side of the creek channel. Public authorities are exempt from the need for a controlled activity approval
- the site landowner does not need a water access licence to take water from Pigring Creek because domestic and stock rights apply

#### ***Noxious Weeds Act 1993***

- the Act requires the control of noxious weeds occurring on the property according to the weed classification and control plans prepared by Council

#### ***Fisheries Management Act 1994***

- Pigring Creek is designated as Key Fish Habitat by NSW Fisheries. Dredging, the removal of large woody debris, temporary or permanent blockage of fish passage would require a permit under the Act

#### ***National Parks and Wildlife Act 1974***

- an Aboriginal Heritage Impact Permit would be required for any works which involve the disturbance of Aboriginal items

#### ***Local Government Act 1993***

- management plans developed for community land must comply with the content provisions and core objectives specified under section 36 of the Act.

## 5 SUMMARY OF KEY MANAGEMENT ACTIONS AND GUIDELINES

This section provides a summary of key management actions and guidelines, with responsibilities and timeframes for implementation, to meet the conservation objectives of the Lake Wallace block and southern blocks offset sites. A completion timeframe is not indicated for guidelines that would apply from commencement on a continuing basis. Additional actions and guidelines and further detail are contained in section 6.

Council is the landowner and is responsible for management of the offset sites. The sites would be leased to allow the grazing of cattle within the terms of this Offset Management Plan and the Conservation Property Vegetation Plan (refer section 10).

Council would monitor compliance with the plan through a series of annual and monthly inspections (refer section 7) and regular vegetation condition monitoring (refer section 8). Funding arrangements for the proposed works and management are detailed in section 9.

Item	Actions and guidelines	Responsibility	Completion	
			June 2016	End 2017
1. Perimeter fencing, access and signage				
1.1	Existing perimeter fencing will be inspected and upgraded as required at the establishment of the offset sites.	CMSC		
1.2	A new perimeter fence will be constructed across the northern boundary of the Lake Wallace block.	CMSC		
1.3	Signage on gates and fences will be installed advising that the site is private land managed for conservation and public access is prohibited.	CMSC		
1.4	The condition of fencing would be monitored during Council compliance inspections, and timely maintenance undertaken as required.	CMSC		
1.5	Where practicable, vehicles will not enter Wet Tussock Grassland areas, or be used at the offset sites when soils are very wet or saturated.	CMSC		
2. Riparian zone, woodland and Small Snake Orchid protection				
2.1	A fence will be constructed protecting a minimum 50 metre buffer from the top water level of Lake Wallace and either side of Pigring Creek, as shown on Figure 3-1 and Figure 3-2. The fence will be sited to avoid the need for tree clearing wherever practicable. Gates will be included to allow management access.	CMSC		
2.2	Redundant fence sections will be considered for removal following construction of the riparian zone fence (Figure 3-1 and Figure 3-2).	CMSC		
2.3	A fence will be constructed protecting the additional area of Wet Tussock Grassland on a tributary in the east of the southern blocks site (Figure 3-2).	CMSC		
2.4	Subject to consultation and agreement with Fisheries NSW and OEH, a rock bed-level creek crossing will be constructed at the southern blocks site to allow stock movement between paddocks on either side of the creek. The approaches will be drained and hardened with gravel.	CMSC		

Item	Actions and guidelines	Responsibility	Completion	
			June 2016	End 2017
2.5	The four existing farm dams at the offset sites will be renovated to improve capacity and groundwater interception and repair a spillway. The works would not affect the Natural Temperate Grassland EEC and would not significantly add to the existing dam disturbance footprint.	CMSC		
2.6	The need for off-stream watering points will be assessed and an off-stream watering system installed if required, using a tank and trough system pumped from Pigging Creek. These works would not affect the Commonwealth Natural Temperate Grassland EEC in zone 2.	CMSC		
2.7	A suitable gate will be provided in the riparian zone fencing at the Lake Wallace block offset site to allow access to the women's waterhole at the upstream end of the reservoir, in consultation with Registered Aboriginal Parties.	CMSC		
2.8	A permanent, pig-proof fence would be constructed around the Small Snake Orchid colony in the Lake Wallace Offset site to protect the colony from damage during dam construction and from pig predation.	CMSC		
<b>3. Stock Management Plan</b>				
3.1	The paddocks in the offset sites will be available for stock grazing between 1 February and 30 September to: <ul style="list-style-type: none"> <li>utilise summer growth of Kangaroo Grass</li> <li>remove rank growth in autumn</li> <li>control exotic annuals in early spring if required.</li> </ul> Stocking rates during the February-September grazing period will not exceed 4 DSE per hectare of pasture (excluding mapped forest and woodland areas).	CMSC (through leaseholder)		
3.2	Paddocks in the offset sites will be rested (no grazing) from 1 October to 31 January.	CMSC (through leaseholder)		
3.3	If monitoring shows high abundance of exotic annual grasses such as <i>Anthoxanthum odoratum</i> , <i>Vulpia</i> spp and <i>Bromus</i> spp (exotic cover more than 50% in spring), and when seasonal conditions favour high germination and growth of annual exotics, short periods of grazing at no more than 4 DSE per hectare can be undertaken in October and early November to control these species. The timing and intensity of this grazing will be recorded and considered during the analysis of subsequent monitoring results.	CMSC (through leaseholder)		
3.4	Grazing will not commence, and stock will be removed from the paddocks, during the February-September grazing period when: <ul style="list-style-type: none"> <li>the live pasture cover falls below 80% (excluding surface rock), <u>or</u></li> <li>the average grass sward height (disregarding the taller <i>Poa labillardierei</i> tussocks) is <math>\leq 50</math>mm.</li> </ul> The lessee/manager will monitor live pasture cover and sward height on a regular basis (fortnightly or more frequently) using an accepted methodology involving at least six representative sample sites distributed throughout each paddock.	CMSC (through leaseholder)		
3.5	The lessee/manager will aim to maintain 100% ground cover in drainage depressions at all times.	CMSC (through leaseholder)		
3.6	Following the implementation of the above rotation for at least 5 years, the management zone 3 paddocks will be available for low intensity set stocking (1-2.5 DSE/ha) for a 20 month period (February to September the following year), at intervals of at least 5 years, subject to the removal of stock if any of the above condition thresholds are met.	CMSC (through leaseholder)		

Item	Actions and guidelines	Responsibility	Completion	
			June 2016	End 2017
3.7	Protein supplements, such as urea, may be utilised in the stock holding areas on the property that are not within the mapped Conservation area.	CMSC (through leaseholder)		
3.8	Cultivation, application of fertilisers and soil ameliorants (such as gypsum and lime), sowing of exotic pasture species or planting of exotic trees will not be undertaken at the offset sites.	CMSC (through leaseholder)		
3.9	Stock grazing will be excluded by fencing from within the Lake Wallace - Pigring Creek riparian corridor and from a tributary Wet Tussock Grassland area (zones 1 and 2) (Figure 3-1 and Figure 3-2).	CMSC (through leaseholder)		
3.10	Limited, short-duration grazing may be permitted in the fenced riparian area and the tributary Wet Tussock Grassland area in zone 2 in the southern blocks offset site during dry weather in Autumn to control grass biomass if necessary subject to monitoring results showing declining condition which is likely to be caused by excessive grass biomass, and subject to recommendations from an ecologist. If practicable, and if necessary, patch burning may be a better method of biomass control in these areas.	CMSC (through leaseholder)		
3.11	The grazing leaseholder must keep a record of the number and type of animals stocked at the offset sites, the dates they were stocked and de-stocked and the paddocks where they were stocked and de-stocked. If paddocks were destocked because of biomass, grass height or pasture cover criteria, this will also be noted.	CMSC (through leaseholder)		
3.12	Stock will be removed from the offset sites when soils are very wet or saturated if this can be done safely with minimal damage to paddock soils and vegetation. Stock will not be brought into the sites and vehicles will not be used off formed access tracks when soils are very wet.	CMSC (through leaseholder)		
<b>4. Fire management</b>				
4.1	If monitoring indicates a decline in the condition of zone 3 Snow Gum Woodland secondary grassland at the sites due to excessive grass growth, and subject to the recommendations by an ecologist, a trial burning program may be designed and implemented in this vegetation. In this case, Council will arrange for up to three 0.04 hectare burns with appropriate monitoring and review prior to any broader scale application of fire to control biomass. The location and design of the burning monitoring program would be developed by an ecologist in consultation with OEH.	CMSC		
4.2	The seasonal timing for ecological burning will generally be autumn-winter. Early spring burns can be used to control exotic annual weeds.	CMSC		
4.3	Any ecologically burning activities undertaken at the offset sites will apply the guidelines contained in this plan.	CMSC		
<b>5. Slashing</b>				
5.1	Slashing may be used to control grassland groundlayer biomass in accessible areas if: <ul style="list-style-type: none"> <li>monitoring indicates a decline in the condition due to excessive grass growth</li> <li>other methods of biomass control are not available or appropriate</li> <li>slashing is recommended by an ecologist.</li> </ul>	CMSC		
5.2	Slashing may be undertaken: <ul style="list-style-type: none"> <li>in autumn-winter to control grass biomass</li> <li>in early spring to control annual weeds</li> </ul>	CMSC		



Item	Actions and guidelines	Responsibility	Completion	
			June 2016	End 2017
	<ul style="list-style-type: none"> <li>in mid-late summer to harvest seed-bearing Kangaroo Grass hay for restoration elsewhere at the offset sites.</li> </ul>			
5.3	Grassland will not be slashed below 10 centimetres in height.	CMSC		
5.4	As far as possible, slashing will be minimised in spring, when birds are nesting or where ground birds are dependent on tall grass habitat.	CMSC		
5.5	No slashing will be undertaken in woodland areas or under tree canopies.	CMSC		
5.6	Where possible, slashing should proceed from areas of higher conservation value to areas of lower conservation value, and from less weedy to weedier areas.	CMSC		
5.7	All machines and vehicles will be washed down prior to entering the offset sites, and after leaving weedy sites. As far as possible, slashing will be avoided when weed seeds are viable.	CMSC		
5.8	Slashing activities will not allow debris to enter waterways or be left beside stream banks.	CMSC		
5.9	Slashing will not be undertaken in wet conditions when the vegetation and soil could be damaged.	CMSC		
5.10	Clippings may need to be removed after slashing if they are likely to smother established native plants.	CMSC		
5.11	Slashing will not be undertaken in areas where significant native shrubs (such as <i>Discaria pubescens</i> ) are likely to be damaged.	CMSC		
<b>6. Weed control</b>				
6.1	African Lovegrass, Briar Rose, Blackberry and Scotch Thistle will be controlled during the establishment phase of the offset sites, and as required thereafter. Briar Rose will be physically removed or treated using the cut stump method with a systemic herbicide in sensitive areas (near water, near <i>Discaria pubescens</i> , in high quality grassland). Blackberry will be controlled in accordance with the CMSC Blackberry Local Management Plan. African Lovegrass and Scotch Thistle will be controlled with herbicide and careful chipping in accordance with the CMSC Annual Noxious Weeds Control Calendar.	CMSC		
6.2	Serrated Tussock will be controlled as soon as possible using careful chipping or spot-spraying plants with a suitable herbicide in spring when tussocks are actively growing but before seed set. Any ripe seed on the plant will be first removed and destroyed. This wind-dispersed species will also be controlled in coordination with neighbouring landowners.	CMSC		
6.3	The noxious and invasive Viper's Bugloss and St John's Wort beside the adjacent highway will be controlled in accordance with the CMSC Annual Noxious Weeds Control Calendar.	CMSC		
6.4	Stock moving from pastures outside the offset sites will be yarded or spelled in a clean area for 5 days prior to entering the offset sites to prevent the introduction and spread of weeds.	CMSC (through leaseholder)		
6.5	Vehicles and machinery moving from weedy areas will be thoroughly washed down before entering the offset sites.	CMSC		
6.6	<p>If spraying is used, selective herbicides will be used on woody weeds where applicable. Care will be taken to avoid overspray and spraydrift, particularly near:</p> <ul style="list-style-type: none"> <li>aquatic habitat area</li> <li>threatened, rare and uncommon plants (such as <i>Discaria pubescens</i>)</li> <li>native shrub habitats for woodland birds.</li> </ul>	CMSC		

Item	Actions and guidelines	Responsibility	Completion	
			June 2016	End 2017
6.7	Spraying will not be undertaken in windy conditions. High volume handgun and boom spray application will cease when wind speed exceeds 8-10kph. Handgun herbicide application for the control of grass weeds can be undertaken up to wind speeds of 13 kph if a 500mm lance is fitted to spray guns.	CMSC		
6.8	No herbicide other than Roundup Bioactive will be used within 20 metres of Pigring Creek or Lake Wallace.	CMSC		
6.9	Chemical will be mixed and poured off site, or in a hardstand area or over a spill mat, where this is not possible.	CMSC		
6.10	Weed control locations, chemicals and rates, target weeds and timing will be recorded to assist management review.	CMSC		
<b>7. Pest animal control</b>				
7.1	An integrated approach to rabbit and pig control will be adopted. Control activities will also be coordinated with neighbours and other landholders in the locality. Property owners and public land managers should coordinate pig control actions to ensure that trapping efforts are not targeting the same pigs at the same time, and shooting (with or without dogs) does not occur within 2 kilometres of trapping.	CMSC		
7.2	Rabbit populations will be controlled at the sites, using baiting, biological control and low-impact harbour and warren destruction (localised ripping, blasting or fumigation).	CMSC		
7.3	Where warrens extend under mature trees or rock outcrops, fumigation rather than ripping or blasting will be used to minimise environmental impact.	CMSC		
7.4	Rabbit control will be initiated as required following natural or induced outbreaks of biological control (myxomatosis, rabbit calicivirus disease). Poisoning will be undertaken during periods of relative food stress (Read <i>et al.</i> 2011).	CMSC		
7.5	Ideally, trapping and poisoning in areas regularly visited by pigs should be undertaken when feed is scarce.	CMSC		
7.6	The use of 1080 and other poisons would comply with all regulatory requirements including certification, training, neighbour notification and warning signage, storage and transportation, setbacks from waterways, roads and boundaries and notification of accidents and incidents.	CMSC		
7.7	Dead animals found during and after the poisoning program, and all unused baits must be collected and destroyed by burning or deep burial outside the offset sites to prevent the secondary poisoning of wildlife.	CMSC		
7.8	Portable or permanent pig traps and pre-baiting may be used in areas attractive to pigs, such as wet grassland or waterholes, or along trails.	CMSC		
7.9	Soil and vegetation disturbance will not be used to attract rabbits and other pest animals for baiting.			
7.10	Pest animal control locations, methods and timing will be recorded to assist monitoring and management review.	CMSC		
<b>8. Track upgrading, and erosion and sedimentation control</b>				
8.1	Access tracks will be upgraded and rollover and mitre drains will be installed on permanent farm tracks, including either side of Pigring Creek crossing (outside the Natural Temperate Grassland EEC). Track design, drainage methods and drain spacing and location would comply with Council's best practice guidelines and OEH (2012) Erosion and Sediment Control on Unsealed Roads. Tracks would generally not exceed 4 metres in width (including table drains).	CMSC		

Item	Actions and guidelines	Responsibility	Completion	
			June 2016	End 2017
8.2	Any material imported to the sites for track resurfacing or stabilising boggy sections would be non-dispersive and would come from a weed-free source.	CMSC		
8.3	Native grass cover would be retained on existing track sections where ever possible. The track would be slashed intermittently as required to maintain route visibility.	CMSC		
8.4	The established or developing erosion gullies at the offset sites would be remediated using 100 millimetre nominal size rip rap, underlain by geotextile, in the actively eroding sections, with jute mesh and coir logs used as necessary to protect exposed soils and slow and divert runoff up to 10 metres upslope of the actively eroding section.	CMSC		
<b>9. Fauna habitat and vegetation management</b>				
9.1	Eucalypt regeneration within the fenced Pigring Creek riparian corridor (zones 1 and 2) may be progressively thinned as required based on ecologist advice, to achieve an ultimate tree spacing of 10-20 metres to protect groundlayer vegetation. Cut stump herbicide application would be used to minimise non-target impacts.	CMSC		
9.2	Native trees, stags, logs or shrubs will not be damaged or removed, other than for clearing required for fencing and other works specified in this plan, or thinning of regeneration to maintain vegetation cover or diversity.	CMSC		
9.3	Surface rock will not be removed or damaged, except to undertake the works specified in this plan.	CMSC		
<b>10. Cultural heritage protection</b>				
10.1	Works at the offset sites would avoid impacts to identified Aboriginal sites, including: <ul style="list-style-type: none"> <li>the Women's Waterhole</li> <li>LW10 stone procurement site</li> <li>Aboriginal artefact sites LW5, LW6 and LW7</li> <li>LW11 reburial site for salvaged Aboriginal objects (stone artefacts).</li> </ul>	CMSC		
10.2	Access to the Women's Waterhole will be provided utilising an existing access track along the western fenceline and descending along the crest of a spur to the waterhole. A suitable gate will be provided in the fenceline around the water storage.	CMSC		
10.3	Any works involving earthworks at the offset sites would be subject to Due Diligence assessment and approval in the form of an AHIP as required.	CMSC		
10.4	If an Aboriginal object is found while undertaking works at the offset sites, works must cease and OEH must be notified; an AHIP may be required. If human skeletal remains are found the proponent must stop work immediately, secure the area to prevent unauthorized access, and contact the NSW Police and OEH.	CMSC		
<b>11. Inspection and compliance</b>				
11.1	Council will conduct routine inspections of the offset sites at least monthly to ensure the provisions of this plan are being implemented.	CMSC	Monthly	

Item	Actions and guidelines	Responsibility	Completion	
			June 2016	End 2017
11.2	A comprehensive inspection and compliance report will be prepared by Council annually. The report will address approval conditions, including implementation of the plan and any breaches in compliance. The report will be published on the Council website within 3 months of each 12 month anniversary of the commencement of the project. Documentary evidence of the date of publication of the inspection and compliance report, and details of any non-compliance, will be provided to the Commonwealth at the same time as the compliance report is published. Potential or actual contraventions of the conditions must be reported to the Commonwealth within 2 days of Council becoming aware of them, and included in the annual compliance report.	CMSC	Annual	
12. Monitoring and review				
12.1	Permanent monitoring sites will be established in each EEC vegetation unit targeting groundlayer vegetation composition and cover, and tree and shrub regeneration. Condition monitoring will be conducted in mid November 2014 by an ecologist at the establishment of the offset sites. Repeat monitoring would be undertaken in mid-November 2015, 2017, 2019, 2021, 2023 and 2025. Monitoring results will be used to evaluate management. Monitoring reports, including Small Snake Orchid monitoring results, will be prepared for Council and sent to OEH, LLS and the Commonwealth Environment Department.	CMSC	Mid-November 2015, 2017, 2019, 2021, 2023 and 2025	
12.2	The colony of Small Snake Orchids will be monitored during the flowering period (mid – November) each year from project approval until the dam has been constructed and operating for 5 years.	CMSC	Annual	
12.3	The Offset Management Plan will be independently reviewed after 10 years of operation, taking into account monitoring results.	CMSC	2026	

## 6 MANAGEMENT STRATEGY

### 6.1 MANAGEMENT ZONES

The offset sites will be managed for biodiversity conservation, water and soil protection and commercial grazing.

