



**Willogoleche Wind Farm  
Offset Management Plan**

# Willogoleche Wind Farm Offset Management Plan EPBC 2011/5850

17<sup>th</sup> January 2017

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Signed



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Date 18 / 1 / 2017

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Front cover photo: Iron-grass NTG within the Offset area.

## GLOSSARY AND ABBREVIATION OF TERMS

DEWNR	Department for Environment, Water and Natural Resources.
DotEE	Department of the Environment and Energy. Commonwealth of Australia.
DSE	Dry Sheep Equivalent - Standard measure of feed demand which represents a 50 kg wether which consumes 1.0 kg dry matter per day. A pregnant or lactating ewe has a greater energy requirement, and the amount varies according to the advancing pregnancy, and the size of the lamb once it is born and feeding.
Native Vegetation Council	<p>The Native Vegetation Council (NVC) is an independent body established under the <i>Native Vegetation Act 1991</i>. The NVC monitors the overall condition of the state's vegetation and makes decisions on a wide range of matters concerning native vegetation in South Australia.</p>
Native Vegetation Council Secretariat	<p>Provides support to the Native Vegetation Council. Sits within the Native Vegetation and Biodiversity Management Unit of DEWNR.</p>
NTG	Natural Temperate Grassland (as it refers to Iron-grass Natural Temperate Grassland of South Australia).
Project owner	Willogoleche Power Proprietary Limited is the owned subsidiary company within the ENGIE group, but ENGIE doesn't exist as a separate legal entity. The project owner/developer for the Willogoleche Wind Farm will be referred to as ENGIE, as part of this OMP. The project owner is involved in the planning of the wind farm site, including seeking and obtaining relevant planning and environmental approvals under State and Federal legislation.
TEC	Threatened Ecological Community

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# 1 BACKGROUND

ENGIE is proposing to construct the Willogeleche Wind Farm approximately 6km west of the township of Hallett, in the Mid North of South Australia (Figure 1). As part of the approval conditions under the *Environment Protection and Biodiversity Conservation Act, 1999*, (approval reference is EPBC 2011/5850), an Offset area must be established and placed under Heritage Agreement (under State legislation) and managed for condition improvement consistent with the EPBC Offsets Policy. The Offset area has been calculated previously (EBS 2013) and is required as a result of potential impacts to Iron-Grass Natural Temperate Grassland of South Australia. The Offset area must be representative of this community and be at least 4 hectares in size. See Figure 2 for the location of the proposed Offset area.

EBS Ecology has conducted numerous ecological assessments within proximity of this site and all background information regarding this management plan should be referred to in the following reports:

- EBS (2010) *Willogeleche Wind Farm Assessment against the EPBC Criteria for Iron-grass Grassland Threatened Ecological Community*.
- EBS (2011) *Willogeleche Wind Farm SEB Area Assessment Report*.
- EBS (2011) *Willogeleche Wind Farm Native Vegetation Clearance Report*.
- EBS (2012) *Willogeleche Wind Farm Regional Lomandra Assessment*.
- EBS (2013) *Willogeleche Wind Hill EPBC Offset area Investigation*.

Temperate native grasslands are considered to be the most threatened ecosystem in Australia with 99.5% lost or seriously modified though past practises (Kirkpatrick et al, 1995 as cited in Graham et al, 2001). In South Australia, less than 2% of the true native grasslands remain (Prescott and Nicholls, 1997). Conservation and management of temperate native grasslands is therefore a high conservation priority within the region. The majority of Iron-grass grassland remnants are on land currently used for agricultural production, either in non-arable grazing areas, or non-arable patches within cropping land (Turner, 2012). This area is extensively grazed by sheep with other native grazing animals prevalent in the wider area.

The Offset area is aimed at providing a representative patch of an Iron Grass Natural Temperate Grassland of South Australia community which can be restored and protected and provide an overall biodiversity gain. Under the *EPBC Act 1999 Environmental Offsets Policy (2012) (EOP)*, the patch must meet a series of Offset Principles outlined in the document to deliver an overall conservation outcome that improves or maintains the health, diversity and productivity of the environment as it relates to these matters. The patch must also meet minimum criteria to qualify as a ‘Class C’ patch as listed under the *Commonwealth Listing Advice on Iron-grass Natural Temperate Grassland of South Australia (TSSC 2007)*.

It is proposed that the development will result in the removal of approximately 0.82 ha of Iron-grass Natural Temperate Grassland of South Australia. The Offset area contains 4 hectares of the same TEC.



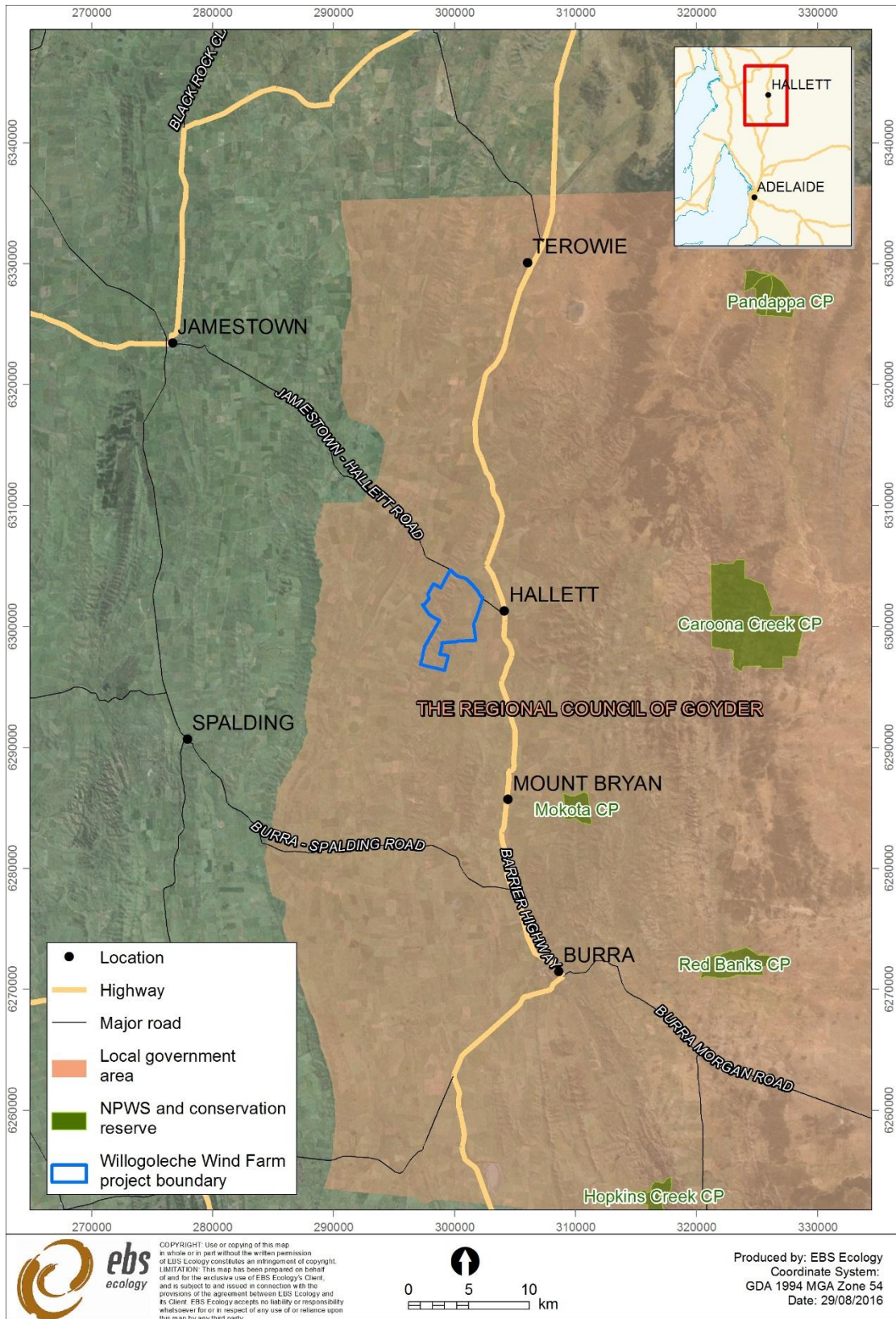


Figure 1. Location of proposed Willogoleche Wind Farm.

Management of the 4 hectares of Class C Iron-grass community will result in a conservation gain that adequately compensates for the impacts associated with the development. The proposed Offset area met the requirements of 100% minimum direct Offset and therefore compensates for the total quantum of impact under the EPBC Offsets Assessment Guide (DSEWPC, 2012).

The management plan for the Offset area will result in significant improvements to the TEC. The Offset area will be protected under the *Native Vegetation Act, 1991* as a Heritage Agreement. The Heritage Agreement will be on the property title Vol 5584 Folio 489.

ENGIE's involvement in the management of the Offset area will continue for the life of the Willogoleche Wind Farm (25 years), at which time care and control of the Offset area will be the exclusive responsibility of the landowners, to be conserved and protected in perpetuity.

The Offset area was selected based on a number of key considerations:

- The site contains a native grassland which is classified as a Category C class Iron-grass Grassland TEC. Therefore, can be improved and directly Offset disturbed Iron-grass Grassland,
- Easily accessible to allow active management of the area,
- Landholder agreement – the Offset area fits with the landholder's management of the property and the Environmental Stewardship Program Project (Commonwealth Funding) the landholder is already involved with.

The Offset Management Plan addresses the following issues:

- Clear Offset objectives
- Minimum targets for key indicators
- Management actions required to meet targets
- Monitoring requirements
- Reporting requirements
- Management review and updating of the Offset Management Plan.

## 1.1 EPBC Act 1999 Environmental Offsets Policy

The EOP applies to the project due to expected impacts to Nationally Critically Endangered *Iron-grass Natural Temperate Grassland of South Australia*. This action carries Offset obligations to deliver an overall conservation outcome that improves or maintains the health, diversity and productivity of the environment as it relates to these matters (DSEWPac 2011). Under the EOP a suitable Offset must:

*Deliver an overall conservation outcome that improves or maintains the viability of the aspect of the environment that is protected by national environment law and affected by the proposed action.*

The Offset area contains *Iron-grass Natural Temperate Grassland of South Australia* in a condition rated as 'Class C' under the *Commonwealth Listing Advice on Iron-grass Natural Temperate Grassland of South Australia* (EBS 2012 and TSSC 2007). The area has been significantly compromised by weeds and grazing, resulting in a lower diversity of native species (nine species), lower density of perennial native grasses and a high incidence of exotic grass and herbs when compared to high quality (Class A) Iron-grass Grasslands.

Proposed management of the Offset area will include fencing to protect from overgrazing by domestic stock and feral and native herbivores, and a weed management program which will be undertaken to improve the patch condition from Class C to Class B. The start quality of the Offset area is a condition class 2 with a target of condition class 7 (on a 0-10 scale) over a 16 year period.

The Offset area will be placed under Heritage Agreement with the South Australian State Government. This process will be completed by 1 July 2018 as per the Variation to Conditions Attached to Approval (EPBC 2011-5850).

A minimum of 3.9 hectares is required to Offset the clearance of *Iron-grass Natural Temperate Grassland* associated with the Willogoleche Wind Farm. 100% of the Offset requirement will be achieved by direct Offsets within the proposed Offset area.

The proposed management of the Offset aims to address the following key Recovery Actions from the *National Recovery Plan for the Iron-grass Natural Temperate Grassland of South Australia ecological community, (2012)*:

- Strategy 3: Increase the area of the EPBC listed Iron-grass Natural Temperate Grassland secured and managed for conservation,
- Strategy 4: Maintain or improve the condition and integrity\* of the EPBC listed Iron-grass Natural Temperate Grassland remnants using 'best practices' strategies,
- Strategy 5: Increase the area of occupancy of the EPBC listed Iron-grass Natural Temperate Grassland ecological community across its natural range.

## 1.2 Aims / Objectives

This plan aims to outline the proposed methodologies and set out the management and monitoring activities for a 5 year period, at which point it will be subject to review. More specifically the aims of the plan are to:

- Provide detail on the Offset area including the location, boundaries and a general site description.
- Detail the management actions for protecting and enhancing the extent and condition of the TEC values of the Offset site.
- Set out the proposed timing, responsibilities and performance criteria for management actions.

The core management objectives for the Offset area include:

- Increase the condition rating for the site from 2 to 7 which would change the site classification from a C Condition Class to a B Condition Class (refer to Table 1 for detail);
- Increase the diversity of native species from nine (current value) to above 15;
- Increase the number of broad-leaved herbaceous species (in addition to disturbance resistance species) to three or more;
- Increase the number of perennial native grass species to four or more species;
- Increase the density of tussock grass species to one per metre
- Manage feral animal populations,
- Establish long-term scientific monitoring sites to demonstrate attainment of condition class targets.

**Table 1. Condition classes for Iron-grass Natural Temperate Grassland of South Australia.**

Condition class	Minimum size of area	Diversity of native species*	Number of broad-leaved herbaceous species* in addition to identified disturbance resistance species**	Number of perennial native grass species*	Tussock ( <i>Lomandra</i> sp. and perennial native grass sp.) Count***
Listed ecological community					
A	0.1 ha	>30	+10	≥5	1 per metre
B	0.25 ha	>15	+3	>4	1 per metre
Degraded patches amendable to rehabilitation					
C		>5	No Minimum	≥1	No minimum
Table adapted from 'EPBC Act Policy Statement 3.7: Nationally Threatened Species and Communities, Peppermint Box ( <i>Eucalyptus odorata</i> ) Grassy Woodland of South Australia and Iron-grass Natural Temperate Grassland of South Australia. DEWR, 2007.					

## 2 PROPERTY DETAILS

### 2.1 Land Owner and Location Details

The Offset area falls within the Wadlow property and is approximately 4 ha in size (Table 2); the Offset area is also situated adjacent to the Willogeleche Wind Farm boundary (Figure 2). The site is located on Woodman Road and forms part of a larger grazing paddock.

**Table 2. Landowner and Offset location details.**

<b>Owner</b>	Arthur Nicholas Wadlow & Katherine Ann Wadlow
<b>Manager</b>	A.N. Wadlow
<b>Address</b>	“Old Ashrose” Hallett SA 5419
<b>Local Government Area</b>	Regional Council of Goyder
<b>NRM Region</b>	Northern and Yorke NRM
<b>Hundred</b>	Anne
<b>Parcel details</b>	Section 341 Deposited/File Plan H240100SE342
<b>Title/s</b>	Vol 5584 Folio 489
<b>Project Area (ha)</b>	4 ha (approximately)
<b>Location</b>	Woodman Road

### 2.2 Land Use History

The project is located in the Regional Council of Goyder, within the Northern Areas General Farming Zone, which generally encourages the preservation of land for agricultural purposes. Accordingly, the predominate land uses are agriculture based, with the main farming activities being livestock grazing and cereal cropping.