The offset sites are divided into three management zones, described below and mapped on Figure 3-1 and Figure 3-2. The zones include NSW and Commonwealth EECs as well as non-EEC vegetation communities. While the full range of general management objectives identified in section 1.3 apply to all zones, management priority and permitted activities vary between zones. All permitted activities must be undertaken in accordance with the provisions of this plan and the Conservation Property Vegetation (CPVP).

If Council or the grazing leaseholder wish to carry out any activity in zone 2 other than in accordance with the approved Natural Temperate Grassland Management Plan, Council will need to submit a revised version of the plan to the Commonwealth Environment Department for the Minister's written approval.

Management zone	Management priorities	Permitted activities
1 Lake Wallace riparian buffer and catchment forest - Lake Wallace offset site	Catchment protection Small Snake Orchid conservation	Pest plant control (Round-up Biactive within 50 metres of dam) Pest animal control Maintenance of infrastructure (fences)
2 Pigging Creek riparian buffer and Wet Tussock Grassland - southern blocks offset site	Vegetation protection (Natural Temperate Grassland EEC and Snow Gum Woodland EEC) Catchment protection	Installation of stock crossing on Pigging Creek Pest plant control (Round-up Biactive only) Pest animal control Short term grazing , slashing if required and recommended by ecologist after monitoring Ecological burning to reduce grass biomass if required and recommended by ecologist after monitoring, and subject to consultation with OEH Maintenance of infrastructure (fences, stock crossing) Thinning of dense eucalypt regeneration to 5-10 metre spacing if required, based on ecologist advice
3 Grassland, woodland and forest (grazed) - Lake Wallace offset site and southern blocks offset site	Vegetation protection (Snow Gum Woodland EEC)	Stock grazing Farm dam renovation Installation of reticulated stock watering system (tank and trough) if required Stock shelter Access track upgrading Pest plant control Pest animal control Maintenance of infrastructure (fences, tracks, stock watering system) Targeted removal of eucalypt seedlings in existing grassland areas if required



## 6.2 MANAGEMENT ACTIONS AND GUIDELINES

### 6.2.1 *Perimeter fencing, access and signage*

Objectives
To provide effective and secure fencing for the boundaries of the offset sites for the control of human and stock access.
To inform the public of the conservation purpose of the sites and restrictions on public access.
Outcomes
Offset sites securely fenced with lockable gates and signage installed within first year.
Actions and guidelines
Existing perimeter fencing will be inspected and upgraded as required at the establishment of the offset sites to ensure their effectiveness in controlling stock and vehicle access. Lockable farm gates are required on perimeter fences.
A new perimeter fence will be constructed across the northern boundary of the Lake Wallace block. The location of this fence shown on Figure 6-1 is indicative, the precise location of the fence will depend on the location of dam infrastructure, surface rock, topography and tree cover. New fences will use plain wire for the top and bottom strands to minimise potential impacts to native fauna.
Signage will be installed on gates and fences advising that the site is private land managed for conservation and public access is prohibited. Potential locations for the signs are on gates into the property from the highway, at the main dam access and at gates along the highway to the south. The signs will provide a CMSC contact number for enquiries.
The condition of fencing would be monitored during Council compliance inspections, and timely maintenance undertaken as required.

### 6.2.2 *Riparian zone, woodland and Small Snake Orchid protection*

#### Fencing

Fencing will be required to protect the Pigring Creek riparian zone and Wet Tussock Grassland from stock grazing. Best practice riparian habitat protection and advice from NSW Fisheries (T. Daly 12 August 2010) indicates that the fencing should provide a minimum 50 metre buffer from the top water level of the water storage and either side of Pigring Creek. The fencing would be sited to avoid the need for tree clearing where practicable.

The new internal fencing would be sited outside areas of the Natural Temperate Grassland EEC, with the exception of the side fencing enclosing the stock and vehicle crossing over Pigring Creek in the southern blocks offset site. The fencing across Pigring Creek would need to be resistant to flood damage, and low impact. The disturbance to the EEC from fencing will be limited to fence posts; no clearing or ground levelling will be required. Existing and new internal fencing and gates proposed for the offset sites are shown on Figure 3-1 and Figure 3-2.

The threatened Small Snake Orchid colony in the Lake Wallace offset site (zone 1) is required to be fenced to protect the colony during the construction period (refer Figure 6-3). Evidence of pig damage has been observed close to the orchid colony. The fence will therefore be permanent, using pig-proof mesh, allowing a 10 metre buffer around the colony centred on 706786 5951036.

## Stock watering

With renovation of the four existing farm dams at the offset sites, supplementary watering infrastructure for stock is unlikely to be required. The dams will be cleaned out to improve capacity and access. The position of the dam of the eastern side of the creek at the southern blocks offset site would be adjusted to better intercept the spring at the site; the Natural Temperate Grassland located close to the dam would be protected during these works. In addition, the spillway of the dam at the Lake Wallace block will be remediated. The dam renovation works would not significantly add to the existing dam disturbance footprint.

If required, watering troughs and tanks may be located in zone 3 in well-drained areas away from drainage lines, in shaded areas where possible, accessible for cleaning and surrounded by a small gravel pad. Tanks would be filled from creek pools (when flows permit), transferred using polypipe buried in a manner that minimises vegetation disturbance and restores the original soil profile. These works, if required, would not affect the Natural Temperate Grassland EEC in zone 2. No trenching would be undertaken in this community.

## Stock crossing over Pigring Creek

A hardened bed-level crossing and gravel approaches will be installed on an existing track crossing over Pigring Creek at the southern blocks offset site (management zone 2) to enable stock to move between paddocks (refer Figure 6-1 and Figure 6-2). The crossing would be double-gated and used only for moving stock and vehicle access between paddocks.

The existing crossing passes through Wet Tussock Grassland (Natural Temperate Grassland EEC), within the Commonwealth offset, which has been disturbed by vehicles, stock trampling, soil pugging and nutrient pollution from stock manure. The existing crossing is boggy and unstable and is negatively impacting riparian vegetation and water quality. Timber has been laid over the track and watercourse to improve trafficability.

The crossing would be installed at bed level to stabilise the creek channel, protect water quality for the Lake Wallace storage and ensure all-weather stock and vehicle access to paddocks on the eastern side of the property. The crossing would comprise a surfaced laneway of 100 millimetre nominal diameter rock set 200 millimetres deep across the creek channel floor, and keyed into the adjacent lower slopes. The crossing corridor would be fenced on each side to restrict stock access, and gated to ensure the crossing is used by stock only when being moved between paddocks.

The crossing would be 4.5 metres wide and 40 metres long, affecting 180 m<sup>2</sup> of disturbed Wet Tussock Grassland (Natural Temperate Grassland EEC). The limited loss of vegetation would be offset by the protection and natural regeneration of damaged Wet Tussock Grassland around the existing crossing. The existing channel profile would be maintained.

The existing access track either side of the crossing will require hardening with gravel, and appropriate drainage structures (profile crowning and rollover cross-drains) to maintain stability and safeguard water quality in the creek. These track improvement works would be largely confined to the existing track surface and are not expected to result in the loss of further Wet Tussock Grassland vegetation.

Pigring Creek is mapped as Key Fish Habitat (KFH) by NSW Fisheries. Under section 200(1) of the *Fisheries Management Act 1994*, a DPI (Fisheries) permit is likely to be required to 'carry out dredging or reclamation work' to construct the crossing. The works would also affect an area of the Commonwealth Natural Temperate Grassland EEC. NSW Fisheries, OEH and the Commonwealth Government will be consulted regarding regulatory requirements during the planning phase of the crossing works.

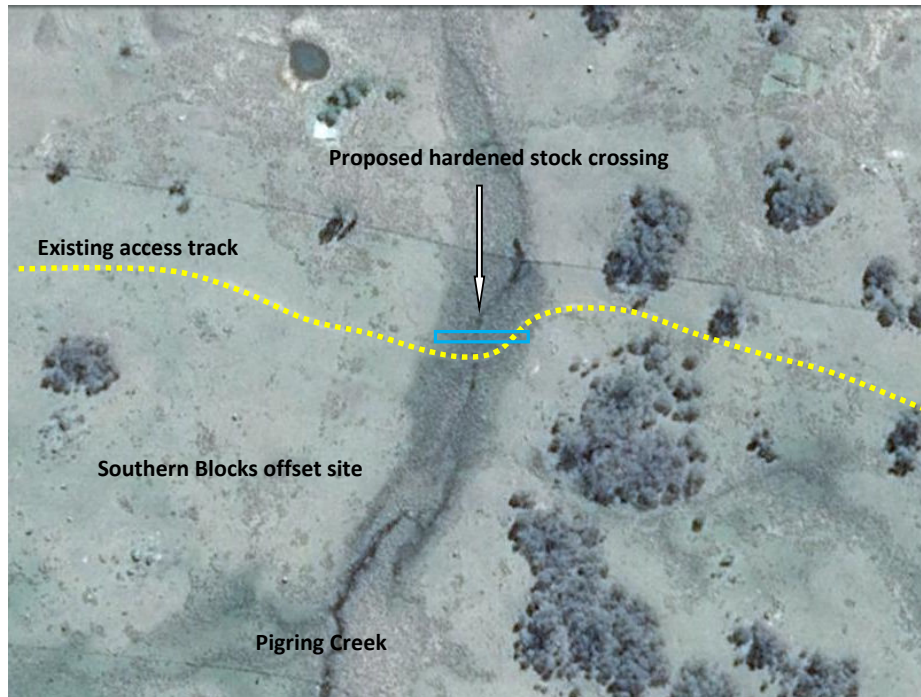


Figure 6-1 Location of the proposed hardened stock crossing over Pigring Creek at the southern blocks offset site (not to scale)



Figure 6-2 Existing stock and vehicle crossing over Pigring Creek (southern blocks offset site)

<b>Objectives</b>
To protect riparian, grassland and woodland communities and the Small Snake Orchid colony (zones 1 and 2) from the impacts of uncontrolled stock grazing.
To protect water quality, and channel and shoreline stability in Pigging Creek and Lake Wallace.
<b>Outcomes</b>
Internal fencing protecting the Lake Wallace shoreline, Pigging Creek riparian zone and Wet Tussock Grassland constructed within the first year.
Bed level crossing over Pigging Creek constructed with hardened approaches, side fences and gates within the first year.
Any required additional off-stream water points constructed within the first year. Water points, such as a tank and trough system, would be sited in lower risk and lower conservation value areas where possible (flat areas away from Pigging Creek and drainage lines, in disturbed areas such as stock camps under trees or on heavily grazed ridge crests). These works would not affect the Natural Temperate Grassland EEC in zones 1 and 2.
<b>Actions and guidelines</b>
A minimum 50 metre buffer will be fenced from the top water level of Lake Wallace and either side of Pigging Creek. The fences will protect water quality and riparian habitats, and areas of the Wet Tussock Grassland and Snow Gum – Candlebark Woodland EECs. Regeneration is expected to produce a near continuous corridor of woodland tree cover on slopes beside Pigging Creek and Lake Wallace over time (refer section 6.2.1).
The indicative locations of the new fences and gates are shown on Figure 3-1 and Figure 3-2. The siting of the fences takes advantage of existing fencing where possible, and aims to minimise edge and fragmentation effects and the need for tree clearing. Redundant fence sections which will be considered for removal are also shown on Figure 3-1 and Figure 3-2. The riparian fencing will include gates to allow access for pest plant and animal control and other management actions as required.
Subject to practicality for stock control, barbed wire would not be used for the top row of any new fencing to minimise risks to native fauna, such as birds, bats and gliders. If electricity is available, at least one wire should be live to maximise effectiveness. If barbed wire is used for cattle, it should be a middle row (at around 600-900mm).
Subject to consultation and agreement with Fisheries NSW and OEH, a rock bed level creek crossing will be constructed at the southern blocks site to allow stock movement between paddocks on either side of the creek. The crossing lane will be fenced and have gates on both sides. The condition of the crossing and fencing will be monitored, particularly after high flows. The approaches to the crossing will also be drained and hardened with gravel.
The need for off-stream watering points will be assessed. Where dams are not available or adequate, a tank and trough system pumped from Pigging Creek will be used to provide stock water in paddocks.
A suitable gate will be provided in the riparian zone fencing at the Lake Wallace block offset site to allow access to the women's waterhole at the upstream end of the reservoir, in consultation with Registered Aboriginal Parties.
A permanent, pig-proof fence would be constructed around the Small Snake Orchid colony in the Lake Wallace Offset site to protect the colony from construction damage and pig predation.

### 6.2.3 Stock Management Plan

#### Grazing exclusion

At productive grassland sites, grazing removal might be expected to:

- promote recruitment and survival of grazing-sensitive species
- reduce recruitment of species that require regeneration niches created by stock, such as soil disturbances or localised areas with elevated nutrients (eg sheep camps)
- reduce recruitment of species that require open canopy conditions for regeneration
- promote mortality of less competitive plants, due to increased competition from vigorous dominant species
- promote recruitment of species that regenerate beneath grass litter (Lunt 2005).

Livestock grazing has particularly affected the abundance of taller growing and palatable species, such as lilies, orchids, shrubs and native legumes. A list of grazing-sensitive shrubs and herbs recorded in grassy woodland at the offset sites, and baseline monitoring results for grazing-sensitive species are provided in Appendix B.

Research in long-grazed temperate grasslands suggests that the exclusion of grazing has potential to negatively affect native plant cover and species richness (Mavromihalis *et al.* 2013). Many native forbs require open spaces between the dominant grass tussocks for germination and growth. The long term exclusion of grazing in Kangaroo Grass grasslands can lead to a build-up of litter and closure of inter-tussock gaps. The complete exclusion of grazing in long-grazed temperate grasslands is likely to lead to a decline in inter-tussock species (Trémont 1994, Lunt *et al.* 2007, Lunt and Morgan 1999; Schultz *et al.* 2011). Kangaroo Grass itself senesces under dense litter, resulting in dramatic changes to grassland dominance and structure (Morgan and Lunt 1999).

Stock grazing will generally be excluded by fencing from within the riparian zone and from some woodland and grassland areas (zones 1 and 2, refer Figure 3-1 and Figure 3-2). In areas with tree cover, competition and reduced light reduces C4 grass vigour and the need for biomass reduction using stock grazing. In grassland areas, if cessation of grazing results in dense shrub/tree regeneration or weed proliferation, some control may be required to maintain groundcover density and diversity (refer section 6.2.9). The need for thinning would be quantitatively assessed if it occurs in condition monitoring plots, and informally assessed outside the plots during the monitoring surveys (refer section 8.1). Dense regeneration is most likely to occur in Snow Gum Woodland secondary grassland, and is not expected to affect the Natural Temperate Grassland (Wet Tussock Grassland) EEC. If required, thinning would be low impact using a highly targeted technique (cut-stump herbicide application), achieving a tree spacing of 10-20 metres.

The effect of grazing exclusion on dominant grass density in dry grassland and Wet Tussock Grassland areas in zones 1 and 2 will be similarly assessed during the condition monitoring and review process (ie in years 2015, 2017, 2019, 2021, 2023 and 2025). Subject to trial monitoring and review results (refer section 8), limited grazing may be used in these areas to control grass biomass.

#### Continuous grazing

Traditional continuous grazing, phosphorus fertiliser and exotic plant introductions can negatively affect grassland biodiversity, perennial native grass cover, soil stability and water quality. Continuous high levels of grazing pressure are at least partly responsible for the decline of a range of grassy ecosystem plant species. Short 'grazing lawns' are also known to compromise soil health (McIntyre and Tongway 2005) and fauna habitat (McIntyre 2005).



High grassland diversity can be maintained with continuous grazing at low densities ( $\leq 4$  DSE/ha), but only in the absence of fertilisers (Dorrough *et al.* 2012). The NSW Department of Primary Industries estimate the carrying capacity for good quality native pasture on the Southern Tablelands at 1.5–3.0 DSE/hectare using long term set-stocking.

Continuous selective grazing produces a mosaic of short-grazed and tall, less intensively grazed patches. A maximum of 30% short-grazed patches in native pastures has been proposed as a working guideline to protect grassland soil condition and infiltration capacity (McIntyre and Tongway 2005).