The land in question has been owned by AN and KA Wadlow since 2002. The area is subject to regular sheep grazing. The slopes are gentle to moderate with clay loam soils of very shallow depths with rock outcropping occurring throughout. Slopes further to the west of the proposed Offset area are used for cropping and grazing where the soil depth allows tillage. Some pasture improvement is evident throughout the foot slope areas, most likely through periodic legume broadcast seeding.

No fertilisers have been applied to the Offset area in over 40 years (Wadlow, N. pers comm. 2016) and grazing has been utilised as a tool to improve the growth of native grasses in the area. No set stocking rate is used and varies depending on seasonal conditions. The minimum sward height of 50% of native vegetation is kept above 50mm. Stock are removed to enable seed set of native species, generally late spring / early summer and occasionally in late summer depending on rainfall (Wadlow, N. pers. comm.).

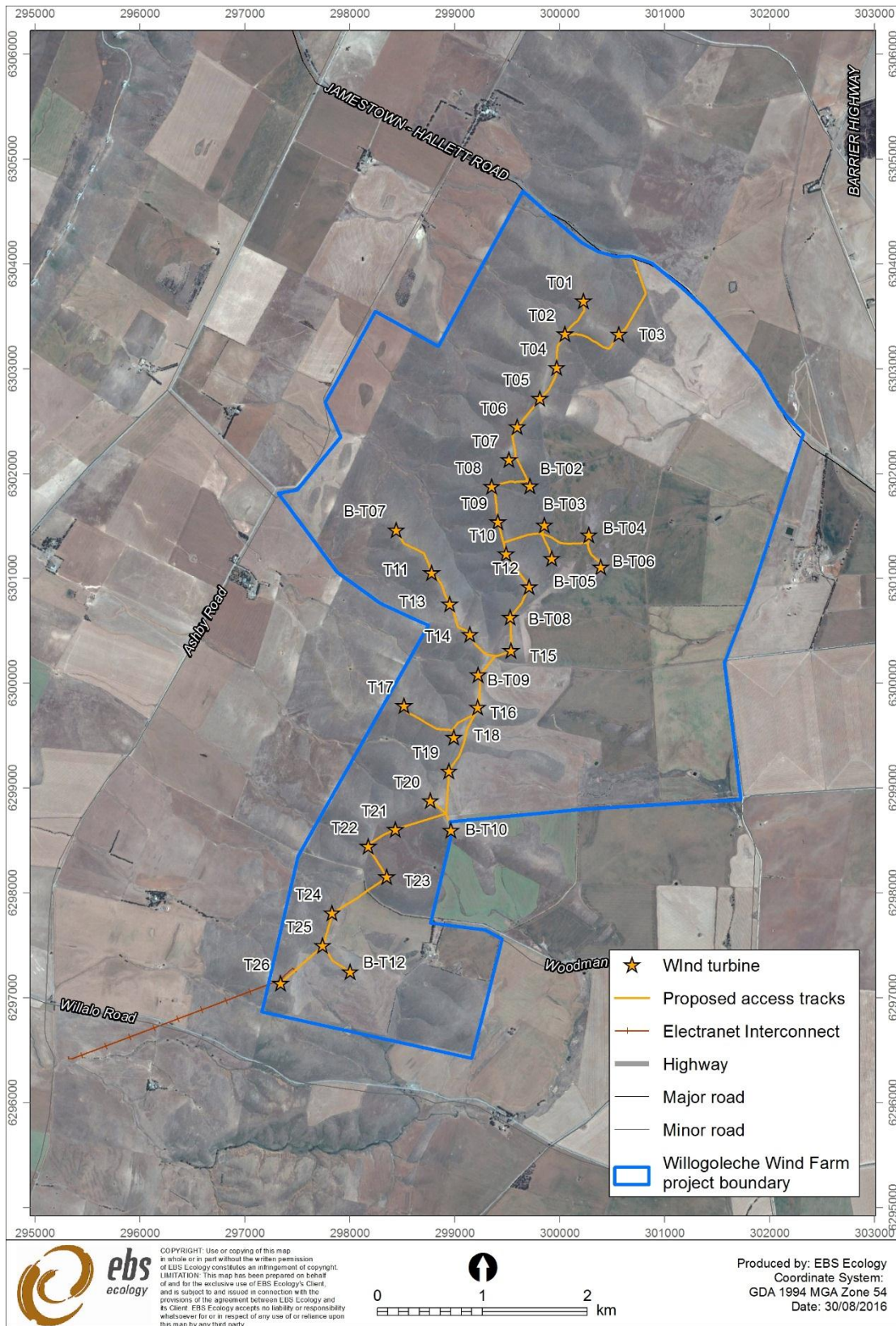


Figure 2. Windfarm layout and proposed Offset area.

## 2.3 Regional Setting

### 2.3.1 Region

The proposed Willogoleche Wind Farm is situated in the mid-north region of South Australia. The mid-north region contains a number of operational wind farms, and several others are approved or proposed for the region.

The mid-north region has some of the best agricultural and pastoral land in SA, with 78 % of land used for either cropping or pastures. The region experiences a Mediterranean climate with warm to hot summers and mild to cool winters, with an annual rainfall of between 300-700 mm (Graham et al. 2001).

### 2.3.2 Interim Biogeographical Regionalisation of Australia (IBRA)

Interim Biogeographical Regionalisation of Australia (IBRA) is a landscape based approach to classifying the land surface across a range of environmental attributes, which is used to assess and plan for the protection of biodiversity (DSEWPaC 2011). The project area falls within the Finders Lofty Block IBRA Bioregion, Broughton Subregion, and Tarcowie IBRA Environmental Association. Native vegetation remnancy within the Tarcowie Environmental Association is moderate (26%), however none of the vegetation is conserved within NPW Reserves or Heritage Agreements (Table 3).

Table 3. IBRA Region and sub-region environmental landscape summary.

<b>Flinders Lofty Block (FLB) IBRA Bioregion</b>	
Temperate to arid Proterozoic ranges, alluvial fans and plains, and some outcropping volcanics, with the semi-arid to arid north supporting native cypress, black oak (belah) and mallee open woodlands, Eremophila and Acacia shrublands, and bluebush/saltbush chenopod shrublands on shallow, well-drained loams and moderately-deep, well-drained red duplex soils. The increase in rainfall to the south corresponds with an increase in low open woodlands of <i>Eucalyptus obliqua</i> and <i>E. baxteri</i> on deep lateritic soils, and <i>E. fasciculosa</i> and <i>E. cosmophylla</i> on shallower or sandy soils.	
<b>Broughton (FLB2) IBRA Sub-region</b>	
This sub region is characterised by a series of wide undulating intramontane basins with red duplex soils, separated by low but distinct northerly trending strike ridges. In the north the region leads into the Southern Flinders Ranges with no sharply defined landform boundary but a land use boundary marking the northern extremity of wheat cultivation. Due to widespread clearing for farming the only significant remnant of native vegetation is found in the Mt Remarkable area, where an open forest dominated by <i>Eucalyptus cladocalyx</i> or by <i>E. goniocalyx</i> and <i>E. leucoxyton</i> on reddish dense loams remains. Degraded remnants of <i>E. leucoxyton</i> and <i>E. odorata</i> woodlands can still be found on stony crests and steep slopes.	
<b>Remnant vegetation</b>	10% (105,852ha) of the sub region is vegetated of which 2% (2,051ha) is protected.
<b>Landform</b>	Hills and valleys; alternating subparallel hilly ridges and valleys with a general N-S trend in north. In south, hilly dissected tableland.
<b>Geology</b>	Dissected lateritized surface in south.
<b>Soil</b>	Hard setting loams with red clayey subsoils, highly calcareous loamy earths, hard setting loams with mottled yellow clayey subsoil, coherent sandy soils, cracking clays.
<b>Vegetation</b>	Eucalyptus woodlands with a shrubby understorey.

Source: DEH (2007).

### 2.3.3 Climate

The most comprehensive available climate dataset is from the Yongala weather station approximately 20 km north-east of the Willogoleche project area. Both rainfall and temperature follow typical Mediterranean seasonal climate, with cool wet winter months and warm dry summer months. The long-term mean annual rainfall for the area is 365.3 mm, with June through to September typically the wettest months (BOM 2016) (Figure 3).

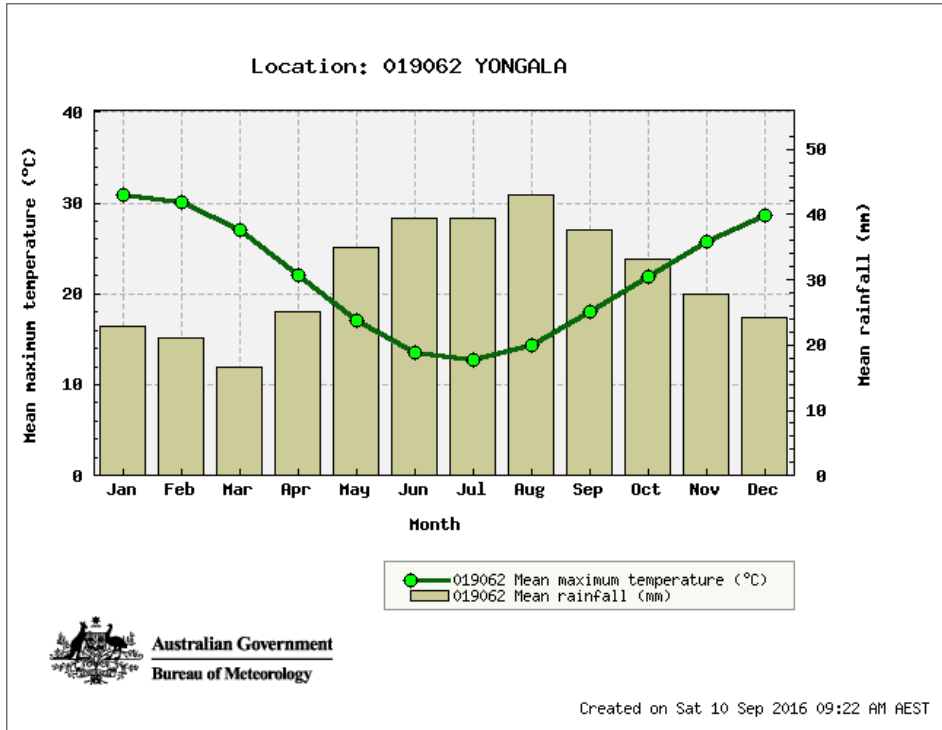


Figure 3. Mean maximum temperature and rainfall data for Yongala weather station (1981-2016). Data source: Bureau of Meteorology 2016.

### 2.3.4 Geology, landform and soils

Soils of the Broughton Sub region are typically hard setting loams with red clayey subsoils, highly calcareous loamy earths, hard setting loams with mottled yellow clayey subsoil, coherent sandy soils and cracking clays (DEWNR 2013). Landforms of the Broughton Sub region can be described as hills and valleys; alternating subparallel hilly ridges and valleys with a general N-S trend in north. In south, hilly dissected tableland (DEWNR 2013).

## 2.4 Offset area

The nominated area is a 4 ha area within a larger 9 ha block of *Lomandra multiflora* subsp. *dura* Open Tussock Grassland (EBS 2013). The proposed Offset area is considered to be in poor - moderate condition and meets the Class C grassland criteria (as defined under the EPBC Act). The *Lomandra multiflora* subsp.



*dura* Tussock Grassland covers the entire proposed Offset area (**Figure 4**). The Offset area is currently utilised for sheep grazing.

The proposed Offset area was assessed against the criteria and benchmarks outlined in the *Commonwealth Listing Advice on Iron-grass Natural Temperate Grassland of South Australia* (TSSC 2007). This was completed by establishing a 50m x 50m quadrat and traversing the quadrat, on foot, in a series of transects approximately 5m apart. All species observed were recorded.

The density of *Lomandra* plants was assessed using a point centred quarter methodology. Previous literature gives cover of *Lomandra* tussocks in listed communities at 10 – 30% (Robertson 1998). This seems far higher than what is commonly observed in other good quality Iron-grass NTG patches and assessing cover based on a percentage range over a one hectare plot is extremely subjective. Less than 50% of Iron-grass NTG quadrats assessed as part of the Robertson survey contained greater than 5% cover so cover values assessed as part of this survey may be more typical for this community.

The point centred quarter method involves establishing a 100m transects and collecting data at 10m intervals. Approximate cover values are assigned based on the individual tussock covering an area of 50cm x 50cm each. The extent of the Iron-grass NTG area was recorded using a handheld GPS and mapped using Arc GIS.

A total of nine native and eight introduced species were recorded during an assessment of the site in September 2012 (EBS 2012) (**Table 4**). The diversity was recorded only within the 50m x 50m quadrat and is likely to be higher across the whole Offset area. The density of *Lomandra* tussocks was also assessed in 2012 with an estimate of 1238 tussocks per ha calculated. A higher quality (Class B) area of Iron-grass NTG has approximately 2000 tussocks per ha (EBS 2012).



Figure 4. General photo of proposed Offset area.

Table 4. List of flora species recorded during the 2012 field survey - 50 x 50m plot results.

Family Name	Scientific Name	Common Name	Introduced
LILIACEAE	<i>Lomandra multiflora</i> ssp. <i>dura</i>	Hard Mat-rush	
GERANIACEAE	<i>Erodium botrys</i>	Long Heron's-bill	*
BORAGINACEAE	<i>Echium plantagineum</i>	Salvation Jane	*
GRAMINEAE	<i>Avena barbata</i>	Bearded Oat	*
LEGUMINOSAE	<i>Trifolium</i> sp.	Clover	*
POLYGONACEAE	<i>Rumex</i> sp.	Dock	*
CHENOPODIACEAE	<i>Maireana enchylaenoides</i>	Wingless Fissure-plant	
COMPOSITAE	<i>Vittadinia cuneata</i> var.	Fuzzy New Holland Daisy	
COMPOSITAE	<i>Onopordum acaulon</i>	Horse Thistle	*
GRAMINEAE	<i>Austrostipa scabra</i> ssp.	Rough Spear-grass	
OXALIDACEAE	<i>Oxalis perennans</i>	Native Sorrel	
RHAMNACEAE	<i>Cryptandra amara</i> var.	Cryptandra	
GRAMINEAE	<i>Enneapogon nigricans</i>	Black-head Grass	
LEGUMINOSAE	<i>Medicago minima</i> var. <i>minima</i>	Little Medic	*
LABIATAE	<i>Salvia verbenaca</i> var.	Wild Sage	*
AMARANTHACEAE	<i>Ptilotus spathulatus</i>	Pussy-tails	
CARYOPHYLLACEAE	<i>Scleranthus pungens</i>	Prickly Knawel	
		Native	9
		Exotic	8
		Species Total	17