### Rotational grazing

Rotational grazing involving the seasonal removal of livestock is a tool for modifying grassland plant composition (Nie and Zollinger 2012). Studies in temperate grasslands have shown an increase in Kangaroo Grass, geophytes and other grazing-sensitive species following a spring rest from livestock grazing (Garden *et al.* 2000, Leonard and Kirkpatrick 2004, Dorrough *et al.* 2008, Dorrough *et al.* 2012, Mavromihalis *et al.* 2013). Spring is the main period of growth and flowering for many temperate annual and perennial grassland species (Mavromihalis *et al.* 2013). Over the dry mid-late summer period, most species are dormant as tubers, buds or seed in soil (Bradstock *et al.* 2002).

The benefits of rotational grazing are likely to vary with seasonal rainfall. In wet years, rapid grass growth through spring and summer can reduce native forb flowering, seeding and germination success. Exclusion of grazing in the spring can also lead to an increase in the cover of exotic annual species and a progressive increase in the weed seed bank. Intensive spring grazing followed by summer exclusion in some years may be a way to reduce grass biomass in wet years, and reduce exotic annual grasses in favour of native perennials (Garden *et al.* 2000, Mavromihalis *et al.* 2013).

While there is no empirical evidence that rotational grazing is better than light continuous grazing for maintaining high diversity in grasslands, the idea is intuitively appealing (Wong and Dorrough in prep.) and has some anecdotal support.

High density rotational grazing may negatively affect some components of grassland diversity (Kirkpatrick 2007, Dorrough *et al.* 2012). Rotational grazing has been shown to be effective in influencing the abundance of dominant native perennial grasses, but there is less certainty about the impact on less abundant forbs and shrubs. A conservative approach is required when shifting from long term continuous grazing to a rotation system. A capacity for flexible management will be required to account for wet summers and weed responses (J Dorrough pers comm).

### Kangaroo Grass

Kangaroo Grass is a critical structural and functional species for the Snow Gum – Candlebark Woodland secondary grassland at the offset sites. It is a warm season C4 grass which flowers and sheds seed summer-autumn, and actively grows during spring and summer. It is frost-sensitive and is dormant over winter. Each individual plant flowers only once per year, although the timing varies between plants in a population. To maintain Kangaroo Grass pastures, they should be stocked at low stocking rates (1 DSE/ha in run country) or spelled at regular intervals, particularly during spring-early summer (Land and Water Australia 2005). Ideally, grazing should commence in Kangaroo Grass pastures when plants have 4.4 leaves (DPI 2011). Burning can also help maintain Kangaroo Grass dominance (Prober *et al.* 2007).

The young growth is most palatable to stock, and provides moderate to high forage value. Kangaroo Grass can be grazed during mid to late summer to utilise dry feed and summer growth (Land and Water Australia 2005). High intensity (short duration) grazing can be used in autumn to remove rank growth and encourage the growth of winter active native grasses (Land and Water Australia 2005).



## Grazing for conservation

It is clear that in the absence of other forms of biomass reduction, Kangaroo Grass grassland biodiversity will decline if there is too much, or too little grazing. At sites with a stock grazing history, grazing can be used to achieve ecological objectives when it:

- controls biomass of dominant grasses (such as Kangaroo Grass)
- prevents encroachment by undesirable, grazing-sensitive potential dominants
- provides disturbance niches for rare or significant species (particularly native forbs)
- maintains grassland fauna habitat structure
- enhances the diversity of species across the landscape (Lunt *et al.* 2007).

Managing for recovery will need to strike a balance between reducing spring-summer grazing pressure and maintaining the inter-tussock spaces which support diversity in the grassland. The high paddock-scale richness and suite of grazing-sensitive species at the offset sites have persisted under a continuous stocking regime. Any change to this grazing regime will need to be undertaken cautiously, supported by monitoring and the capacity to adapt practices.

The grazing rotation guidelines below governing the intensity, frequency and season of stock grazing are intended to control biomass while protecting the habitat and life cycles of native grassland flora species. Grazing commences in summer while Kangaroo Grass is actively growing but before it has become overgrown and rank, and after most native forbs and grasses have seeded.

Importantly, the timing and duration of grazing at the offset sites are controlled by regular assessments of field conditions. Observable thresholds are used to restrict grazing when biomass and groundcover levels are low. Using this approach, grazing management can also respond to contingencies such as drought and wildfire which affect groundlayer vegetation.

The effectiveness of the guidelines will be evaluated following vegetation monitoring at the offset sites and the review of the management plan.

For caution, a provision is included which allows for low intensity set stocking at five-yearly intervals to maintain some consistency with the previous management of the sites which has allowed Kangaroo Grass and rare native forbs to persist at the offset sites.

Objectives
To manage herbaceous groundcover biomass in Snow Gum – Candlebark Woodland secondary grassland in management zone 3 using stock grazing to maintain and enhance native flora species diversity and cover.
To encourage rare and depleted flora species in management zone 3 at the sites to increase abundance and distribution over time. A list of rare and grazing-sensitive shrubs and herbs recorded in grassy woodland at the offset sites, and baseline monitoring results for grazing-sensitive species are provided in Appendix B.
To manage biomass in the Wet Tussock grassland community in zone 2 using short term grazing if required, subject to monitoring results and advice from an ecologist.
Outcomes
Native groundcover exceeds 80% measured in spring (excluding surface rock), after the first year.
Bare ground cover is no more than 10% at any time of year, after the first year.
Secondary grassland average sward height (excluding rock and <i>Poa labillardierei</i> tussocks) maintained within the range 5cm – 10 cm, after the first year
Kangaroo Grass cover ≥50% at all secondary grassland sites (excluding surface rock) within 5 years.

Grassland at the sites meet or exceed benchmark richness at the 20 metre x 20 metre quadrat scale in all parts of the site within 5 years.

The abundance of grazing-sensitive native flora species is maintained or increased, as reflected in monitoring results.

#### **Actions and guidelines**

The paddocks in management zone 3 at the offset sites will be available for grazing between 1 February and 30 September to:

- utilise summer growth of Kangaroo Grass
- remove rank growth in autumn
- control exotic annuals in early spring (when annual grass stems have elongated but before seed set) if required.

Stocking rates during the February-September grazing period will not exceed 4 DSE per hectare of pasture (excluding mapped forest and woodland areas).

Paddocks in management zone 3 at the offset sites will be rested (no grazing) from 1 October to 31 January.

If monitoring shows high abundance of exotic annual grasses such as *Anthoxanthum odoratum*, *Vulpia* spp and *Bromus* spp (exotic cover more than 50% in spring), and when seasonal conditions favour high germination and growth of annual exotics, short periods of grazing at no more than 4 DSE per hectare can be undertaken in October and early November to control these species. The timing and intensity of this grazing will be recorded and considered during the analysis of subsequent monitoring results.

Grazing will not commence, and stock will be removed from the paddocks, during the February-September grazing period when:

- the live pasture cover falls below 80% (excluding surface rock), or
- the average grass sward height (disregarding rock and *Poa labillardierei* tussocks) is  $\leq 50$ mm.

The lessee/manager will monitor live pasture cover and sward height on a regular basis (fortnightly or more frequently) using an accepted methodology involving at least six representative sample sites distributed throughout each paddock.

The lessee/manager will aim to maintain 100% ground cover in drainage depressions at all times.

Following the implementation of the above rotation for at least 5 years, the management zone 3 paddocks will be available for low intensity set stocking (1-2.5 DSE/ha) for a 20 month period (February to September the following year), at intervals of at least 5 years, subject to the removal of stock if any of the above condition thresholds are met.

Protein supplements, such as urea, may be utilised in the stock holding areas on the property that are not within the mapped Conservation area.

Cultivation, application of fertilisers and soil ameliorants (such as gypsum and lime), sowing of exotic pasture species or planting of exotic trees will not be undertaken at the offset sites.

Stock grazing will be excluded by fencing from within the Lake Wallace - Pigging Creek riparian corridor and from a tributary Wet Tussock Grassland area (zones 1 and 2) (refer Figure 3-1 and Figure 3-2).

Limited, short-duration grazing may be permitted in the fenced riparian area and the tributary Wet Tussock Grassland area in zone 2 in the southern blocks offset site during dry weather in Autumn to control grass biomass if necessary, subject to monitoring results showing declining condition which is likely to be caused by excessive grass biomass, and subject to recommendations from an ecologist. If practicable, and if necessary, patch burning may be a better method of biomass control in these areas (refer below).

Stock will be removed from the offset sites when soils are very wet or saturated if this can be done safely with minimal damage to paddock soils and vegetation. Stock will not be brought into the sites and vehicles will not be used off formed access tracks when soils are very wet.

The landowner must keep a record of the number and type of animals stocked at the offset sites, the dates they were stocked and de-stocked and the paddocks where they were stocked and de-stocked. If paddocks were destocked because of biomass, grass height or pasture cover criteria, this will also be noted.

#### **6.2.4 Fire management**

Fire may be used to help control weeds, reduce grass biomass, promote Kangaroo Grass, trigger native seed germination and provide growth opportunities for disturbance-dependent species. The ecological effects of fire are largely determined by fire regimes, comprising fire frequency, intensity and seasonality. Species and communities have limits of tolerance in relation to each of these factors. For example, frequent burning will favour Kangaroo Grass over Snow Tussock (*Poa* spp), which recovers more slowly after fire (Prober *et al.* 2007).

##### **Fire frequency and seasonal thresholds**

Snow Gum - Candlebark Woodland has an estimated fire frequency threshold range of 12–50 years (Kitchin 2008). A decline in biodiversity is considered likely if: 1) 3 or more consecutive fires occur with inter-fire intervals of <12 years, and 2) no moderate to high intensity fires occur within 50-100 years (Kitchin 2008). In areas maintained as ungrazed secondary grassland, a higher frequency may be required to control grass biomass, and tree and shrub regeneration. The relatively high elevation at the Lake Wallace site may mean that fire frequency thresholds are longer than those typically ascribed to the Snow Gum Woodland community.

The fire frequency threshold range for the Wet Tussock Grassland association is not known (Kitchin 2008).

The recommended optimal timing for burning varies in the research literature. At the offset sites, autumn or early spring may be the best times to burn, with minimal impact to native species and providing some control of exotic annual weeds.

##### **The use of fire at the offset sites**

In view of the uncertainty surrounding the natural fire regime, no planned burning is recommended for Natural Temperate Grassland (Wet Tussock Grassland) community at this stage. The use of fire in this community in zone 2 may be considered if monitoring demonstrates a need for grass biomass reduction and short-term grazing and slashing are not available as practical and effective options. Any use of fire in the community would be based on monitoring results, the specific recommendations of an ecologist and consultation with OEH. The community would not be burnt in zone 1 to avoid impacts to water quality in the reservoir.

If grazing intensity in zone 3 is not adequate to control grass biomass, alternative biomass reduction methods may be required (burning or slashing). Regular condition monitoring will include indicators for excessive biomass and quality decline (such as grass cover, average grass sward height, Floristic Site Value and grazing-sensitive species - refer section 8.1).

The use of fire to control biomass at the offset sites should be approached cautiously; regular burning will introduce a further set of impacts which may combine with the effects of historical continuous grazing to adversely affect biodiversity at the sites.

Fire may adversely affect water quality through nutrient accession, soil erosion and reduced landscape function. The loss of coarse woody litter affects landscape function by increasing runoff, exposing soils and

reducing the organic topsoil layer (Barton *et al.* 2009 in Sharp 2011). For this reason, burning is not recommended within the zone 1.

Note that burning for ecological purposes may require approval under the *Native Vegetation Act 1991* and a scientific licence from the Office of Environment and Heritage (OEH). The South East Local Land Services and OEH should be consulted when planning an ecological burn. Approval from the Rural Fire Service (RFS) under the *Rural Fires Act 1997* is required to burn native vegetation for the purpose of hazard reduction (Bush Fire Hazard Reduction Certificate). A Fire Permit from RFS required for burning during the Bushfire Danger Period (generally from 1 October to 31 March).

Objectives
To use fire to control biomass as required with minimal adverse impact to biodiversity, soil and water values at the offset sites.
To protect the EECs at the offset sites from inappropriate fire regimes which exceed the tolerance thresholds of native species or communities, or result in undesirable changes to habitats.
Outcomes
Ecological burning available for use as an effective and beneficial biomass reduction tool.
Planned and unplanned fire within the defined fire frequency thresholds for the Snow Gum - Candlebark Woodland EEC.
Actions and guidelines
If monitoring indicates a decline in the condition of zone 3 Snow Gum Woodland secondary grassland at the sites due to excessive grass growth, and subject to the recommendations by an ecologist, a trial burning program may be designed and implemented in this vegetation. In this case, Council will arrange for up to three 0.04 hectare burns with appropriate monitoring and review prior to any broader scale application of fire to control biomass. The location and design of the burning monitoring program would be developed by an ecologist in consultation with OEH.
The seasonal timing for any ecological burning at the offset sites will generally be autumn-winter. Where exotic annual weeds are abundant, early spring burns can also be used to interrupt their life cycle.
Fuel and weather conditions during ecological burning should produce a low-moderate intensity fire, perhaps 0.5-1.5 metre flame height, running quickly over the ground. Ideally, grass will be thick and dry and soils will be moist.
Where practicable, burning should avoid long upslope fire runs; burning progressively in short run strips, or in a downslope direction, is preferable.
Ecological burns in woodland areas will aim for less than 10% mature tree crown scorch.
Logs and hollow-bearing trees, stags and tree regeneration areas to be retained will be protected during ecological burning, by raking litter away from trees, wetting down and extinguishing trees and logs.
Vehicles and machinery attending planned burns will be cleaned of mud and weed seed prior to entering the sites. Vehicles will use formed tracks and crossings where possible.
Soil disturbance such as ploughing or mineral earth rake hoe lines will not be used to provide control lines for planned burns or wildfire suppression. Where practicable, supervised wet lines or controlled burning would be used to manage planned burns.
Fire-fighting foam or retardants will not be used.
Any Snow Gum – Candlebark Woodland areas with young tree regeneration (<2 metres tall) in zones 2 and 3 that are to be retained will be excluded from ecological burning. These areas may develop adjacent to existing woodland patches with the reduction of stock grazing pressure.

For both ecological burning and wildfires, the timing, location, size and intensity of the fire, weather conditions will be recorded to assist vegetation monitoring and evaluation.

### 6.2.5 Slashing

Slashing is an alternative method used to control grass biomass in locations where grazing or burning are not appropriate. Slashing retains an open structure in native grassland that allows for the regeneration of herbaceous species in the gaps (ACT Government 2005). If monitoring indicates excessive biomass and declining condition, slashing may be used in the fenced riparian zone and the Natural Temperate Grassland (Wet Tussock Grassland) community (zones 1 and 2). Slashing in these areas presents less risk to water quality and streambank soils than grazing or burning. The use of slashing at the offset sites is however likely to be restricted by steep slopes and access.

Potential risks from slashing in native ecosystems include:

- spread of weed seeds across the site or from other sites on the machinery
- creation of windrows of clippings which rot, smothering many plants below the clippings, increasing nutrient loads and ultimately creating habitat conducive to the germination of annual weeds
- slashing when native plants are flowering and/or before they set seed, preventing natural regeneration
- too frequent slashing and/or slashing low, which prevents flowering but also depletes root reserves
- loss of habitat structure for fauna
- soil compaction and rutting especially when the ground is wet or damp. This can also damage cryptogams (lichens, moss, algae) (Eddy 2002, ACT Government 2005).

Slashing can also adversely affect shrubs and grass-nesting birds, and reduce the visibility of weeds.

The slashing and gathering of the hay while viable seed is attached may be used to assist the re-establishment of Kangaroo Grass in heavily grazed parts of the sites, such as on the ridge alongside the highway. This technique involves laying down the Kangaroo Grass cuttings as soon as possible after collection, allowing the seeds to drop and corkscrew into the soil (McDougall 1989).

#### Objectives

To use slashing to control biomass if required, when other methods are unavailable, with minimal adverse impact to biodiversity, soil and water values at the offset sites.

#### Outcomes

Slashing available for use as an effective and beneficial biomass reduction tool.

#### Actions and guidelines

Slashing may be used to control grassland groundlayer biomass in accessible areas if:

- monitoring indicates a decline in the condition due to excessive grass growth
- other methods of biomass control are not available or appropriate
- slashing is recommended by an ecologist.

Slashing may be undertaken:

- in autumn-winter to control grass biomass
- in early spring to control annual weeds

- in mid-late summer to harvest seed-bearing Kangaroo Grass hay for restoration elsewhere at the offset sites.

Grassland will not be slashed below 10 centimetres in height.

As far as possible, slashing will be minimised in spring, when birds are nesting or where ground birds are dependent on tall grass habitat.

No slashing will be undertaken in woodland areas or under tree canopies.

Where possible, slashing should proceed from areas of higher conservation value to areas of lower conservation value, and from less weedy to weedier areas.

All machines and vehicles will be washed down prior to entering the offset sites, and after leaving weedy sites. As far as possible, slashing will be avoided when weed seeds are viable.

Slashing activities will not allow debris to enter waterways or be left beside stream banks.

Slashing will not be undertaken in wet conditions when the vegetation and soil could be damaged.

Clippings may need to be removed after slashing if they are likely to smother established native plants.

Slashing will not be undertaken in areas where significant native shrubs (such as *Discaria pubescens*) are likely to be damaged.