## 2.5 Overall condition and management issues

The overall condition of the site at the time of the survey was poor with vegetative cover being dominated by alien species. There were moderate numbers of native species present (nine native species in total) in the ground layer but these were being fairly heavily grazed, most probably by kangaroos and rabbits in addition to domestic stock. Significant weeds were not recorded in high densities throughout the wider area. Low densities of *Echium plantagineum* (Salvation Jane) were widespread and scattered individual occurrences of *Onopordum acaulon* (Horse Thistle) were recorded. Primarily, weed management will be focussed on reducing the cover the broad leaf weeds (such as Salvation Jane and Horse Thistle) through targeted spot spraying. In addition, other species such as introduced annual grasses will be managed through reducing the seed the set each season. This will be achieved by targeted grazing prior to seed set in these species. This will enable native species to compete with the more aggressive introduced annual grasses.

## 3 THREATS TO BIODIVERSITY

### 3.1 Change of land use / development

The mid-north region contains a number of operational wind farms and several others are approved or proposed for the region. The region has some of the best agricultural and pastoral land in SA, with 78 % of land used for either cropping or pastures. Although the current land use of the subject land (sheep grazing) is generally compatible with the conservation of grasslands, the possibility of the land being sold or subject to other development is a threat to these biodiversity assets. This could include increased grazing pressure from higher stocking rates of sheep or a change in stock type (eg to cattle) leading to lower quality native grasses.

Native grasslands are not well represented within formal Reserve systems, with Mokota Conservation Park (DENR 2011) and Tiliqua Reserve providing protection for grassland communities (EBS Ecology 2011c).

### 3.2 Grazing pressure

The subject land has been owned by the Wadlows since 2002. The land has been used primarily for grazing of sheep. No set stocking rates have been used with grazing intensity and duration dependent on seasonal conditions and vegetation growth.

It is recognised in the *Biodiversity Plan for the Northern Agricultural Districts* (2001), that in the absence of any grassland management activities or adopting the ‘do nothing’ approach, is a threat to the community’s biodiversity. Weeds tend to proliferate in the understorey, native grass tussocks develop high proportions of dead material which accumulate and smother the plant and inhibit natural regeneration. Modifications in grazing regime coupled with the strategic use of fencing and waters can allow regeneration by stimulating the effects of a ‘cold burn’, and therefore is important in maintaining and promoting plant species diversity (Barlow, 1998).

### 3.3 Weeds

The weed species recorded within the Offset area are considered to be common weeds for the Mid-North region. No woody weeds, Weeds of National Significance or species considered to be particularly invasive were recorded within the site. It is anticipated that annual weed management will be a manageable task for the landholder given the low levels of infestations.

The key weed threats to the Offset area are the scattered occurrences of broad-leaf weeds such as Horse Thistle (*Onopordum acaulon*), Dock (*Rumex sp*) and Salvation Jane (*Echium plantagineum*) as well as the widespread occurrences of introduced annual grasses. Different strategies will be implemented to manage these two ‘groups’ of weed species occurring in the Offset area.

### 3.4 Pest animals

When in high numbers, European Rabbits have the potential to compete with native animals for food resources and damage native plants by ringbarking trees and shrubs, inhibiting regeneration by eating seed and seedlings and in extreme cases, causing soil disturbance. It is likely that foxes and feral cats occur within the area and would be common across the region.

No pest animals have been recorded within the site.

## 4 MANAGEMENT ACTIONS

The management objectives for the Offset area are outlined in Section 1.2. Management actions to achieve these are provided in Table 5. Key actions are discussed in the following section in addition to being listed in Table 6.

### 4.1 Management Targets

The aim of implementing the Offset Management Plan is to achieve a future condition class, within the Offset area, consistent with the EPBC Offset Policy 2012. Currently, the Offset area has been classed as a Category C *Iron-grass Natural Temperate Grassland of South Australia* (EBS 2013). The key aim is to improve the quality to a point where the Offset area meets the criteria for a Category B *Iron-grass Natural Temperate Grassland of South Australia*. This will require the current condition score of 2 to be increased to 7. To achieve this, the following targets will need to be reached:

- Increase diversity of native species by at least 6 species (to 15 or more)
- Increase number of perennial native grass species by at least two species (to hit target of 4 or more species)
- Increase number broad-leaved native herbaceous species by two (to be at least 3 non disturbance resistant species)
- One tussock per metre of native perennial grass or Iron-grass.

The proposed management of the Offset aims to address the following key Recovery Actions from the *National Recovery Plan for the Iron-grass Natural Temperate Grassland of South Australia ecological community, (2012)*:

- Strategy 3: Increase the area of the EPBC listed Iron-grass Natural Temperate Grassland secured and managed for conservation
- Strategy 4: Maintain or improve the condition and integrity\* of the EPBC listed Iron-grass Natural Temperate Grassland remnants using ‘best practices’ strategies
- Strategy 5: Increase the area of occupancy of the EPBC listed Iron-grass Natural Temperate Grassland ecological community across its natural range

The Offsets Assessment Guide was utilized current quality and future quality targets (Table 5). As per Table 5, the target is to improve the quality from a current rating of 2 to a rating of 7 within 16 years. This will also allow the area to be re-classified as a Category B class *Iron-grass Natural Temperate Grassland of South Australia* compared to the Category C the area has been classified at currently.

The improvement in the Offset area will be achieved through the management actions that have been developed for the Offset area and are detailed in this Section (including Table 6). Table 7 (in Section 5) details the specific improvement requirements and monitoring criteria which will be met as part of implementing this Offset Management Plan. The targets set reflect the vegetation condition improvements

to meet the specific targets. After 5 years, the actions and targets will be reviewed and updated where required.

## 4.2 Management Action Responsibilities

Management responsibilities are allocated for each Management Action in Table 6.

‘Project owner’ – ENGIE is the project developer for the Willogoleche Wind Farm. This involves the planning of the wind farm site, including seeking and obtaining relevant planning and environmental approvals under State and Federal legislation and construction and operation of the project. ENGIE will also be responsible for completing any reporting responsibilities associated with the project. The implementation of this Offset Management Plan will be the responsibility of the land owner for the 25 year life of the wind farm.

‘Landowner / Manager’ – is responsible for undertaking the day to day management of the Offset area on behalf of the project owner and providing information to allow ENGIE to meet reporting requirements for the project. Upon completion of the 25 year life of the wind farm, the landowner is responsible for the protection of the native vegetation in the Offset area in perpetuity.

## 4.3 Change in Land use / Development

To provide an increased level of protection for the native grasslands an Offset area is sought. When an Offset is entered into, it protects the indigenous plants and animals in the area in perpetuity. In this case, this Offset Management Plan forms part of the conditions of the approval conditions under the EPBC Act which provided approval for the potential impact to the Iron-grass NTG TEC associated with the Willogoleche Wind Farm. Once accepted, this Offset Management Plan will form part of the Offset area / Heritage Agreement (refer to Section 4.4 for details on the Heritage Agreement) and sets out what management must be undertaken on the site in perpetuity. This includes the management actions outlined in this section such as the stocking rate as outlined in 4.3.1, stock type (sheep), erecting a fence around the Offset area, not applying fertiliser and undertaking weed control within the site.

Table 5. Offset Assessment Calculator output.

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed Offset	Time horizon (years)		Start area and quality		Future area and quality without Offset				
					Risk-related time horizon (max. 20 years)	20	Start area (hectares)	4	Risk of loss (%) without Offset	10%	Future area without Offset (adjusted hectares)	3.6	Time until ecological benefit
Area of community	Yes	0.49	Adjusted hectares	4									



Future area and quality with Offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact Offset	Minimum (90%) direct Offset requirement met?	Cost (\$ total)	Information source
Risk of loss (%) with Offset	2%	0.32	75%	0.24	0.06	104.93%	Yes	\$0	EBS (2012). Willogoleche Hill EPBC Offset area Investigation.
Future area with Offset (adjusted hectares)	3.9								
Future quality with Offset (scale of 0-10)	7	5.00	3.75	1.31					

## 4.4 Heritage Agreement

In-principle approval from the Native Vegetation Management Unit (NVMU) for the establishment of a Heritage Agreement under the *Native Vegetation Act 1991*, over the Offset area, was confirmed on 2 February 2017 (HA 2016\_1009). The process of assessing and activating a Heritage Agreement on the title, can be a protracted process (currently up to 2 years). The Heritage Agreement over the Offset area must be in place by the 1<sup>st</sup> of July 2018. This will add further conservation protection to the Offset area resulting in the inability of the current, or future landowners, to develop or significantly change the management of the site.

## 4.5 Grazing Levels

### 4.5.1 Limiting stocking rates

The small size of the Offset area makes grazing management more difficult. The fencing of the area will remove stock grazing pressure and allow it to be managed closely. To allow the regeneration of native grassland species, the following grazing regime will be implemented:

- Short duration, periodic high intensity grazing events of Offset area except during late spring / early summer when no grazing is to occur. A condition set by the NVMU, in approving in-principle the Heritage Agreement of the Offset area, was that an upper limit to grazing periods will need to occur i.e. duration of 1-4 days maximum at a time, with a minimum of 4 weeks rest afterwards.
- Duration of grazing will need to be monitored by landowner so native vegetation is not grazed to less than 5cm in height. This will be dependent on number of sheep used, height of vegetation and seasonal conditions.

The duration of grazing has been reduced, however the stocking rate will be increased. The aim is that the sheep will graze the introduced annual species particularly hard after germination and prior to seed set. This allows for native grasses and herbs to grow and set seed and for sheep to graze on annual introduced grasses (i.e. *Avena barbata* (Bearded oat)) and hence reduce their dominance.

The introduced annual species will set less seed which, over time, will favour the native species. The native species will also be grazed, but as most perennial native species set seed later in the year (late spring/early summer), they will have sufficient growing time from the grazing event in August to set seed. Grazing of perennial native grass species will also reduce the amount of thatch and ensure the grassland area is reinvigorated each year. The short duration of grazing will reduce the impact of the hard sheep hooves on the soil as well.

#### **4.5.2 Fencing**

The southern boundary of the proposed Offset area is currently fenced (boundary fence along Woodman Road). The remainder of the Offset area is currently unfenced. A stock proof fence is required on the three remaining sides of the Offset area (Figure 5). An access gate into the area will be required as well. The construction of the stock fence should have minimal impact on the vegetation. No grading or flattening of the ground should be required to install the fence. No access tracks or perimeter tracks will be required for the Offset area.

#### **4.5.3 Water points**

Due to the small size of the proposed Offset area and the proposed grazing regime, additional water points within the Offset area will not be required.

#### **4.5.4 Adaptive management**

If the condition of the native grasslands does not improve, as demonstrated through annual monitoring and compared to the baseline data, then additional management of the site may be required. The adaptive management approach may result in alterations to the grazing regime which could include creating smaller paddocks and the provision of additional water points.



Figure 5. Fence location around the Offset area. Note – the fence adjacent to the road is an existing fence.

## 4.6 Weed / Feral Animal Management

### 4.6.1 Weed management

The land holders will undertake weed management. Due to the extensive experience of the current landholders in weed management, no weed identification or management training is considered to be required.

The targeted introduced species for weed control will include Horse Thistle (*Onopordum acaulon*), Dock (*Rumex sp.*), Salvia (*Salvia verbenaca*) and Salvation Jane (*Echium plantagineum*). These species will need to be spot sprayed across the Offset area in late autumn / early winter depending on the season. Care will need to be target to ensure no off-target damage to native species occurs.

No woody weed species are known to occur within the Offset area. However, new weed species may infest the Offset area. These weed can be managed opportunistically when they are first identified. For example, if a small Boxthorn plant is observed, it can be easily removed at the time of observation.

### 4.6.2 Feral animal control

The land holders will undertake all feral animal management. Rabbits, Feral Cats and Foxes are the key feral animals within the project area. The focus for the management of the Offset area is the control of Rabbits as this species is most likely to have a negative impact on the condition of the TEC.

Control effort for these species will be part of annual program undertaken by the property owner. No Rabbit or Fox warrens were recorded within the Offset area, however, if any become established, then they will need to be fumigated, or ripped. If Rabbit numbers rise, a targeted baiting program will need to be developed and implemented.

See Appendix 1 for *Activity Record Datasheet*.

## 4.7 Management measures required

Management actions for the Offset area are summarised in Table 6 and described in more detail below.

### 4.7.1 Erosion and Sediment Control

No major construction activities are to occur as part of the implementation of the plan and no construction works related to the construction of the wind farm are to be undertaken in the Offset area. As such, erosion and sedimentation are not considered to be risks that require management.

If rabbit warren ripping is required to be undertaken (no warrens are currently present), it will be undertaken in small, confined areas that will regenerate quickly. It is unlikely that any sediment and erosion control

measures will be required. However, if ripping is extensive or in an area that is likely to be prone to erosion, sediment control structures (such as silt fences, straw bales) will be implemented. These will be implemented on the downslope of the disturbance area to catch any sediment that may leave the area. These structures will be implemented until such time that the disturbed area has stabilised.

#### **4.7.2 Fire Management**

Fire management in addition to any management the landholder would reasonably be expected to currently undertake is not required to achieve any of the conservation objectives of the Offset area. As such, fire management is not considered to be a risk that requires specific management actions.

#### **4.7.3 Restrictions on Access**

The Offset area is on private property with the perimeter of the entire area to be fenced with stock fencing.

As such, it is not currently open to indiscriminate access by the public and any access is managed by the property owners/managers. Although the property is bounded by one public road, there will be no signage or other information readily available to distinguish this area from any other in the region.

No additional restrictions on access are considered necessary.