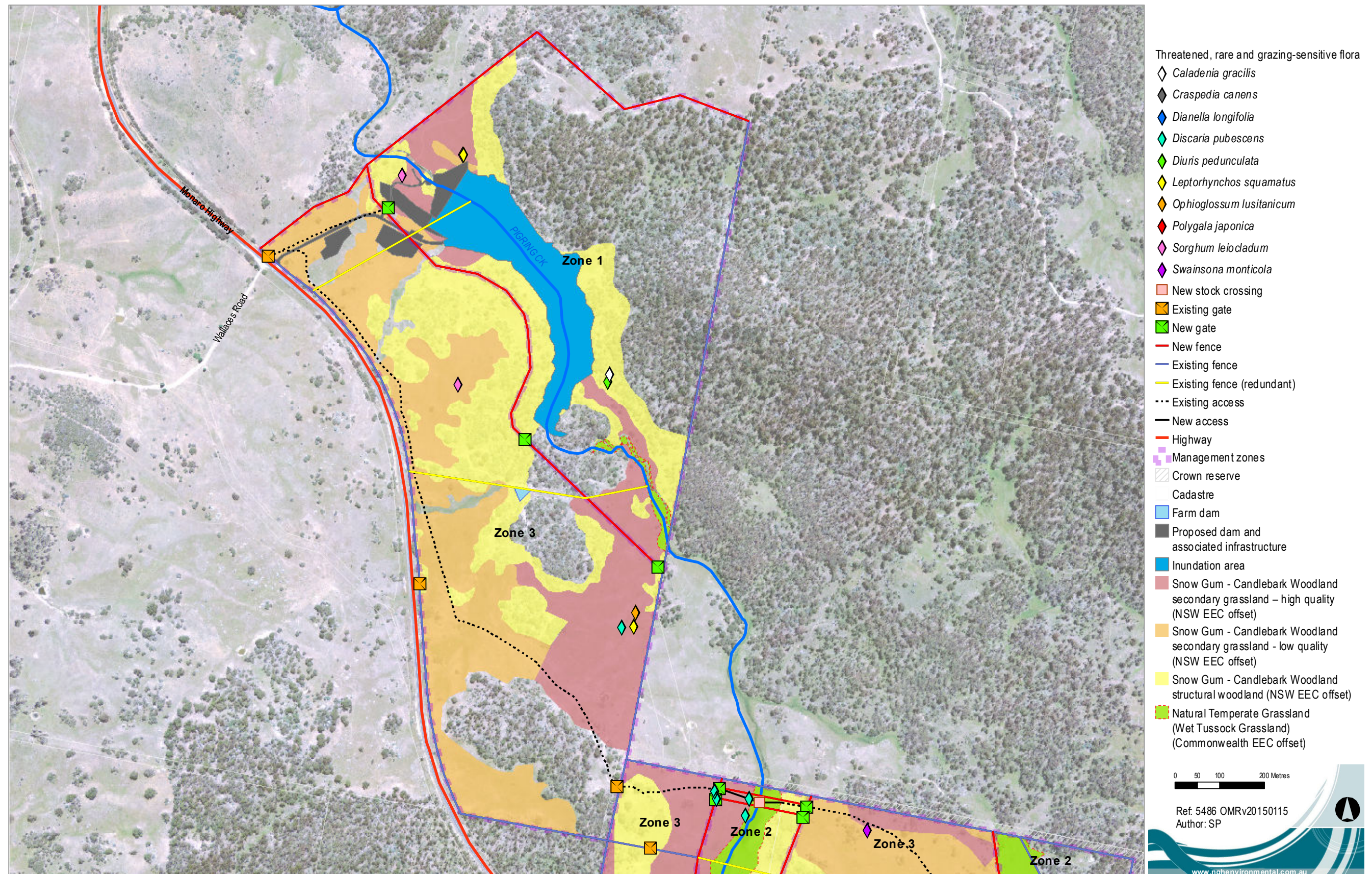


Figure 6-3 Threatened, rare and grazing-sensitive flora records at the Lake Wallace offset site



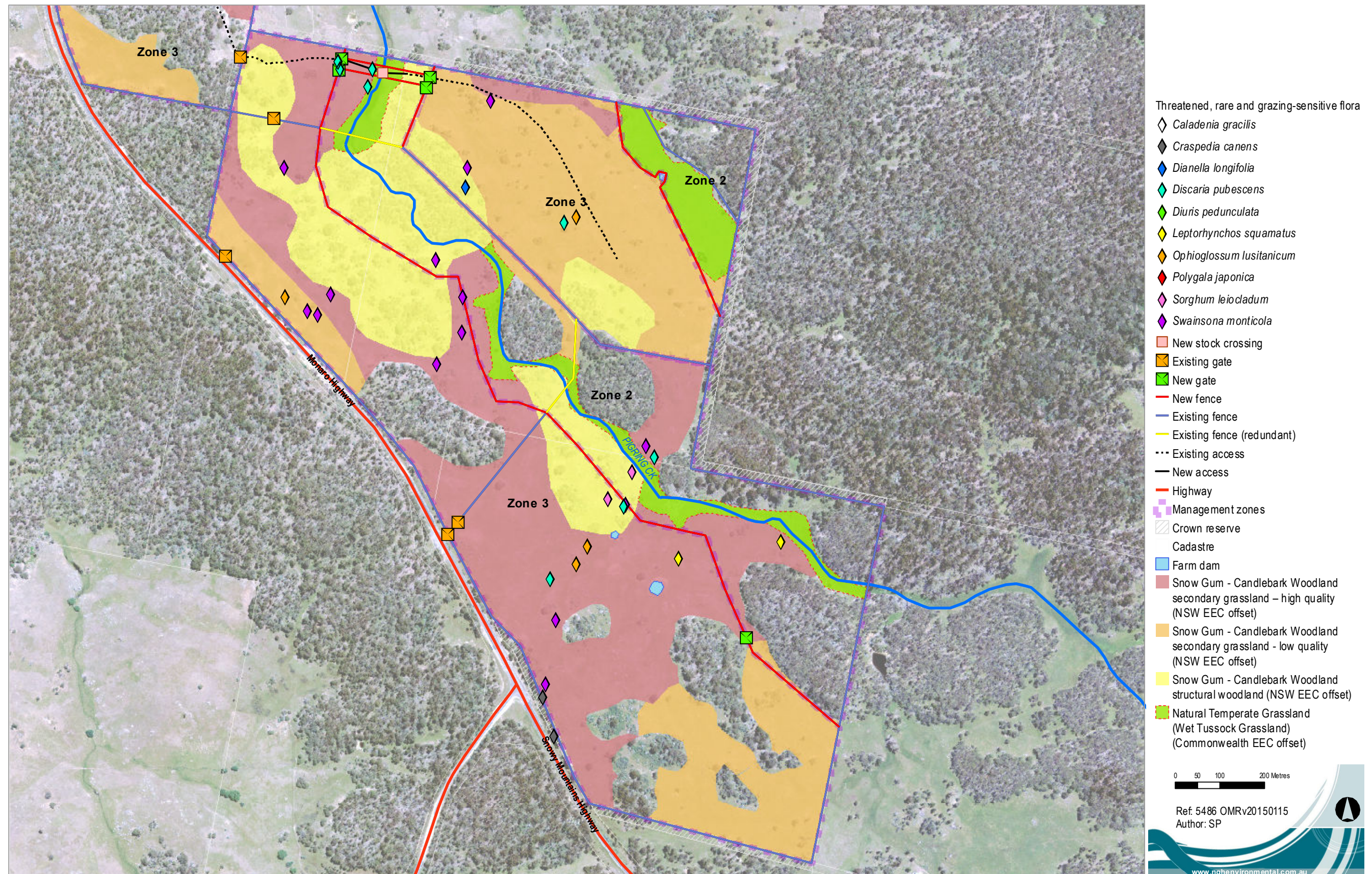


Figure 6-4 Threatened, rare and grazing-sensitive flora records at the southern blocks offset site



### 6.2.6 Weed control

Landholders must control declared noxious weeds. Noxious weeds declared under the *Noxious Weeds Act 1993* for the control area include African Lovegrass, Blackberry, Scotch Thistle, Serrated Tussock, Fireweed, Briar Rose, St John's Wort and Viper's Bugloss. Council is responsible for property inspections, weed control on Council-owned land and roadsides and enforcement of noxious weed control on private land.

Briar Rose (*\*Rosa rubiginosa*) and Blackberry (*\*Rubus fruticosus* sp agg) are present at both offset sites. Fireweed (*\*Senecio madagascariensis*) was recorded in the Lake Wallace block, including at floristic quadrat at monitoring site SW1 at 706412 5951240 (this plant was removed from the site). Scotch Thistle (*Onopordum acanthium*) - 706938 5949996, and Serrated Tussock (*Nassella trichotoma*) – 707278 5949640 were recorded in the north of the southern blocks site; refer Figure 4-2. Scotch Thistle and Serrated Tussock are wind-blown and highly mobile and should be controlled as soon as possible. African Lovegrass plants were observed on the access track at the Lake Wallace site at 706117 5951261.

Pest plant occurrences observed at the offset sites have been mapped on Figure 6-5 and Figure 6-6.

The noxious weeds Viper's Bugloss and St John's Wort are also present in the highway road reserve adjacent to the offset sites.

Some weed species, such as Briar Rose and Blackberry, may increase following the reduction of grazing pressure. These species are bird-dispersed and should be controlled during the establishment phase of the offset sites.

Objectives
To eradicate the major noxious and environmental weeds at the offset sites or reduce them to ecologically benign maintenance levels. Target detection levels are identified in the condition monitoring program (refer section 8.1).
To reduce the incursion and spread of new weeds.
Outcomes
Briar Rose, Blackberry, African Lovegrass, Serrated Tussock and Scotch Thistle treated over all of the offset sites in the first year.
Major pest plants eradicated or maintained at very low levels within 3 years (cover less than 1%, zero detection rates in monitoring).
Any new weed occurrences identified and treated as soon as seasonal factors allow.
Actions and guidelines
African Lovegrass, Briar Rose, Blackberry and Scotch Thistle will be controlled during the establishment phase of the offset sites, and as required thereafter. Briar Rose will be physically removed or treated using the cut stump method with a systemic herbicide in sensitive areas (near water, near <i>Discaria pubescens</i> , in high quality grassland). Blackberry will be controlled in accordance with the CMSC Blackberry Local Management Plan. African Lovegrass and Scotch Thistle will be controlled with herbicide and careful chipping in accordance with the CMSC Annual Noxious Weeds Control Calendar.
Serrated Tussock will be controlled as soon as possible using careful chipping or spot-spraying plants with a suitable herbicide in spring when tussocks are actively growing but before seed set. Any ripe seed on the plant will be first removed and destroyed. This noxious, wind-dispersed species will also be controlled in coordination with neighbouring landowners.
The noxious and invasive Viper's Bugloss and St John's Wort beside the adjacent highway will be controlled in accordance with the CMSC Annual Noxious Weeds Control Calendar.

Stock moving from pastures outside the offset sites will be yarded or spelled in a clean area for at least 5 days prior to entering the offset sites to prevent the introduction and spread of weeds.
Vehicles and machinery moving from weedy areas will be thoroughly washed down before entering the offset sites.
<p>If spraying is used, selective herbicides will be used on woody weeds where applicable. Care will be taken to avoid overspray and spraydrift, particularly near:</p> <ul style="list-style-type: none"> <li>• aquatic habitat area</li> <li>• threatened, rare and uncommon plants (refer Figure 6-3, Figure 6-4 and Appendix B)</li> <li>• native shrub habitats for woodland birds.</li> </ul>
Spraying will not be undertaken in windy conditions which will lead to excessive spray drift. High volume handgun and boom spray application will cease when wind speed exceeds 8-10kph. Handgun herbicide application for the control of grass weeds can be undertaken up to wind speeds of 13 kph if a 500mm lance is fitted to spray guns (from nghenvironmental 2012).
No herbicide other than Roundup Bioactive will be used within 50 metres of Pigring Creek or Lake Wallace.
Chemical will be mixed and poured off site, or in a hardstand area or over a spill mat, where this is not possible.
Weed control locations, chemicals and rates, target weeds and timing will be recorded to assist monitoring and management review.

### 6.2.7 Pest animal control

The main pest animal impacts evident during survey fieldwork at the offset sites were caused by rabbits and pigs. Rabbits are an insidious cause of degradation on native grasslands, contributing to the loss of native herbaceous and woody species and their replacement by weedy annual forbs and grasses, and the denudation and erosion of soil (Williams 2011). Rabbits sustain populations of foxes and cats, although they are also an important diet component for raptors such as the Wedge-tailed Eagle.

Concentrations of rabbit scats were noted in the southern blocks site at 707343 5949055, and just west of the gate between the Lake Wallace block and southern blocks sites at 706808 5950125.

Likely pig damage to soils and vegetation was recorded in the Lake Wallace block at 706861 5950929 and 706864 5950861 (close to the Small Snake Orchid population), and at the southern blocks site at 707632 5949028. The Wet Tussock Grassland EEC and orchid populations in moist areas at the offset sites are particularly attractive and vulnerable to feral pigs. Pigs also prey on native fauna, including invertebrates, reptiles, frogs and small mammals. Pest animal evidence observed at the offset sites has been mapped on Figure 6-5 and Figure 6-6.

Under the *Local Land Services Act 2013*, all land managers in NSW have an obligation to control declared pest species on their land. Declared pests include rabbits, wild dogs and feral pigs.

Rabbit control generally involves baiting, biological control and low-impact harbour and warren destruction. Feral pig control options include poisoning and trapping using box traps or corral traps. Box traps are easier to transport and erect, while the corral trap is more efficient over the longer term (R. Summerrell, Biosecurity Support Officer, South East LLS in Gazzard 2015). Both poisoning and trapping requires pre-feeding to maximise effectiveness. The shelf stable 1080 product PIGOUT® has been specifically flavoured and dyed to minimise uptake by non-target species. A next generation feral pig bait, HOG-GONE®, is based on sodium nitrite, a common human food additive, which is highly toxic to pigs and acts humanely by preventing oxygen binding to haemoglobin (IACRC 2010). The Invasive Animal CRC has

developed a portable steel feeding bin (marketed as the Hoghopper®) allowing pigs to access poisoned baits by lifting a door, which is also intended to minimise non-target impacts.

Pesticide use must comply with directions on the label, NSW registration conditions or any requirements issued by the Australian Pesticides and Veterinary Medicines Authority (APVMA). Pesticides such as 1080 poison baits are restricted and can only be used under certain conditions and by trained and certified people. Under the Pesticide Control (1080 Liquid Concentrate and Bait Products) Order 2010 1080 ground baits for rabbits and feral pigs must not be laid within twenty metres of a domestic water supply or public road. All 1080 feral pig bait must be placed in fenced bait stations.

Objectives
To reduce major pest animal populations to ecologically benign maintenance levels. Target detection levels are identified in relation to the condition monitoring program in section 8.1.
Outcomes
Pest animals are under control and maintained at very low levels within 3 years (zero detection rates in monitoring).
Actions and guidelines
An integrated approach to rabbit and pig control will be adopted. Local Land Services will be consulted to plan methods and timing for control operations.
Control activities will be coordinated with neighbours and other landholders in the locality, either directly or through the local Landcare group or Local Land Services. Property owners and public land managers should coordinate control actions to ensure that trapping efforts are not targeting the same pigs at the same time, and shooting (with or without dogs) does not occur within 2 kilometres of trapping.
Rabbit populations will be controlled at the sites, using baiting, biological control and low-impact harbour and warren destruction (localised ripping, blasting or fumigation).
Where warrens extend under mature trees or rock outcrops, fumigation rather than ripping or blasting will be used to minimise environmental impact.
Rabbit control will be initiated as required following natural or induced outbreaks of biological control (myxomatosis, rabbit calicivirus disease). Poisoning will be undertaken during periods of relative food stress (Read <i>et al.</i> 2011).
Trapping may be the best way to achieve ongoing pig control, preceded by several days of free-feeding.
Ideally, trapping and poisoning in areas regularly visited by pigs should be undertaken when feed is scarce.
The use of 1080 and other poisons would comply with all regulatory requirements including certification, training, neighbour notification and warning signage, storage and transportation, setbacks from waterways, roads and boundaries and notification of accidents and incidents.
Dead animals found during and after the poisoning program, and all unused baits must be collected and destroyed by burning or deep burial outside the offset sites to prevent the secondary poisoning of wildlife.
Portable or permanent pig traps and pre-baiting may be used in areas attractive to pigs, such as wet grassland or waterholes, or along trails.
Soil and vegetation disturbance will not be used to attract rabbits and other pest animals for baiting.
Shooting is not a preferred control method; it has little effect on numbers and is likely to disperse pigs and interfere with future trapping and poisoning operations.
Pest control locations, methods, target species and timing will be recorded to assist monitoring and management review.



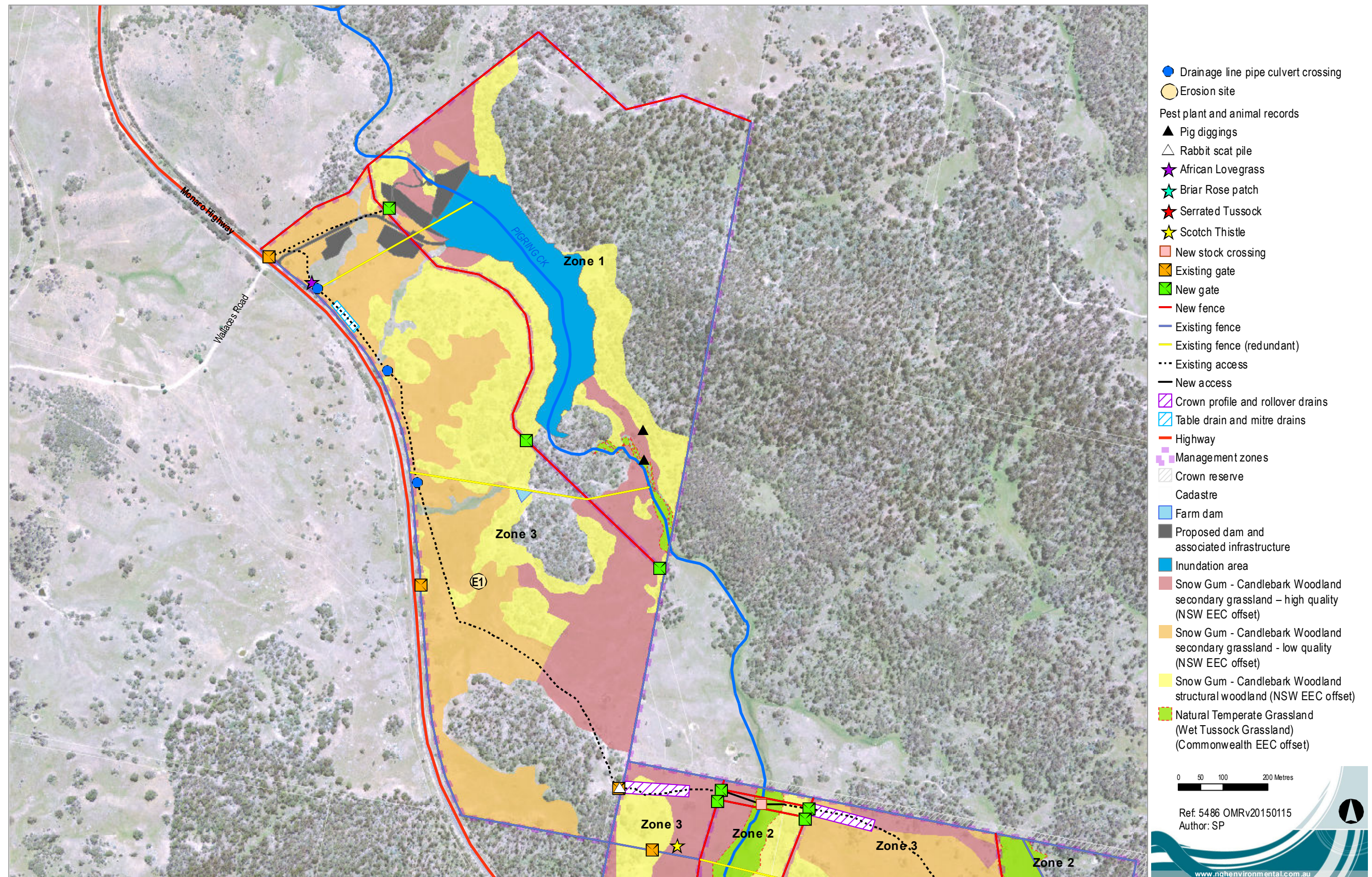


Figure 6-5 Observed erosion sites and pest plant and animal occurrences at the Lake Wallace offset site



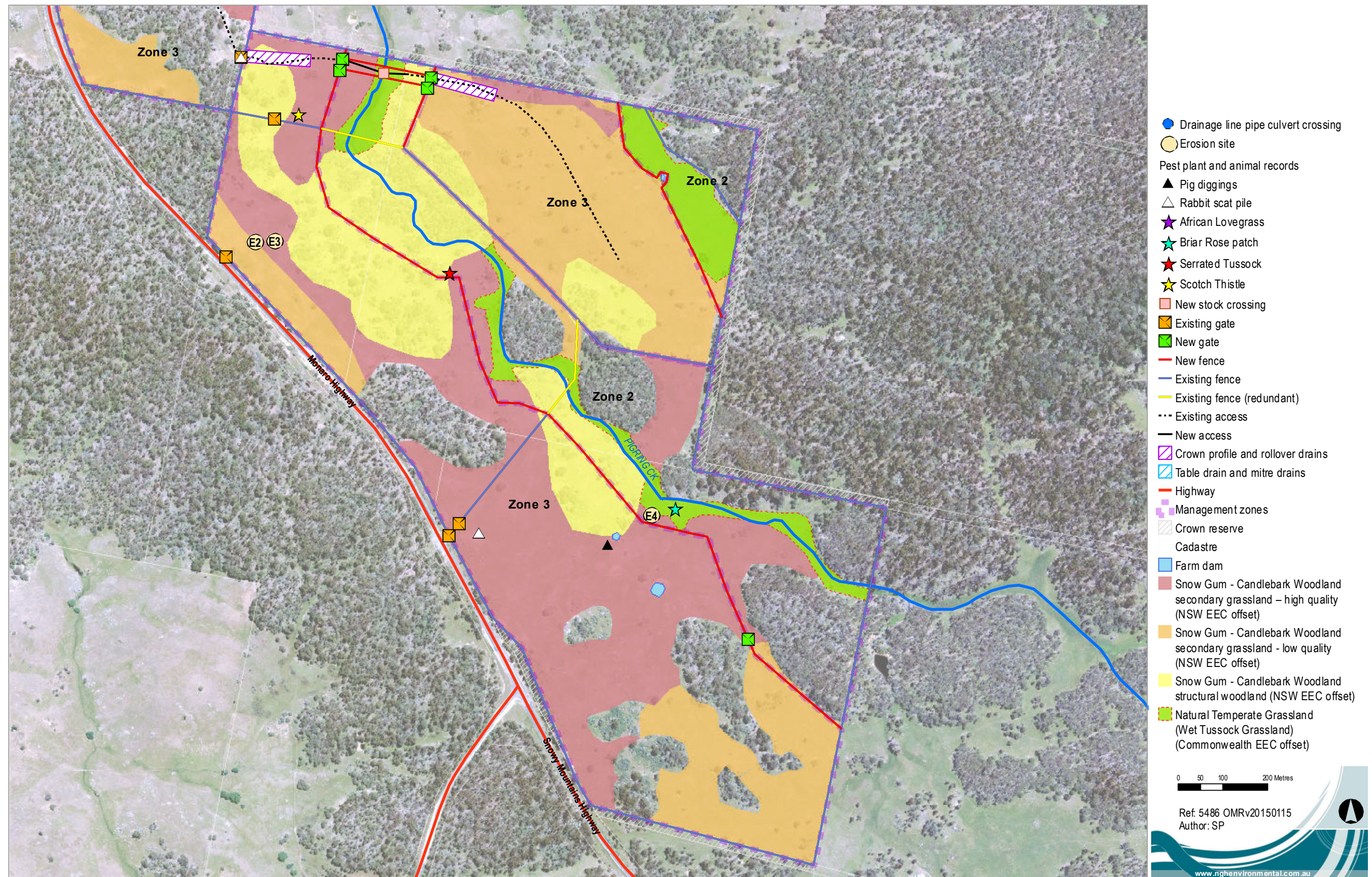


Figure 6-6 Observed erosion sites and pest plant and animal occurrences at the southern blocks offset site



## 6.2.8 Track upgrading, erosion and sedimentation control

### Track works

The existing access tracks at the offset sites will be upgraded and maintained to 'farm track' standard to provide reliable, low impact management access. Track design and drainage would comply with Council's best practice guidelines and OEH (2012) Erosion and Sediment Control on Unsealed Roads.

In addition to road crowning and crossfall drainage, a combination of drainage structures would be installed, including table drains, mitre drains and rollovers. Drains would be spaced to ensure effective road surface drainage and prevent runoff from reaching erosive volumes and velocities. The maximum spacing between drains (such as rollovers) and rollover design standards according to OEH (2012) is shown in Table 6-1 and Figure 6-7.

Table 6-1 Maximum distance of water flow along road surfaces and table drains (from OEH 2012)

Road grade (degrees)	Maximum distance (m)	Road grade (degrees)	Maximum distance (m)
1	250	8	70
2	200	9	65
3	150	10	60
4	125	11	55
5	100	12	50
6	90	13	45
7	80	14 and 15	40

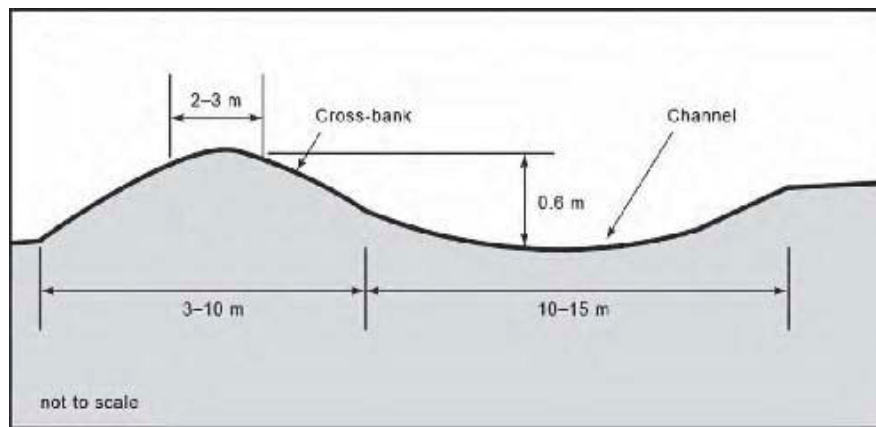


Figure 6-7 Rollover design and dimensions (OEH 2012)

Weed free track surfacing material will be imported to replace eroded soil and enable crown profiling and the installation of rollover drains on steep slopes.

Drainage lines and boggy areas would have bed-level rock surfacing, using a similar technique to that used for the Pigring Creek stock crossing (refer section 6.2.2). Wet drainage line crossings would have pipe culverts, raised approaches and table drains installed as required. The indicative locations of track and drainage works are indicated on Figure 6-5 and Figure 6-6.

Aside from the formed stock crossing in the southern blocks offset site (refer section 6.2.2), no tracks or drainage structures would be located in watercourses, or in the Natural Temperate Grassland EEC (Wet Tussock Grassland) community.

### Gully erosion remediation

Gully erosion results in loss of grassland habitat and siltation in aquatic and riparian communities. Gullies also affect accessibility across paddocks for stock and vehicles. Four established or developing erosion gullies have been identified at the offset sites.

Remediation of the gullies will involve the placement of 100 millimetre nominal size rip rap, underlain by geotextile, in the actively eroding section. Jute mesh and coir logs would be used as necessary to protect exposed soils and slow and divert runoff up to 10 metres upslope of the actively eroding section. Active soil erosion at the offset sites has been mapped on Figure 6-5 and Figure 6-6.

Increasing vegetation cover at the offset sites resulting from the planned grazing strategy will assist remediation and reduce the potential for future gully erosion. Soil erosion occurring on track sections on steeper slopes, especially on steep slopes either side of the Pigging Creek crossing point in the southern blocks offset site, will be remediated as part of the track upgrade works. The identified erosion sites, and any additional sites subsequently recorded, would be included in the regular condition monitoring program. Baseline photographs of the erosion sites are provided below.



Figure 6-8 Wet drainage line in Lake Wallace block requiring pipe culvert crossing



Figure 6-9 Eroded track surface on slope in Lake Wallace block requiring resurfacing and drainage



Figure 6-10 Lake Wallace block erosion site 1 (706491 5950589)



Figure 6-11 Southern blocks erosion site 2 (706839 5949709)



Figure 6-12 Southern blocks erosion site 3 (706884 5949711)



Figure 6-13 Southern blocks erosion site 4 (707730 5949096)

### Objectives

To upgrade existing farm access tracks to ensure all-weather access and minimise erosion and sedimentation impacts on adjacent vegetation and waterways.

To remediate existing soil erosion and track drainage problems.

To stabilise soils and vegetation to prevent future erosion through track design and drainage and pasture management.

### Outcomes

No active sheet, rill or gully erosion is occurring at the sites within 3 years.

All permanent tracks are upgraded with drainage structures (rollover and mitre drains, road profile shaping, resurfacing) as required within 1 year. These works would not be undertaken in areas of the Natural Temperate Grassland (Wet Tussock Grassland) EEC (with the exception of the creek crossing at the southern blocks offset site).

### Actions and guidelines

Access tracks will be upgraded and rollover and mitre drains will be installed on permanent farm tracks, including either side of Pigging Creek crossing (outside the Natural Temperate Grassland EEC). Track design, drainage methods and drain spacing and location would comply with Council's best practice guidelines and OEH (2012) Erosion and Sediment Control on Unsealed Roads. Tracks would generally not exceed 4 metres in width (including table drains).

Any material imported to the sites for track resurfacing or stabilising boggy sections would be non-dispersive and would come from a weed-free source.

Native grass cover would be retained on existing track sections where ever possible. The track would be slashed intermittently as required to maintain route visibility.

The established or developing erosion gullies at the offset sites would be remediated using 100 millimetre nominal size rip rap, underlain by geotextile, in the actively eroding sections, with jute mesh and coir logs used as necessary to protect exposed soils and slow and divert runoff up to 10 metres upslope of the actively eroding section.



### 6.2.9 Fauna habitat and vegetation management

General criteria for forest and woodland habitat and connectivity include:

- woodland vegetation with trees should cover at least 30% of the total farm area, and at least 10% of the farm area should be protected for wildlife (Barrett 2000)
- woodland patch size should be at least 10 hectares in size and within 500-1000 metres of other remnants (McIntyre *et al.* 2002, Freudenberger 1999)
- isolated woodland patches with an area of less than 10 hectares in size should be either connected by corridors at least 50 metres wide (Barrett 2000) or separated by no more than 100 metres (Freudenberger 1999)
- patches should have structural complexity including tree, shrub and native ground layers, and a range of tree ages
- shrub cover should be maintained over at least one third of the area of woodland patches (Barrett 2000)
- linear corridors should be at least 50 metres wide to provide habitat for woodland birds and reduce edge effects (Lambeck 1999, McIntyre *et al.* 2000, Lindenmayer *et al.* 2011)
- native vegetation around water sources should be protected; buffers should be a minimum of 50-100 metres for major rivers, 20-50 metres for creeks and 10-20 metres for major drainage lines (Wentworth Group 2003)
- the site should be managed to maintain important habitat features including paddock trees, rock outcrops, shrub patches, and litter, fallen trees and branches on the ground.

As noted in section 2, the offset sites already have good landscape connectivity with forest and woodland to the east, north and south. Over time, protection from stock and natural tree regeneration within the zone 1 and zone 2 Pigring Creek riparian zone will enable the offset sites to meet all of the above criteria.

Tree hollows and fallen logs are expected to increase in abundance as the woodland and forest stands age at the sites.

With the implementation of rotational grazing, Snow Gum – Candlebark Woodland secondary grassland is expected to gradually improve in terms of native species richness, structural complexity and landscape function. Dense tree regeneration in ungrazed riparian areas (zones 1 and 2) may require thinning to protect groundlayer vegetation. The need for thinning would be informally assessed during regular vegetation condition monitoring conducted in the offset sites (refer section 8.1). Dense regeneration is most likely to occur in Snow Gum Woodland secondary grassland, and is not expected to affect the Natural Temperate Grassland (Wet Tussock Grassland) EEC. If required, thinning would be low impact using a highly targeted technique (cut-stump herbicide application), achieving a final tree spacing of 10-20 metres.

#### Objectives

To provide suitable conditions for the ongoing natural restoration of woodland habitat and connectivity at the offset sites.

#### Outcomes

The offset sites meet the identified habitat connectivity criteria within 10 years.

Fallen log habitat maintained within the BioMetric benchmark for the relevant vegetation community in all forest and woodland areas at the offsets sites (OEH 2014c, refer condition monitoring section 8.1).

#### Actions and guidelines

Eucalypt regeneration within the fenced Pigring Creek riparian corridor (zones 1 and 2) may be progressively thinned as required based on ecologist advice, to achieve an ultimate tree spacing of 10-20 metres to protect groundlayer vegetation. Cut stump herbicide application would be used to minimise non-target impacts.

Native trees, stags, logs or shrubs will not be damaged or removed, with the exception of clearing required for fencing and other works specified in this plan, or thinning of natural regeneration to maintain vegetation cover or diversity.

Surface rock will not be removed or damaged to, except to undertake the works specified in this plan.

### **6.2.10 Aboriginal cultural heritage protection**

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) establishes a process for the identification, protection and management of cultural and natural heritage places and their values through recognition and inclusion on the World Heritage, National Heritage and Commonwealth Heritage lists. Places inscribed onto these lists will have outstanding heritage values and are significant at the national level and state level.

There are no cultural heritage places listed, under assessment or nominated to the World Heritage, National Heritage and Commonwealth Heritage lists within the project area. None of the cultural heritage places recorded within project area will meet either the eligibility requirements or threshold for inclusion on these lists. Aboriginal cultural heritage within the Lake Wallace project area has therefore been assessed under relevant NSW legislation, the *NSW Parks and Wildlife Act 1974* (NPW Act).

The Review of Environmental Factors for the Lake Wallace project (ngn environmental 2013c) summarises the results of a series of Aboriginal cultural heritage surveys, assessments and consultations. This work is focused around the Lake Wallace potential impact area, including the Lake Wallace offset site.

The NSW Office of Environment and Heritage (OEH) issued an Aboriginal Heritage Impact Permit (AHIP) (C0000529) in August 2014 authorising harm to Aboriginal objects (stone artefacts). The AHIP permitted archaeological salvage (excavation, collection, relocation) of identified Aboriginal objects to facilitate geotechnical drilling and specific construction works. Three Aboriginal sites containing objects were designated as no-harm areas in the AHIP. The proposed reburial location for the salvaged Aboriginal objects and two cultural features not protected under the NPW Act will also be protected and managed throughout the project.

Aboriginal cultural heritage features located at and near the Lake Wallace block offset site were identified during the assessment process for ongoing protection and management, including:

- Women's Waterhole
- LW10 stone procurement site
- Aboriginal artefact sites LW5, LW6 and LW7
- reburial location for salvaged stone artefacts.

These features are shown on Figure 6-14. Works associated with the offset sites have been located and designed to avoid impacts to these Aboriginal cultural heritage features.

A plan to guide the salvage and reburial of Aboriginal objects and management of Aboriginal heritage was developed (On site CHM 2015). Salvage works have been undertaken by On Site Cultural Heritage Management Pty Ltd in accordance with the AHIP. A total of 239 stone artefacts (Aboriginal objects) were reburied near the Women's Waterhole on 15 March 2015 (at site LW11).

The plan also contains conservation and management strategies for Aboriginal cultural heritage features:

1. Sites LW5, LW6 and LW7 and LW10 require protection and management arrangements during the construction and operational phases of the Lake Wallace project.
2. The reburial site (Site LW11) should be identified in relevant management documents into the future.
3. The Womens' Waterhole should be identified in the EMP and OMP as requiring protection and management arrangements. A number of future management strategies and recommendations are identified in On Site CHM (2013).