**Table 6. Management actions.**

Action No.	Asset / Feature	Action	Priority	Timeframe	Responsibility
<b>Landscape integrity</b>					
1.1	Soils and land surfaces	Practice minimal disturbance of soil and vegetation during all activities (including weed control, fire management, grazing, fauna surveys and vehicle access) within the entire Offset area. <ul style="list-style-type: none"> <li>• only drive on identified vehicle tracks where possible</li> <li>• limit excessive driving (walk where possible)</li> <li>• avoid driving on wet tracks</li> <li>• avoid un-necessary digging and soil disturbance.</li> </ul>	Medium	On-going	Landholder/ Manager
1.2		Avoid any ripping (for activities such as laying water pipelines for stock watering points, and installation of utility services) with the exception of ripping of rabbit warrens if required.	High	On-going	Landholder/ Manager
1.3		Maintain existing vehicle tracks for access, sheep movement and access to infrastructure.	High	On-going	Landholder/ Manager
1.4		Avoid creating new vehicle tracks.	High	On-going	Landholder/ Manager
<b>Ecosystems</b>					
2.1	Vegetation communities	Establish permanent photo-monitoring points and reference sites (as outlined in Section 5) targeting the vegetation communities. (Undertaken using marker posts to the ensure location and direction is consistent over time).	High	2017, 1 <sup>st</sup> quarter	Project Owner
2.2		Avoid planting trees and shrub species that will alter the integrity of the native grasslands of the Offset area.	High	On-going	Landholder/ Manager
2.3		Utilise Ecological Indicators and suggested methods outlined in Table 6 to develop a detailed annual monitoring program to assess grassland health.	High	2017, 1 <sup>st</sup> quarter	Project Owner
2.4		Eradicate declared and environmental weed species, using spot-spraying and minimal disturbance methods. Control weed species such as Salvation Jane, Horse Thistle and Dock.	Medium	On-going	Landholder/ Manager
2.5		Prevent the establishment of new weed species and/or infestations by practicing minimal disturbance methods, and hygiene practices when bringing in equipment, vehicles, and other materials which may harbour weed seeds.	Medium	On-going	Landholder/ Manager

Action No.	Asset / Feature	Action	Priority	Timeframe	Responsibility
2.6		Conduct an annual survey to identify the location and extent of all weed species within the Offset area, and noting the areas immediately adjacent.	Medium	Annually from 3 <sup>rd</sup> quarter	Project Owner
2.7	Plant bio-mass management	Implement recommended grazing regime (as detailed in Section 4.3)	High	On-going	Landholder/ Manager
2.8		Assess plant bio-mass and alter sheep grazing routine if deemed necessary – increasing grazing/stocking rate if biomass is high in fire risk periods.	High	On-going, bi-monthly	Landholder/ Manager
2.9		Ensure artificial fertiliser is not applied.	Medium	On-going	Landholder/ Manager
2.10	Pest fauna	Control declared pest animal species (especially Rabbits, Foxes and Cats) by fumigating (Rabbit warrens), poisoning (Rabbits and Foxes), shooting (Foxes and Cats), and manually filing-in warrens and dens, ensuring minimal disturbance methods are used. Undertake in collaboration with adjoining landholders, where possible. This may not be required given that no pest animal species were recorded.	Low	2017, 2 <sup>nd</sup> quarter, on-going maintenance as necessary	Landholder/ Manager
2.11		Avoid the use of insecticides to control locusts, grasshoppers, and snails unless in plague proportions.	High	On-going	Landholder/ Manager
<b>Access Arrangements</b>					
3.1	Access	Install stock fence to perimeter of Offset area. The cost is to be coordinated between the Project Owner and the Landholder.	High	2017, 1 <sup>st</sup> quarter	Landholder/ Manager
3.2		Maintain external fencing to ensure neighbouring stock prevented from accessing the Offset area.	High	On-going	Landholder/ Manager
<b>Protection and Reporting</b>					
4.1	Protection	Establish a Heritage Agreement over Offset area through DEWNR	High	1 <sup>st</sup> July 2018	Project Owner
4.2	Annual Reporting	Prepare and distribute an annual report detailing the management actions undertaken and the monitoring results for the Offset area. Also review management each year and adapt if necessary.	High	December each year	Project Owner
4.3	Offset Management Plan Review	Review the effectiveness of management actions within the Offset area and whether targets have been met. Update / modify management actions based on monitoring results	High	2022	Project Owner



## 5 ANNUAL MONITORING PROGRAM

An effective annual monitoring program will be implemented and carried out by an independent suitably qualified ecologist to assess the target vegetation condition indicators. The management actions will also be reviewed to determine if changes brought about by the management actions are moving the condition of the Offset area towards the nominated targets. The results of this monitoring will be provided to the Native Vegetation Council and DotEE and used to direct the land owner's management of the Offset area to work towards improvement of the grasslands.

It will be important to note that seasonal variation will likely impact on results and that general trends emerging from the data are probably more significant than annual fluctuations. The baseline of condition of the Offset area was determined during an assessment of the site in 2013 (EBS 2013). The current condition of the Offset area is a C Class iron-grass Grassland or a 2 on the 0-10 condition rating scale. This is the starting point and the basis for the vegetation condition indicators that have been set as targets for the overall improvement of condition of the TEC.

The management actions need to be adaptive, if improvements to the grassland condition have occurred then management actions can be maintained and monitoring continued. If improvements to the grassland condition have not occurred then changes to the management actions will be required. This may include increasing the number of paddocks and water points to allow greater management of grazing duration, location and stocking rates.

The TEC condition indicators (Table 7) that have been set as targets for the management of the Offset area are:

- Increase the condition rating for the site from 2 to 7 which would change the site classification from a C Condition Class to a B Condition Class;
- Increase the diversity of native species from nine (current value) to above 15;
- Increase the number of broad-leaved herbaceous species (in addition to disturbance resistance species) to three or more;
- Increase the number of perennial native grass species to four or more species;
- Increase the density of tussock grass species to one per metre.

**Table 7. Ecological Indicators and desired outcomes.**

Ecological Indicator	Suggested Method	Desired Outcome	Interim 5 yr target	Interim 10 yr target	Target (16 years)
Plant Species Diversity	Two 50 x 50m Quadrats	Increase in native species diversity from 9 (current diversity) to 15 or more species	11	13	15
Perennial Native Grass Species Diversity	Two 50 x 50m Quadrats	Increase native grass species diversity from two to four or more species	3	4	4
Broad-leaf Native Herbaceous Species Diversity	Two 50 x 50m Quadrats	Increase broad-leaf native herbaceous species from one to three or more species (excluding disturbance resistant species)	1	2	3
Density of Tussock Grassland Species (Including native grasses and iron-grass))	Two 50m point count transects	Increase density of tussock species to one per metre	1 per 10 metres	1 per 5 metres	1 per metre

## 5.1 Ecological Indicators

Overall, the ecological indicators reflect the desired outcomes for the implementation of the Offset area and the improvements to TEC condition that are required. To improve the Offset area from a current condition of 2 through to a Condition of 7 (which will mean the area changes from a C Class to a B Class iron-grass Grassland TEC), four key ecological indicators will be monitored. These are discussed in more detail below.

### 5.1.1 Plant Species Diversity

The native plant species diversity of the Offset area will be monitored within two permanent monitoring sites. The total diversity of native plant species is a key indicator in grassland health. A total of nine native plant species have been previously recorded within the Offset area with a target of 15 species as part of the implementation of this management plan.

### 5.1.2 Perennial Native Grass Species Diversity

A key indicator for a grassland community, such as the Iron-grass Grassland TEC, the diversity of native grass species. The diversity of native grass species will be measured within the two permanent monitoring sites. With only two native grass species currently present, the target is to double the diversity to four species within the Offset area.