Access to the Women's Waterhole would utilise an existing access track along the western fenceline and descend along the crest of a spur to the waterhole (On Site CHM 2013). A suitable gate would be provided in the fenceline around the water storage.

There are currently no identified constraints relating to Aboriginal heritage for the southern blocks offset site. This site will be subject to Due Diligence assessment to identify potential sensitivities. The Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW (DECCW 2010) would be applied to:

- Identify whether or not Aboriginal objects are, or are likely to be, present in an area
- Determine whether or not proposed activities are likely to harm Aboriginal objects (if present)
- Determine whether an AHIP application is required.

Objectives
To protect, conserve and maintain access to Aboriginal cultural values at the offset sites.
Outcomes
Aboriginal cultural values securely protected and appropriately managed at the offset sites.
Suitable access provided and maintained to the Women's Waterhole.
Actions and guidelines
Works at the offset sites would avoid impacts to identified Aboriginal sites, including: <ul style="list-style-type: none"> <li>• the Women's Waterhole</li> <li>• LW10 stone procurement site</li> <li>• Aboriginal artefact sites LW5, LW6 and LW7</li> <li>• LW11 reburial site for salvaged Aboriginal objects (stone artefacts).</li> </ul>
Access to the Women's Waterhole will be provided utilising an existing access track along the western fenceline and descending along the crest of a spur to the waterhole. A suitable gate will be provided in the fenceline around the water storage.
Any works involving earthworks at the offset sites would be subject to Due Diligence assessment and approval in the form of an AHIP as required.
If an Aboriginal object is found while undertaking works at the offset sites, works must cease and OEH must be notified; an AHIP may be required. If human skeletal remains are found the proponent must stop work immediately, secure the area to prevent unauthorized access, and contact the NSW Police and OEH.



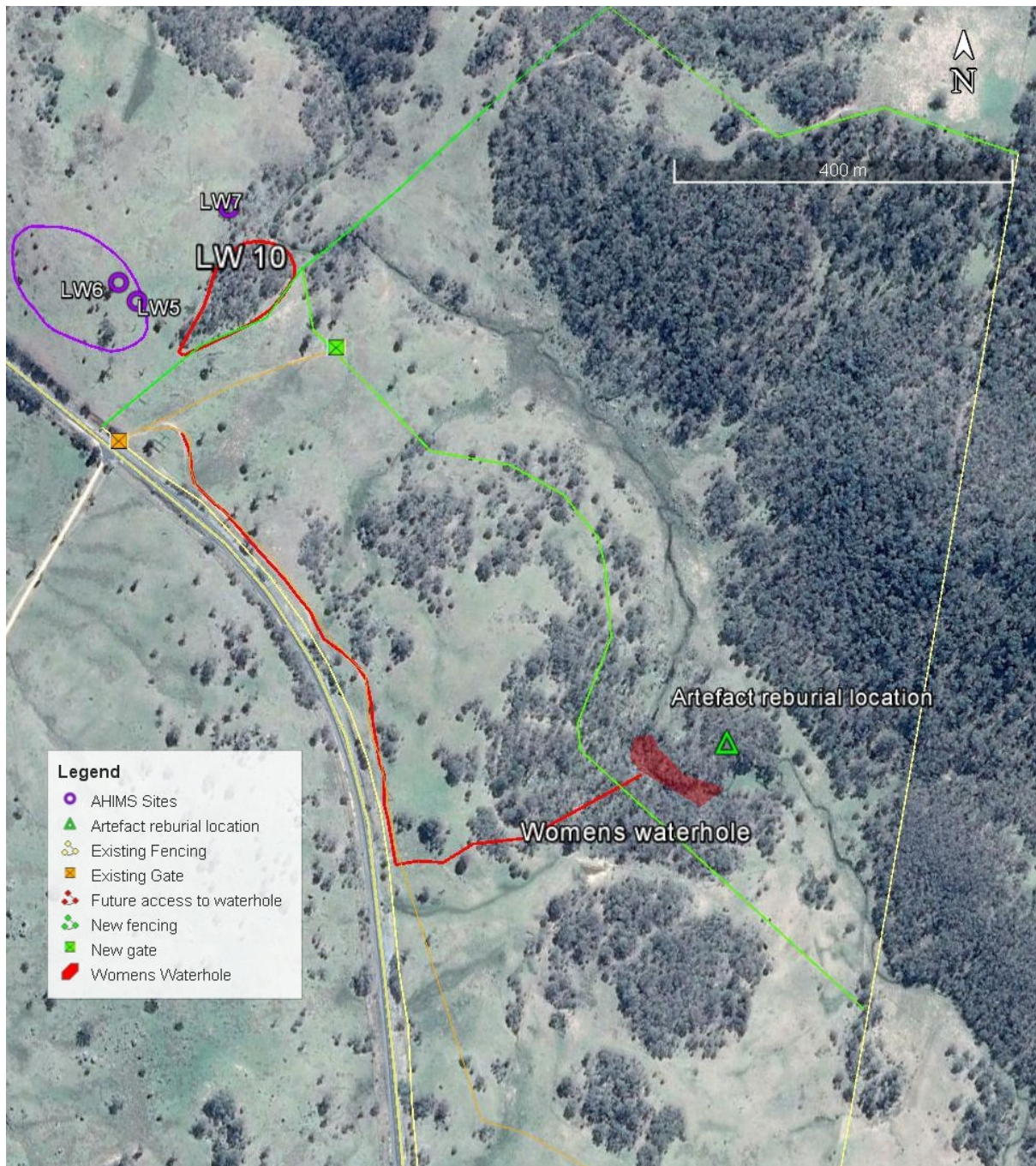


Figure 6-14 Aboriginal cultural heritage sites and no harm areas at the offset sites



## 7 INSPECTION AND COMPLIANCE

Council would conduct routine inspections of the offset sites at least monthly to ensure the provisions of this plan are being implemented.

At each inspection, the Council officer would complete a checklist recording:

- average sward height, measured with a ruler at representative sites on upper and midslope locations
- the locations, type and visible number of stock
- fence and gate repair requirements (particularly riparian fencing)
- any unrecorded or untreated noxious weed or pest animal infestations
- active erosion sites, and track and drain repair requirements
- any adverse impacts of the use of the property
- any areas of soil or vegetation disturbance not associated with works under the Offset Management Plan or the Lake Wallace project approval
- any evidence of agricultural activities not permitted under the plan, including supplementary feeding, sowing of exotic pasture species and fertiliser use
- any evidence of pile or broadscale burning
- any evidence of illegal access or activities.

A comprehensive inspection and compliance report would be prepared by Council annually, summarising the previous year's monthly inspections and including a full and current assessment of track and fence condition covering all parts of the site. The report by Council would also summarise the records maintained by the leaseholder relating to grazing rotations, stock movements and stock numbers.

Council is required to prepare an annual compliance report under the Commonwealth project approval. The report must address approval conditions, including implementation of the plan. Breaches in compliance would be recorded and included in the inspection and compliance report. The report is to be published on the Council website within 3 months of each 12 month anniversary of the commencement of the project.

A single consolidated annual compliance report will be prepared to address the requirements of all relevant agencies including State and Commonwealth government agencies.

Documentary evidence providing proof of the date of publication, and details of any non-compliance, must be provided to the Commonwealth at the same time as the compliance report is published. Potential or actual contraventions of the conditions must be reported to the Commonwealth within 2 days of Council becoming aware of them, and included in the annual compliance report.

## 8 MONITORING, REVIEW AND REPORTING

### 8.1 CONDITION MONITORING

#### 8.1.1 Indicators and targets

The condition of the EECs at the sites will be monitored and reported by an independent third party to assist the evaluation of management effectiveness in terms of plan objectives, outcomes and condition targets. The condition indicators, targets and proposed achievement timeframes are summarised in Table 8-1 below.

Table 8-1 Condition indicators, targets and achievement timeframes for monitoring at the offset sites

Condition indicator	Target	Achievement
Live native groundcover	≥80%	December 2015
Bare ground cover	≤10%	December 2015
Average sward height (secondary grassland)	5-10 cm	December 2015
Kangaroo Grass cover (secondary grassland)	≥50%	December 2019
Floristic richness	SR637 Snow Gum - Candle Bark woodland BioMetric benchmark- 20 (OEH 2014c) SR610 River Tussock - Tall Sedge - Kangaroo Grass moist grasslands BioMetric benchmark – 16 (OEH 2014c)	December 2019
Floristic Value Score	≥ high floristic value category (scores ≥20)	December 2019
Pest animal scat count	No occurrences	December 2015
Noxious weed count	No occurrences	December 2015
Grazing-sensitive flora species	Abundance maintained or increased between years	Continuing
Small Snake Orchid	Abundance and area maintained or increased between years	Continuing

#### 8.1.2 Methods

The monitoring methods are based on the NSW BioBanking Assessment Methodology (BBAM) (OEH 2014a). The data collected in the BBAM plots and transects have been extended to enable the monitoring of progress toward the condition targets. Monitoring sites are located within representative vegetation in each management zone and EEC vegetation unit. The locations of the monitoring sites are shown on Figure 3-1 and Figure 3-2.

#### General floristics and cover

Plot and transect surveys were used to measure 10 site condition attributes:

##### 20 metre x 20 metre (0.04 ha) plot

- Native plant richness

##### 50 metre x 20 metre (0.1 ha) plot

- Number of trees with hollows
- Total length of fallen logs (metres)

### **50 metre line transect**

- Native overstorey cover (10 points)
- Native mid-storey cover (10 points)
- Native ground cover - grasses (50 points)
- Native ground cover - shrubs (50 points)
- Native ground cover - other (50 points)
- Exotic plant cover (50 points)
- Bare ground, rock and litter (50 points).

Native plant richness was surveyed using relative cover/abundance based on visual estimates of foliage cover (Carnahan 1997), scored using a seven point Braun-Blanquet scale modified to allow the calculation of grassy ecosystem Floristic Site Value (Rehwinkel 2007). Native mid-storey and overstorey cover were recorded as foliage cover to the nearest 5%, expressed as average cover values for each transect. The native ground cover categories were recorded as simple presence/absence; the number of 'hits' along the transect is divided by the number of transect points (50) to give a frequency score.

### **Live native groundcover and Kangaroo Grass cover**

The BBAM transects were also used to collect data on total live native cover and Kangaroo Grass cover. Kangaroo Grass were identified to species when it occurred at each of the 50 points of the transects. Kangaroo Grass cover is an important condition indicator and is included among the condition targets.

### **Average grass sward height**

The BBAM transects were used to collect data on sward height every 5 metres along the transect. A ruler was used to measure the prevailing green sward height at each point (excluding flowering stems). The recorded heights are averaged to provide an indication of groundlayer biomass for the assessment of condition targets.

### **Floristic site value**

The Floristic Site Value scores calculated from the 20 metre quadrat monitoring data for each site are based on number, type and cover/abundance of significant species which indicate site quality (Rehwinkel 2007). The initial monitoring results provide a baseline to track change in Floristic Site Value over time. The scores are grouped into floristic value classes based on the categorisation in Mulvaney (2012).

### **Grazing-sensitive species**

Grazing over a long period is likely to have reduced the abundance of grazing-sensitive flora species, particularly shrubs, legumes, geophytes and taller forbs. Candidate species from these groups occurring at the offset sites were selected as indicators to monitor the status of grazing-sensitive species at the sites. Cover/abundance scores recorded in the 20 metre floristic quadrats were monitored for comparison between survey years.

### **Pest plants and animals**

Pest animal scats and noxious weeds were recorded at all points where they intersected with the 50 metre transect tape at each BBAM monitoring plot. The cover/abundance scores of noxious weeds in the 20 metre floristic quadrats were extracted for weed abundance monitoring. Noxious weeds and pest animal sign were also recorded informally during the monitoring survey when moving to and between sites.

### Soil erosion

Active soil erosion at the offset sites were photographed and mapped. The erosion sites are those identified during the offset site assessment, and while moving to and between monitoring sites during the monitoring survey.

### Photopoints

Photopoint photographs were taken along the transect line from the floristic quadrat end of the plot (usually the northern end). Photographs were taken approximately 1.5 metres back from the transect post, with the top of the post in the lower foreground and with the camera angled parallel to the ground.

### Informal observations

In addition to plot-based monitoring, a field data sheet would be used to record informal observations of significant flora species, pest plants and animals, soil erosion, the state of infrastructure, and any other issues which may negatively affect biodiversity values at the sites. The effect of any dense shrub or tree regeneration within the ungrazed zones 1 and 2 would also be assessed to determine the need for thinning to protect the condition of groundlayer vegetation. These observations would be made while moving to and between condition monitoring and erosion monitoring sites.

### Small Snake Orchid monitoring

The colony of the threatened Small Snake Orchid (*Diuris pedunculata*) in the Lake Wallace block (refer Figure 6-3) will be monitored during the flowering period each year from project approval until the dam has been constructed and operating for 5 years. Monitoring results will be provided to OEH within 2 months of the fieldwork.

5 metre wide search transects were used to determine the extent of the Small Snake Orchid (*Diuris pedunculata*) colony in the Lake Wallace block, applying a 50 metre buffer around the known colony site. The colony was monitored by recording:

- number of individual plants
- plant health and reproductive status
- the area of occupancy
- habitat and associated species
- presence and status of pollination mimicry models (yellow-flowered pea species)
- any apparent impacts or threats to the colony.

The time of day and prevailing weather conditions were also recorded. The colony was photographed and the location of the colony recorded with a GPS. One of the BBAM monitoring plots (SW2) was located adjacent to the orchid monitoring site to provide more detailed site composition and condition information. Any new Small Snake Orchid records discovered at the site will be submitted to OEH and Bionet.

### Timing

Baseline monitoring was conducted by an ecologist at the establishment of the offset sites. Subsequent monitoring will occur after one year, and then every two years until 2025. Monitoring scope and frequency may be adjusted depending on monitoring results, the observed rate of change or following any alteration to the management regime. Any change to monitoring frequency or methodology however would require written approval from the Commonwealth Environment Minister, and OEH. Monitoring will be conducted



in mid-November each year. The Small Snake Orchid colony will be monitored and reported on an annual basis.

## **8.2 MANAGEMENT REVIEW AND ADAPTIVE RESPONSE**

### **8.2.1 Management review**

Monitoring results will be interpreted and used to evaluate the effectiveness of management at the sites, in conjunction with records of relevant management activities (including weed control, grazing and pest animal control). The monthly and annual inspection results maintained by Council would be made available to an independent third party for the preparation of the condition monitoring reports and management review.

The monitoring report, including Small Snake Orchid monitoring results, will be prepared for Council and sent to OEH and the Commonwealth Environment Department. South East Local Land Services would also be sent a copy of the monitoring report, as party to the Conservation Property Vegetation Plan agreement.

Under the Lake Wallace project approval, Council is required to provide the Small Snake Orchid monitoring results to OEH within 2 months of the fieldwork. OEH has formally offered to assist with the interpretation of monitoring results and providing advice on management (M. Saxon, letter to Council, 17 November 2014).

### **8.2.2 Corrective actions and contingency measures**

If monitoring shows that key condition targets or conservation works milestones are not being met, or are unlikely to be met, management will be evaluated and adjusted to improve performance. Any proposal to change the management arrangements contained in the plan would be submitted to the Commonwealth Environment Minister and OEH for approval, with supporting monitoring results and other records.

Relevant condition indicators that may trigger changes to management include native grass cover (%), Kangaroo Grass cover (%), average sward height, native groundlayer species richness and weed abundance. Target condition thresholds which may trigger an adaptive response are identified in section 8.1, Table 8-1. Potential scenarios and management responses are described below.

#### Excessive dominant grass biomass

Excessive dominant grass biomass (reflected in high grass cover and sward height values, possibly decreasing Kangaroo Grass cover due to senescence and decreasing groundlayer richness) may be addressed by changing the timing, duration or intensity of stock grazing. Grass growth during wet years may require summer grazing to control biomass. Any departure from the grazing regime in the plan would be based on the advice of an ecologist, consideration of field conditions and approval from OEH and LLS.

#### Below-target grass cover levels

Grass cover below target levels (which may also be associated with decreasing Kangaroo Grass cover and groundlayer richness) may require a reduction in grazing intensity or duration, or suspension of stock grazing during drought periods. Depending on causes, the provisional grazing control criteria included in section 6.2.3 may need to be revised.

#### Increase in abundance of exotic annual grasses or forbs

Repeated spring resting of paddocks may lead to an increase in the density of exotic annual grasses and forbs, and in the weed seed bank. Subject to monitoring results and advice from an ecologist, early spring grazing may be trialled in some years to break the growth cycle of these weeds. Any departure from the grazing regime in the plan would be based on the advice of an ecologist, consideration of field conditions and approval from OEH and LLS.

#### Excessive biomass accumulation in ungrazed areas

If monitoring indicates that condition in ungrazed areas in the southern blocks offset site (such as the fenced riparian area or Natural Temperate Grassland - Wet Tussock Grassland association) is declining due to excessive dominant grass biomass, biomass would be reduced using controlled, short duration grazing or mechanical removal (slashing).

#### Increase in the abundance or range of noxious weeds

Noxious and invasive weeds and evidence of pest animal activity would be recorded during monitoring, and during monthly Council inspections. Any incidence of pest plants and animals exceeding the target levels identified in the plan would trigger additional control action.

### **8.3 PLAN REVIEW**

The management plan will be comprehensively reviewed at the end of 2025, after 10 years of operation, taking into account condition monitoring results, annual inspection and compliance reports, the achievement and effectiveness of works, advances in technical knowledge and any changes in environmental or management circumstances. OEH would be involved in the review of the plan. Any revision of the plan would require the approval of the Commonwealth Environment Minister and OEH.