### 5.1.3 Broad-leaf Native Herbaceous Species Diversity

The diversity of broad-leaf native herbaceous species will also be monitored within the permanent monitoring sites. Six species classed as broad-leaf native herbaceous species have been identified as disturbance resistant species meaning that they will persist in disturbed environments. The key target for this indicator is to have more than three broad-leaf herbaceous native species present in addition to any of the disturbance resistant species present.

### 5.1.4 Tussock Density

The density of tussock native species (including native grasses and iron-grass) will be measured along 50m transects at each of the two permanent monitoring sites. This will allow a count of tussocks per metre to be determined. The target for this indicator is to have one tussock every metre within the Offset area.

## 5.2 Monitoring Sites

Two permanent monitoring sites will be established within the Offset area. The specific location of each monitoring site will be determined in the field prior to commencing the monitoring, however, two representative sites will be selected within the 4ha Offset area.

At each site, a 50m x 50m will be set up with star dropper posts used to delineate the corner of each quadrat. As per the assessment methodology for the Iron-grass NTG, the native plant species diversity,

perennial grass species diversity and broad-leaf native herbaceous species diversity will be recorded within each quadrat.

In addition to the monitoring quadrats, a 50m transect will be established at each of the monitoring sites. Each transect will be marked and recorded to ensure the same transect is utilised during each monitoring event. The number of tussocks (perennial native grasses and iron-grasses) will be recorded along the length of each transect. Only the tussocks that intersect the transect will be recorded. This will provide a tussock density figure for the Offset area.

Monitoring will be undertaken at the same time each year to ensure results are consistent. October to early November is considered to be the most appropriate time to undertake the monitoring of native grasslands in the mid north region of SA.

### 5.3 Annual reporting responsibilities

#### 5.3.1 Landholder

The landholder must:

1. Provide the necessary information to ENGIE for them to submit the *Activity Record Datasheet* (Appendix 1) at the end of each financial year until 2027.
2. Provide the necessary information to ENGIE to complete and submit the *Paddock Monitoring Sheet* (Appendix 2) to assist with management of the grazing program.

#### 5.3.2 ENGIE

ENGIE must:

1. Contract a suitably qualified consultant to undertake the annual monitoring and reporting requirements set out in the Management Plan.
2. Submit an annual report to the Native Vegetation Council Secretariat and DotEE detailing the monitoring results of the program including management actions undertaken in the Offset areas and the outcome of those actions including identifying any need for improved management.

### 5.4 Ongoing Management of Offset area

#### 5.4.1 Previous survey design

Any areas of *Lomandra* sp. (Iron-grass) Grassland were assessed against the EPBC Act criteria for determining whether a community qualified as the nationally listed threatened ecological community *Iron-grass Natural Temperate Grassland of South Australia* (DEWR 2007). The DEWR (2007) document '*EPBC Act Policy Statement 3.7. Peppermint Box (Eucalyptus odorata) Grassy Woodland of South Australia and Iron-grass Natural Temperate Grassland of South Australia*', sets out the criteria. For

further details on how survey design EBS Ecology used to capture the *Iron-Grass ecological community* extent and condition, refer to EBS 2010.

#### **5.4.2 Annual review**

As part of the annual monitoring and reporting program the Land Holder and ENGIE is to work with the suitably qualified ecologist to determine ongoing management actions to continue to work towards the improvement of the grasslands.

Any significant changes to the Offset Management Plan must be approved by the Native Vegetation Council Secretariat and DotEE.

#### **5.4.3 Ten year review**

At the completion of the initial five year period (2022) a review of the management plan will be undertaken using the annual monitoring data that has been collated in association with valuable landholder input. This adaptive management approach will help to inform any future management plan amendments and inclusions and determine the overall success of the existing management strategies.

The report, which will set out 2022 – 2042 management, will then be submitted to the current property owners, the Federal Minister (through DotEE) and the Native Vegetation Council for approval.

ENGIE will contribute to the implementation of this Offset area until 2042. After that date, the management of the Offset area will be the responsibility of the landholder in accordance with the Heritage Agreement.

## 6 RISK MANAGEMENT

It is acknowledged that despite good planning, there are still potential risks to the successful management of the Offset area. The following section outlines these potential risks and provides a description of the contingency measures that should be implemented to mitigate them.

### 6.1 Failure to meet condition targets

One of the key risks associated with the implementation of this Offset Management Plan is that the condition targets that have been set within this management plan will not be met through the identified management actions such as fencing the area, spot spraying targeted weed species and utilizing grazing to reduce annual introduced grass cover.

The risk associated with failing meeting the condition targets will be managed through the implementation of the annual monitoring program and the review of the management plan after five years. The annual monitoring program will provide data on the annual progression towards the defined targets for each of the four key ecological indicators. This will assist in determining whether the management actions are being effective in the implementation of the plan. As detailed, a review of the Offset Management Plan and all associated actions will be undertaken after five years. This will provide an opportunity to assess the progression of the plan and implement any changes to management actions deemed necessary to ensure the defined targets for the Offset area are met.

### 6.2 Change of land use

The change of land use is a threat to the implementation of this Offset Management Plan. If the land was to be used for a ground disturbing activity such as cropping, mining or other industry then the ability for the Offset Management Plan to be implemented is low. Additionally, a change in the type of grazing animal (e.g. from sheep to cattle) will have a significant impact on the Offset area.

However, the establishment of a Heritage Agreement, under the *Native Vegetation Act 1991*, over the Offset area significantly reduces the risk of any change in land use now or in perpetuity.

### 6.3 Sale of property

The Offset area is currently owned and managed by A.N. and K.A. Wadlow. It is possible that the land is sold in the future. To ensure continuity of the delivery of the Offset Management Plan, the establishment of a Heritage Agreement, under the *Native Vegetation Act 1991*, will be listed on the property title in perpetuity. It will also be the responsibility, whilst the wind farm is operational, of Engie to ensure any new land holder is aware of the responsibilities and implementation of this management plan.

#### **6.4 Lack of funding / lack of agreement with landholder and ENGIE**

If an agreement cannot be reached between ENGIE and the landowner to implement the Offset Management Plan, ENGIE must develop a new Offset strategy under *EPBC Act 1999*.

#### **6.5 A decrease in the grassland condition**

Initial population surveys will determine a baseline condition of the native grasslands. Annual monitoring will be used as a tool to measure the changes in these indicators over time. The risk is that the management of the site, for some reason, results in a decline in grassland condition. The contingency for this will be the annual review of management actions compared to changes in grassland condition scores. Adaptive management will be implemented to ensure the most appropriate management is implemented.

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## 8 APPENDICES

### 8.1 Appendix 1. Activity Record Datasheet

Activity Record Datasheet - *To be filled in by landholders as work progresses, then issued to ENGIE at the end of each financial year*

Management Action (e.g. fox baiting / shooting, boxthorn control, horehound control)	Date	Time spent on task (hrs / days)	Comments (Completed/more remaining/ follow up required – provide estimate of time remaining)

**8.2 Appendix 2. Paddock Monitoring Sheet**

*Paddock Monitoring Sheet - To be filled in by landholders as grazing management progresses*

Source: Mid North Grasslands Working Group and Land Water & Wool (1986)

Paddock Name:.....											
Paddock Size	Date in	Date out	A. Grazing Days	B. Estimate of feed left (kg/DM/ha)	C. Sheep number and type	D. DSE rating	E. Total DSE of mob	F. Feed utilised (kg)	G. Rest Period (days)	I. DSE days/ha	J. DSE days/ha/yr





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