## **9 MANAGEMENT RESPONSIBILITY AND FUNDING**

Cooma-Monaro Shire Council has purchased the land required for the offset sites. Council will also purchase the Crown road reserves along the boundaries of the southern blocks offset site for inclusion in the offset site. These road reserves have been included in this plan and will be managed as part of the offset site from the outset.

After establishing the legal protection of the offset sites, Council will lease the land for use in accordance with the Offset Management Plan and the Conservation Property Vegetation Plan (CPVP) (refer section 10 below).

As landowner, Lake Wallace works approval-holder and party to the CPVP, Council is legally responsible for the implementation of this plan and the CPVP. Council would undertake relevant works required under the plan and the CPVP and supervise the use of the land by the lessee.

During the offset site establishment phase, prior to leasing the land, Council will fund and complete the following preliminary works and activities (refer section 5):

- new perimeter fence sections and internal stock fencing
- noxious weed control
- farm track upgrade and drainage works

- hardened stock crossing over Pigring Creek
- assessment of the need for off-stream stock watering and installation of a tank and trough system as required
- gully erosion remediation
- baseline vegetation monitoring.

Council is providing recurrent funding for the management of the offset sites as part of funding for the ongoing management of the Lake Wallace water supply.

## **10 OFFSET SITE TENURE AND SECURITY**

Council will use a Conservation Property Vegetation Management Plan (CPVP) to provide the in perpetuity legal protection mechanism for the offset sites. The CPVP would be registered on the title.

A CPVP is a legally binding agreement between the landholder (Council) and the Local Land Services under both the *Native Vegetation Act 2003* and the *Threatened Species Conservation Act 1995*. The CPVP is to be prepared by the South East Local Land Services in conjunction with the development of this Offset Management Plan.

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## APPENDIX A FLORA SPECIES LISTS

Introduced species or non-local native species are denoted by an asterisk. Noxious weeds declared for the Cooma-Monaro control area under the *Noxious Weeds Act 1993* are indicated with a ‘†’ symbol.

Where uncertainty exists due to the unavailability of reproductive material, the taxon is preceded by a question mark, or plants are identified to genus level only.

Botanical nomenclature follows Harden (1990-2002) and the Sydney Royal Botanic Gardens’ PlantNet website. The family classification follows Angiosperm Phylogeny Group III (2009).

### A.1.1 Snow Gum Woodland structural woodland

Scientific name	Common name	Family
<b>TREES</b>		
<i>Acacia dealbata</i>	Silver Wattle	Fabaceae
<i>Eucalyptus pauciflora</i>	Snow Gum	Myrtaceae
<i>Eucalyptus rubida</i>	Candlebark	Myrtaceae
<i>Eucalyptus stellulata</i>	Black Sally	Myrtaceae
<b>SHRUBS, SUB-SHRUBS</b>		
<i>Acrotriche serrulata</i>	Honeypots	Ericaceae
<i>Astroloma humifusum</i>	Cranberry Heath	Ericaceae
<i>Bossiaea buxifolia</i>	Matted Bossiaea	Fabaceae
<i>Bossiaea foliosa</i>	Leafy Bossiaea	Fabaceae
<i>Brachyloma daphnoides</i>	Daphne Heath	Ericaceae
<i>Epacris microphylla</i>	Coral Heath	Ericaceae
<i>Hovea heterophylla</i>	Variable Hovea	Fabaceae
<i>Leptospermum myrtifolium</i>	Myrtle Tea-tree	Myrtaceae
<i>Leucopogon fraseri</i>		Ericaceae
<i>Melicytus dentatus</i>	Tree Violet	Violaceae
<i>Mirbelia oxylobioides</i>	Mountain Mirbelia	Fabaceae
<i>Pimelea linifolia</i> ssp <i>caesia</i>	Slender Rice Flower	Thymelaeaceae
†* <i>Rosa rubiginosa</i>	Briar Rose, Sweet Briar	Rosaceae
<b>VINES AND TWINERS</b>		
<i>Glycine clandestina</i>	Twining Glycine	Fabaceae
<b>FORBS</b>		
<i>Acaena agnipila</i>	Sheep’s Burr	Rosaceae
<i>Acaena</i> sp		Rosaceae
* <i>Acetosella vulgaris</i>	Sheep Sorrel	Polygonaceae
<i>Ajuga australis</i>	Austral Bugle	Lamiaceae
<i>Arthropodium milleflorum</i>	Vanilla Lily	Asparagaceae
<i>Asperula scoparia</i>	Prickly Woodruff	Rubiaceae
<i>Brachyscome decipiens</i>	Field Daisy	Asteraceae
<i>Caladenia gracilis</i>	Musky Caladenia	Orchidaceae
<i>Calotis scabiosifolia</i> ssp <i>integrifolia</i>	Rough Burr-Daisy	Asteraceae
<i>Chrysocephalum apiculatum</i>	Common Everlasting	Asteraceae
<i>Chrysocephalum semipapposum</i>	Clustered Everlasting	Asteraceae
* <i>Cirsium vulgare</i>	Black Thistle	Asteraceae



Scientific name	Common name	Family
<i>Coronidium scorpioides</i>	Button Everlasting	Asteraceae
<i>Craspedia canens</i>	Grey Billy Buttons	Asteraceae
<i>Crassula sieberiana</i>	Austral Stonecrop	Crassulaceae
<i>Cullen microcephalum</i>	Dusky Scurf-pea	Fabaceae
<i>Cymbonotus preissianus</i>	Austral Bear's Ear	Asteraceae
<i>Daucus glochidiatus</i>	Native Carrot	Apiaceae
<i>Desmodium varians</i>	Slender Tick-trefoil	Fabaceae
<i>Dianella longifolia</i>	Blue Flax Lily	Hemerocallidaceae
<i>Dichondra repens</i>	Kidney Weed	Convolvulaceae
<i>Epilobium sp</i>	Willow Herb	Onagraceae
<i>Euchiton involucratus</i>	Star Cudweed	Asteraceae
<i>Euchiton japonicus</i>	Creeping Cudweed	Asteraceae
<i>Galium liratum</i>		Rubiaceae
<i>Geranium antrorsum</i>	Rosetted Crane's-bill	Geraniaceae
<i>Geranium solanderi</i>	Native Geranium	Geraniaceae
<i>Gonocarpus tetragynus</i>	Raspwort	Haloragaceae
<i>Haloragis heterophylla</i>	Raspwort	Haloragaceae
<i>Hydrocotyle laxiflora</i>	Stinking Pennywort	Araliaceae
<i>Hypericum gramineum</i>	Grassy St John's Wort	Hypericaceae
* <i>Hypochaeris glabra</i>	Smooth Catsear	Asteraceae
* <i>Hypochaeris radicata</i>	Catsear, Flatweed	Asteraceae
<i>Hypoxis hygrometrica</i>	Golden Weather Grass	Hypoxidaceae
<i>Leptorhynchos squamatus ssp squamatus</i>	Scaly Buttons	Asteraceae
* <i>Myosotis discolor</i>	Forget-me-not	Boraginaceae
<i>Oxalis perennans</i>	Wood Sorrel	Oxalidaceae
* <i>Petrorhagia nanteuilii</i>	Proliferous Pink	Caryophyllaceae
<i>Plantago varia</i>	Variable Plantain	Plantaginaceae
<i>Poranthera microphylla</i>	Small Poranthera	Euphorbiaceae
<i>Rumex brownii</i>	Native Dock	Polygonaceae
<i>Scleranthus biflorus</i>	Two-flowered Knawel	Caryophyllaceae
<i>Scleranthus fasciculatus</i>	Knawel	Caryophyllaceae
†* <i>Senecio madagascariensis</i> (1 plant removed from site)	Fireweed	Asteraceae
<i>Senecio prenanthoides</i>		Asteraceae
<i>Solenogyne gunnii</i>	Hairy Solenogyne	Asteraceae
<i>Stackhousia monogyna</i>	Creamy Candles	Celastraceae
* <i>Taraxacum officinale</i>	Dandelion	Asteraceae
<i>Thysanotus tuberosus</i>	Common Fringe-lily	Anthericaceae
* <i>Trifolium arvense</i>	Haresfoot Clover	Fabaceae
* <i>Trifolium campestre</i>	Hop Clover	Fabaceae
* <i>Trifolium dubium</i>	Yellow Clover	Fabaceae
* <i>Trifolium repens</i>	White Clover	Fabaceae
* <i>Trifolium sp</i>	Clover	Fabaceae
* <i>Verbascum thapsus</i>	Great Mullein	Scrophulariaceae
<i>Veronica calycina</i>	Hairy Speedwell	Plantaginaceae
<i>Veronica gracilis</i>	Slender Speedwell	Plantaginaceae
<i>Viola betonicifolia</i>	Purple Violet	Violaceae
<i>Vittadinia cuneata</i>	Fuzzweed	Asteraceae
<i>Wahlenbergia gracilis</i>	Sprawling Bluebell	Campanulaceae

Scientific name	Common name	Family
<i>Wahlenbergia planiflora</i>	Flat Bluebell	Campanulaceae
<b>GRASSES</b>		
* <i>Aira caryophyllea</i>	Hair Grass	Poaceae
* <i>Anthoxanthum odoratum</i>	Sweet Vernal Grass	Poaceae
<i>Aristida ramosa</i>	Wiregrass	Poaceae
<i>Austrostipa scabra ssp falcata</i>	Corkscrew Grass	Poaceae
<i>Austrostipa ?bigeniculata</i>	Tall Speargrass	Poaceae
<i>Dichelachne crinita</i>	Longhair Plumegrass	Poaceae
<i>Dichelachne sieberiana</i>		Poaceae
<i>Elymus scaber</i>	Wheat Grass	Poaceae
* <i>Holcus lanatus</i>	Yorkshire Fog	Poaceae
<i>Microlaena stipoides</i>	Weeping Grass	Poaceae
<i>Panicum effusum</i>	Hairy Panic	Poaceae
<i>Poa labillardierei</i>	Silver or River Tussock	Poaceae
<i>Poa sieberiana</i>	Snowgrass	Poaceae
<i>Rytidosperma pilosum</i>	Short-flowered Wallaby Grass	Poaceae
<i>Rytidosperma sp</i>	Wallabay Grass	Poaceae
<i>Sorghum leiocladum</i>	Native Sorghum	Poaceae
<i>Themeda triandra</i>	Kangaroo Grass	Poaceae
* <i>Vulpia sp</i>		Poaceae
<b>SEDGES AND RUSHES</b>		
<i>Carex inversa</i>	Knob Sedge	Cyperaceae
<i>Lomandra longifolia</i>	Spiny-headed Mat-rush	Asparagaceae
<i>Luzula densiflora</i>	Woodrush	Juncaceae
<i>Luzula flaccida</i>	Pale Woodrush	Juncaceae
<i>Schoenus apogon</i>	Bog Sedge	Cyperaceae
<b>FERNS AND FERN ALLIES</b>		
<i>Asplenium flabellifolium</i>	Necklace Fern	Aspleniaceae

### A.1.2 Snow Gum Woodland secondary grassland - high diversity

Scientific name	Common name	Family
<b>SHRUBS, SUB-SHRUBS</b>		
<i>Acrotriche serrulata</i>	Honeypots	Ericaceae
<i>Discaria pubescens</i>	Australian Anchor Plant	Rhamnaceae
<i>Hovea heterophylla</i>	Variable Hovea	Fabaceae
<i>Leptospermum myrtifolium</i>	Myrtle Tea-tree	Myrtaceae
<i>Leucopogon fraseri</i>	Beard-heath	Ericaceae
<i>Mirbelia oxylobioides</i>	Mountain Mirbelia	Fabaceae
<i>Pimelea linifolia ssp caesia</i>	Slender Rice Flower	Thymelaeaceae
†* <i>Rosa rubiginosa</i>	Briar Rose, Sweet Briar	Rosaceae
<i>Rubus parvifolius</i>	Native Raspberry	Rosaceae
<b>VINES AND TWINERS</b>		
<i>Glycine clandestina</i>	Twining Glycine	Fabaceae
<b>FORBS</b>		
<i>Acaena agnipila</i>	Sheep's Burr	Rosaceae

Scientific name	Common name	Family
<i>Acaena novae-zelandiae</i>	Bidgee Widgee	Rosaceae
<i>Acaena</i> sp		Rosaceae
* <i>Acetosella vulgaris</i>	Sheep Sorrel	Polygonaceae
<i>Ajuga australis</i>	Austral Bugle	Lamiaceae
<i>Arthropodium milleflorum</i>	Vanilla Lily	Asparagaceae
<i>Asperula conferta</i>	Woodruff	Rubiaceae
<i>Asperula scoparia</i>	Prickly Woodruff	Rubiaceae
<i>Calotis scabiosifolia</i> ssp <i>integrifolia</i>	Rough Burr-Daisy	Asteraceae
* <i>Chondrilla juncea</i>	Skeleton Weed	Asteraceae
<i>Chrysocephalum apiculatum</i>	Yellow Buttons	Asteraceae
<i>Chrysocephalum semipapposum</i>	Clustered Everlasting	Asteraceae
<i>Convolvulus angustissimus</i>	Bindweed	Convolvulaceae
<i>Coronidium gunnianum</i>	Pale Everlasting	Asteraceae
<i>Crassula sieberiana</i>	Austral Stonecrop	Crassulaceae
<i>Cymbonotus preissianus</i>	Austral Bear's Ear	Asteraceae
<i>Cymbonotus</i> sp	Bear's Ear	Asteraceae
<i>Cynoglossum suaveolens</i>	Sweet Hounds-tongue	Boraginaceae
<i>Desmodium varians</i>	Slender Tick-trefoil	Fabaceae
<i>Dichondra repens</i>	Kidney Weed	Convolvulaceae
<i>Epilobium billardierianum</i> ssp <i>cinereum</i>	Willow Herb	Onagraceae
* <i>Erodium cicutarium</i>	Common Stork's-bill	Geraniaceae
<i>Euchiton japonicus</i>	Creeping Cudweed	Asteraceae
<i>Galium liratum</i>		Rubiaceae
<i>Galium</i> sp		Rubiaceae
<i>Gamochaeta calviceps</i>		Asteraceae
<i>Geranium antrorsum</i>	Rosetted Crane's-bill	Geraniaceae
<i>Geranium solanderi</i>	Native Geranium	Geraniaceae
<i>Glycine clandestina</i>	Twining Glycine	Fabaceae
<i>Glycine tabacina</i>	Variable Glycine	Fabaceae
<i>Gonocarpus tetragynus</i>	Raspwort	Haloragaceae
<i>Haloragis heterophylla</i>	Rough Raspwort	Haloragaceae
<i>Hydrocotyle laxiflora</i>	Stinking Pennywort	Araliaceae
<i>Hydrocotyle peduncularis</i>	Shining Pennywort	Araliaceae
<i>Hypericum gramineum</i>	Native St John's Wort	Hypericaceae
* <i>Hypochaeris glabra</i>	Smooth Catsear	Asteraceae
* <i>Hypochaeris radicata</i>	Catsear, Flatweed	Asteraceae
<i>Hypoxis hygrometrica</i>	Weathergrass, Golden Star	Hypoxidaceae
<i>Leptorhynchus squamatus</i> ssp <i>squamatus</i>	Scaly Buttons	Asteraceae
<i>Oreomyrrhis eriopoda</i>	Australian Caraway	Apiaceae
<i>Oxalis perennans</i>	Wood Sorrel	Oxalidaceae
* <i>Petrorhagia nanteuillii</i>	Proliferous Pink	Caryophyllaceae
<i>Plantago varia</i>	Variable Plantain	Plantaginaceae
<i>Polygala japonica</i>	Dwarf Milk-wort	Polygalaceae
<i>Ranunculus lappaceus</i>	Common Buttercup	Ranunculaceae
<i>Rumex brownii</i>	Native Dock	Polygonaceae
<i>Scleranthus biflorus</i>	Two-flowered Knawel	Caryophyllaceae
<i>Scleranthus fasciculatus</i>	Knawel	Caryophyllaceae
<i>Scleranthus diander</i>	Tufted Knawel	Caryophyllaceae



Scientific name	Common name	Family
<i>Solenogyne gunnii</i>	Hairy Solenogyne	Asteraceae
<i>Stellaria pungens</i>	Prickly Starwort	Caryophyllaceae
<i>Stylidium graminifolium</i>	Grass Trigger-plant	Stylidiaceae
<i>Swainsona monticola</i>	Notched Swainson-pea	Fabaceae
* <i>Taraxacum officinale</i>	Dandelion	Asteraceae
<i>Trachymene humilis</i>	Alpine Trachymene	Apiaceae
* <i>Trifolium arvense</i>	Haresfoot Clover	Fabaceae
* <i>Trifolium campestre</i>	Hop Clover	Fabaceae
* <i>Trifolium dubium</i>	Yellow Clover	Fabaceae
* <i>Trifolium repens</i>	White Clover	Fabaceae
* <i>Trifolium ?subterraneum</i>	Subterranean Clover	Fabaceae
<i>Veronica gracilis</i>	Slender Speedwell	Plantaginaceae
<i>Veronica subtilis</i>	Slender Speedwell	Plantaginaceae
<i>Viola betonicifolia</i>	Purple Violet	Violaceae
<i>Vittadinia muelleri</i>	New Holland Daisy	Asteraceae
<i>Wahlenbergia ?planiflora</i> (rosette)	Flat Bluebell	Campanulaceae
<i>Wahlenbergia</i> sp	Bluebell	Campanulaceae
<b>GRASSES</b>		
* <i>Aira caryophyllea</i>	Hair Grass	Poaceae
* <i>Anthoxanthum odoratum</i>	Sweet Vernal Grass	Poaceae
<i>Austrostipa scabra</i> ssp <i>falcata</i>	Corkscrew Grass	Poaceae
* <i>Bromus hordeaceus</i>	Soft Brome	Poaceae
<i>Dichelachne crinita</i>	Longhair Plumegrass	Poaceae
<i>Elymus scaber</i>	Wheat Grass	Poaceae
<i>Microlaena stipoides</i>	Weeping Grass	Poaceae
<i>Panicum effusum</i>	Hairy Panic	Poaceae
<i>Poa labillardierei</i>	Silver or River Tussock	Poaceae
<i>Poa sieberiana</i>	Snowgrass	Poaceae
<i>Rytidosperma laeve</i>	Smooth Wallaby Grass	Poaceae
<i>Rytidosperma pilosum</i>	Short-flowered Wallaby Grass	Poaceae
<i>Rytidosperma tenuius</i>	Short-awn Wallaby Grass	Poaceae
<i>Sorghum leiocladum</i>	Native Sorghum	Poaceae
<i>Themeda triandra</i>	Kangaroo Grass	Poaceae
* <i>Vulpia muralis</i>	Wall Fescue	Poaceae
* <i>Vulpia myuros</i>	Fox-tail Fescue	Poaceae
<b>SEDGES AND RUSHES</b>		
<i>Carex appressa</i>	Tall Sedge	Cyperaceae
<i>Carex chlorantha</i>	Greentop Sedge	Cyperaceae
<i>Carex inversa</i>	Knob Sedge	Cyperaceae
<i>Juncus bufonius</i>	Toadrush	Juncaceae
<i>Juncus filicaulis</i>	Pinrush	Juncaceae
<i>Juncus ?subsecundus</i>		Juncaceae
<i>Lomandra longifolia</i>	Spiny-headed Mat-rush	Asparagaceae
<i>Luzula densiflora</i>	Woodrush	Juncaceae
<i>Schoenus apogon</i>	Bog Sedge	Cyperaceae
<b>FERNS AND FERN ALLIES</b>		
<i>Ophioglossum lusitanicum</i>	Adder's Tongue	Ophioglossaceae

### A.1.3 Snow Gum Woodland secondary grassland - low diversity

Scientific name	Common name	Family
<b>SHRUBS, SUBSHRUBS</b>		
<i>Acrotriche serrulata</i>	Honeypots	Ericaceae
<i>Leucopogon fraseri</i>	Beard-heath	Ericaceae
<i>Mirbelia oxylobioides</i>	Mountain Mirbelia	Fabaceae
<b>FORBS</b>		
<i>Acaena agnipila</i>	Sheep's Burr	Rosaceae
<i>Acaena novae-zelandiae</i>	Bidgee Widgee	Rosaceae
<i>Acaena ovina</i>	Sheep's Burr	Rosaceae
<i>Acaena x anserovina</i>	Hybrid Burr	Rosaceae
<i>Acaena sp</i>		Rosaceae
* <i>Acetosella vulgaris</i>	Sheep Sorrel	Polygonaceae
<i>Asperula conferta</i>	Woodruff	Rubiaceae
<i>Brachyscome scapigera</i>	Tufted Daisy	Asteraceae
* <i>Cerastium vulgare</i>	Mouse-ear Chickweed	Caryophyllaceae
<i>Chrysocephalum apiculatum</i>	Yellow Buttons	Asteraceae
* <i>Cirsium vulgare</i>	Spear Thistle	Asteraceae
<i>Convolvulus angustissimus</i>	Bindweed	Convolvulaceae
<i>Cymbonotus preissianus</i>	Austral Bear's Ear	Asteraceae
<i>Dichondra repens</i>	Kidney Weed	Convolvulaceae
<i>Epilobium billardierianum</i> ssp <i>cinereum</i>	Willow Herb	Onagraceae
* <i>Erodium cicutarium</i>	Common Stork's-bill	Geraniaceae
<i>Euchiton japonicus</i>	Creeping Cudweed	Asteraceae
<i>Galium liratum</i>		Rubiaceae
<i>Galium sp</i>		Rubiaceae
<i>Geranium antrorsum</i>	Rosetted Crane's-bill	Geraniaceae
<i>Geranium solanderi</i>	Native Geranium	Geraniaceae
<i>Gonocarpus tetragynus</i>	Raspwort	Haloragaceae
<i>Haloragis heterophylla</i>	Rough Raspwort	Haloragaceae
<i>Hydrocotyle laxiflora</i>	Stinking Pennywort	Araliaceae
<i>Hydrocotyle peduncularis</i>	Shining Pennywort	Araliaceae
<i>Hypericum gramineum</i>	Grassy St John's Wort	Hypericaceae
* <i>Hypochaeris glabra</i>	Smooth Catsear	Asteraceae
* <i>Hypochaeris radicata</i>	Catsear, Flatweed	Asteraceae
<i>Hypoxis hygrometrica</i>	Weathergrass, Golden Star	Hypoxidaceae
* <i>Myosotis discolor</i>	Forget-me-not	Boraginaceae
<i>Oxalis perennans</i>	Wood Sorrel	Oxalidaceae
* <i>Petrorhagia nanteuillii</i>	Proliferous Pink	Caryophyllaceae
<i>Plantago varia</i>	Variable Plantain	Plantaginaceae
<i>Rumex brownii</i>	Native Dock	Polygonaceae
<i>Scleranthus biflorus</i>	Two-flowered Knawel	Caryophyllaceae
<i>Solenogyne gunnii</i>	Hairy Solenogyne	Asteraceae
<i>Swainsona monticola</i>	Notched Swainson-pea	Fabaceae
* <i>Trifolium arvense</i>	Haresfoot Clover	Fabaceae
* <i>Trifolium campestre</i>	Hop Clover	Fabaceae
* <i>Trifolium dubium</i>	Yellow Clover	Fabaceae
* <i>Trifolium glomeratum</i>	Clustered Clover	Fabaceae

Scientific name	Common name	Family
<i>*Trifolium repens</i>	White Clover	Fabaceae
<i>*Trifolium subterraneum</i>	Subterranean Clover	Fabaceae
<i>Veronica gracilis</i>	Slender Speedwell	Plantaginaceae
<i>Viola betonicifolia</i>	Purple Violet	Violaceae
<i>Vittadinia gracilis</i>	Woolly New Holland Daisy	Asteraceae
<i>Vittadinia muelleri</i>	Fuzzweed	Asteraceae
<i>Wahlenbergia planiflora</i>	Flat Bluebell	Campanulaceae
<b>GRASSES</b>		
<i>*Aira caryophyllea</i>	Hair Grass	Poaceae
<i>*Anthoxanthum odoratum</i>	Sweet Vernal Grass	Poaceae
<i>Austrostipa scabra ssp falcata</i>	Corkscrew Grass	Poaceae
<i>Bothriochloa macra</i>	Redgrass	Poaceae
<i>Elymus scaber</i>	Wheat Grass	Poaceae
<i>Enneapogon nigricans</i>	Niggerheads	Poaceae
<i>Microlaena stipoides</i>	Weeping Grass	Poaceae
<i>Panicum effusum</i>	Hairy Panic	Poaceae
<i>Poa labillardierei</i>	Silver or River Tussock	Poaceae
<i>Poa sieberiana</i>	Snowgrass	Poaceae
<i>Rytidosperma erianthum</i>	Wallaby Grass	Poaceae
<i>Rytidosperma laeve</i>	Smooth Wallaby Grass	Poaceae
<i>Rytidosperma pilosum</i>	Smooth-flower Wallaby Grass	Poaceae
<i>Rytidosperma sp</i>	Wallaby Grass	Poaceae
<i>Sorghum leiocladum</i>	Native Sorghum	Poaceae
<i>Themeda triandra</i>	Kangaroo Grass	Poaceae
<i>*Vulpia bromoides</i>	Squirrel Tail Fescue	Poaceae
<i>*Vulpia muralis</i>	Wall Fescue	Poaceae
<i>*Vulpia myuros</i>	Fox Tail Fescue	Poaceae
Unidentified grasses		Poaceae
<b>SEDGES AND RUSHES</b>		
<i>Carex inversa</i>	Knob Sedge	Cyperaceae
<i>Carex appressa</i>	Tall Sedge	Cyperaceae
<i>Juncus filicaulis</i>	Pinrush	Juncaceae
<i>Juncus sp</i>	Rush	Juncaceae
<i>Luzula densiflora</i>	Woodrush	Juncaceae
<i>Luzula sp</i>	Woodrush	Juncaceae
<i>Schoenus apogon</i>	Bog Sedge	Cyperaceae
<b>FERNS AND FERN ALLIES</b>		
<i>Ophioglossum lusitanicum</i>	Adder's Tongue	Ophioglossaceae

#### A.1.4 Natural Temperate Grassland (Wet Tussock association) – NG

Scientific name	Common name	Family
<b>FORBS</b>		
<i>Acaena sp</i>		Rosaceae
<i>*Acetosella vulgaris</i>	Sheep Sorrel	Polygonaceae
<i>Asperula conferta</i>	Woodruff	Rubiaceae



Scientific name	Common name	Family
<i>Asperula gunnii</i>	Mountain Woodruff	Rubiaceae
<i>Cardamine ?ilacina</i>	Lilac Bitter-cress	Brassicaceae
* <i>Cirsium vulgare</i>	Black Thistle	Asteraceae
<i>Cotula alpina</i>	Alpine Cotula	Asteraceae
<i>Dichondra repens</i>	Kidney Weed	Convolvulaceae
<i>Epilobium billardierianum</i>	Willow Herb	Onagraceae
<i>Euchiton japonicus</i>	Creeping Cudweed	Asteraceae
<i>Galium</i> sp		Rubiaceae
<i>Gratiola peruviana</i>	Brooklime	Scrophulariaceae
<i>Haloragis heterophylla</i>	Rough Raspwort	Haloragaceae
<i>Hydrocotyle peduncularis</i>	Shining Pennywort	Araliaceae
<i>Hydrocotyle tripartita</i>	Pennywort	Araliaceae
<i>Hypericum japonicum</i>	Small St John's Wort	Hypericaceae
* <i>Hypochaeris radicata</i>	Catsear, Flatweed	Asteraceae
* <i>Hypochaeris glabra</i>		Asteraceae
<i>Hypoxis hygrometrica</i>	Weathergrass, Golden Star	Hypoxidaceae
* <i>Myosotis discolor</i>	Forget-me-not	Boraginaceae
<i>Neopaxia australasica</i>	White Purslane	Portulacaceae
<i>Ranunculus diminutus</i>		Ranunculaceae
<i>Ranunculus pimpinellifolius</i>	Bog Buttercup	Ranunculaceae
<i>Solenogyne gunnii</i>	Hairy Solenogyne	Asteraceae
<i>Stellaria angustifolia</i>	Swamp Starwort	Caryophyllaceae
* <i>Taraxacum officinale</i>	Dandelion	Asteraceae
* <i>Trifolium dubium</i>	Yellow Clover	Fabaceae
* <i>Trifolium repens</i>	White Clover	Fabaceae
<i>Viola betonicifolia</i>	Purple Violet	Violaceae
<b>GRASSES</b>		
* <i>Anthoxanthum odoratum</i>	Sweet Vernal Grass	Poaceae
* <i>Holcus lanatus</i>	Yorkshire Fog	Poaceae
<i>Lachnagrostis aemula</i>	Blown Grass	Poaceae
<i>Microlaena stipoides</i>	Weeping Grass	Poaceae
* <i>Paspalum dilatatum</i>	Paspalum	Poaceae
<i>Poa labillardierei</i>	Silver or River Tussock	Poaceae
* <i>Poa pratensis</i>	Kentucky Bluegrass	Poaceae
<i>Poa sieberiana</i>	Snowgrass	Poaceae
<b>SEDGES AND RUSHES</b>		
<i>Carex appressa</i>	Tall Sedge	Cyperaceae
<i>Carex chlorantha</i>	Green-top Sedge	Cyperaceae
<i>Carex inversa</i>	Tall Sedge	Cyperaceae
<i>Juncus ?usitatus</i>	Common Rush	Juncaceae
<i>Juncus</i> sp		Juncaceae
<i>Schoenus apogon</i>	Bog Sedge	Cyperaceae

## APPENDIX B RARE AND GRAZING-SENSITIVE FLORA

### B.1 RARE AND GRAZING-SENSITIVE GRASSY WOODLAND FLORA RECORDED AT THE OFFSET SITES

Species	Significance	Lake Wallace block	Southern blocks
<b>Shrubs, sub-shrubs</b>			
<i>Acrotriche serrulata</i>	Grazing-sensitive	✓	✓
<i>Bossiaea buxifolia</i>	Grazing-sensitive	✓	
<i>Bossiaea prostrata</i>	Grazing-sensitive	✓	✓
<i>Discaria pubescens</i>	ROTAP 3RCa	✓	✓
<i>Hovea heterophylla</i>	Grazing-sensitive	✓	✓
<i>Leucopogon fraseri</i>	Grazing-sensitive		✓
<i>Mirbelia oxylobioides</i>	Grazing-sensitive	✓	
<i>Pimelea curviflora</i>	Grazing-sensitive	✓	✓
<i>Pimelea linifolia ssp caesia</i>	Grazing-sensitive	✓	✓
<i>Pultenaea procumbens</i>	Grazing-sensitive	✓	
<b>Geophytes</b>			
<i>Arthropodium milleflorum</i>	Grazing-sensitive	✓	✓
<i>Caladenia gracilis</i>	Grazing-sensitive	✓	
<i>Diuris pedunculata</i>	Threatened (vulnerable) - NSW	✓	
<i>Diuris maculata</i>	Grazing-sensitive	✓	
<i>Diuris punctata</i>	Depleted or regionally uncommon	✓	
<b>Other forbs</b>			
<i>Brachyscome spp</i>	Grazing-sensitive	✓	✓
<i>Calotis scabiosifolia</i>	Grazing-sensitive	✓	✓
<i>Craspedia canens</i>	Depleted or regionally uncommon	✓	✓
<i>Cullen microcephalum</i>	Grazing-sensitive	✓	
<i>Desmodium varians</i>	Grazing-sensitive	✓	✓
<i>Dianella longifolia</i>	Depleted or regionally uncommon	✓	✓
<i>Glycine tabacina</i>	Grazing-sensitive	✓	✓
<i>Ophioglossum lusitanicum</i>	Depleted or regionally uncommon	✓	✓
<i>Oreomyrrhis eriopoda</i>	Grazing-sensitive	✓	✓
<i>Leptorhynchus squamatus</i>	Depleted or regionally uncommon	✓	✓
<i>Polygala japonica</i>	Depleted or regionally uncommon	✓	✓
<i>Stackhousia monogyna</i>	Grazing-sensitive	✓	✓
<i>Stylidium graminifolium</i>	Grazing-sensitive	✓	✓
<i>Swainsona monticola</i>	Depleted or regionally uncommon	✓	✓
<i>Wahlenbergia stricta</i>	Grazing-sensitive	✓	✓
<b>Grasses</b>			
<i>Sorghum leiocladum</i>	Grazing-sensitive	✓	✓

## B.2 BASELINE MONITORING RESULTS FOR GRAZING-SENSITIVE FLORA

Vegetation condition monitoring was undertaken at the offset sites was conducted on 18 and 20 November 2014 and 18 December 2014. Some of the floristic quadrat surveys were conducted during the offset site assessment on 13 November 2013 (ngghenvironmental 2014).

Candidate grazing-sensitive species occurring at the offset sites were selected as indicators to monitor the status of grazing-sensitive species at the sites. Cover/abundance scores recorded in the 20 metre floristic quadrats will be monitored for comparison between survey years.

The full set of condition monitoring results are contained in the Offset Monitoring Report (ngghenvironmental 2015).

Monitoring sites were located within representative vegetation in each of the following EEC vegetation units:

- Snow Gum – Candlebark Woodland structural woodland (SW)
- Snow Gum – Candlebark Woodland secondary grassland high quality (GH)
- Snow Gum – Candlebark Woodland secondary grassland low quality (GL)
- Wet Tussock Grassland (NG).

The locations of the plots/transects are provided below, and shown on Figure 3-1 and Figure 3-2.

Monitoring site	Transect end post (quadrat end)	Orientation (from quadrat end) <sup>1</sup>
SW1	706412 5951240 (north end)	152°
SW2	706790 5951052 (south end)	327°
SW3	707320 5949829 (north end)	235°
GH1	706462 5951594 (north end)	141°
GH2	706854 5950521 (south end)	330°
GH3	707026 5950116 (north end)	192°
GH4	707721 5949250 (north end)	123°
GH5	707590 5949021 (north end)	202°
GL1	706435 5951086 (north end)	122°
GL2	707578 5949785 (north end)	216°
GL3	706937 5949562 (north end)	126°
GL4	707847 5948460 (north end)	168°
NG1	707844 5949780 (north end)	118°
NG2	708054 5949069 (north end)	117°

<sup>1</sup> magnetic north



Baseline cover/abundance scores for grazing-sensitive species in monitoring plots are provided below. Cover/abundance assessments are scored using a modified Braun-Blanquet 7-point scale:

Braun-Blanquet cover-abundance scale	
<b>r</b>	Solitary ( 1-3 individuals), <5% cover
<b>+</b>	Few (4-15), <5% cover
<b>1</b>	Numerous/scattered, <5% cover
<b>2</b>	5 - 25% cover
<b>3</b>	25- 50% cover
<b>4</b>	50 - 75% cover
<b>5</b>	75 - 100% cover

**Baseline cover scores for grazing-sensitive indicator species**

Species	Site	Baseline cover score
<b>Shrubs, subshrubs</b>		
<i>Discaria pubescens</i>	GH3	+
<i>Hovea heterophylla</i>	SW1	r
	SW2	r
	SW3	r
	GH3	r
	GH5	r
<b>Forbs</b>		
<i>Calotis scabiosifolia</i>	SW1	+
	SW2	+
	GH3	1
<i>Craspedia canens</i>	SW2	+
<i>Cullen microcephalum</i>	SW1	r
<i>Dianella longifolia</i>	SW3	r
<i>Swainsona monticola</i>	GH3	+
	GH4	+
	GH5	+
	GL3	+