Willogoleche Wind Farm

Operational Environmental Management Plan

Willogoleche Wind Farm Operational Environmental Management Plan

Version 4 - Final

18 October 2019

Declaration of accuracy

In making this declaration, I am aware that section 491 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) makes it an offence in certain circumstances to knowingly provide false or misleading information or documents to specified persons who are known to be performing a duty or carrying out a function under the EPBC Act or the *Environment Protection and Biodiversity Conservation Regulations 2000* (Cth). The offence is punishable on conviction by imprisonment or a fine, or both. I am authorised to bind the approval holder to this declaration and that I have no knowledge of that authorisation being revoked at the time of making this declaration.

Signed

_____

Full name (please print)

_____

Organisation (please print)

_____

Date ___/__/___

Prepared by EBS Ecology for ENGIE

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EBS Ecology
125 Hayward Avenue
Torrensville, South Australia 5031
t: 08 7127 5607
http://www.ebsecology.com.au
email: info@ebsecology.com.au

GLOSSARY AND ABBREVIATION OF TERMS

CFS	Country Fire Service
COEMP	Construction and Operational Environmental Management Plan
DotEE	Department of the Environment and Energy
DRP	Decommissioning and Rehabilitation Plan
EBS	EBS Ecology
EPA	Environment Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
GE	General Electric
HGV	heavy goods vehicle
IECA	International Erosion Control Association
Iron-Grass NTG	*Iron-Grass Natural Temperate Grassland*
km	kilometre(s)
LFA	Landscape Function Analysis
m	metre(s)
mm	millimetre(s)
NRM Act	*Natural Resources Management Act 2004*
NTG	Natural Temperate Grassland
OEMP	Operational Environmental Management Plan
SA	South Australia/South Australian
SEB	Significant Environmental Benefit
subsp.	sub species
TEC	Threatened Ecological Community
WTG	Wind Turbine Generator(s)
WWF	Willogoleche Wind Farm

Table of Contents

List of Tables

List of Figures

1 INTRODUCTION

1.1 Project Overview

Willogoleche Power will commence the operation and maintenance phase of the Willogoleche Wind Farm (WWF) post completion of the commissioning phase on approximately 31 October 2019. Located approximately 6 kilometres (km) west of the township of Hallett in the Mid North of South Australia (Figure 1), the WWF has 32 turbines with a combined generation capacity of 119 Megawatts, giving it the capability of powering 80,000 homes across South Australia (ENGIE 2019). It is expected to be operational for approximately 25 years.

As part of the WWF approval conditions under the *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act) approval (EPBC 2011/5850), a Construction and Operational Environmental Management Plan (COEMP) was developed, and approved by the Department of the Environment and Energy (DotEE) on 3 February 2017, prior to the commencement of construction on 9 September 2017 (EBS Ecology 2017a). The COEMP detailed the environmental management requirements of the project with a specific focus on management of the *Iron-Grass Natural Temperate Grassland of South Australia* listed Threatened Ecological Community (TEC) identified within the project area, to ensure its quality and coverage is not diminished as a result of constructing and operating the wind farm.

As construction works have been completed, the COEMP has been reviewed and condensed into this Operational Environmental Management Plan (OEMP). Information collected during monthly environmental inspections throughout the construction phase (9 September 2017 to September 2019) as well as annual monitoring events completed to date and feedback from ENGIE, has been used to inform the review of the COEMP and production of this OEMP. Refer to the COEMP for background information (EBS Ecology 2017).

1.2 Previous Assessments and Reports

Numerous ecological assessments were completed within and adjacent to the WWF site during the planning stage and all background information supporting this OEMP should be referred to in the following reports:

- EBS Ecology (2004) Hallett Wind Farm Ecological Assessment – March 2004.
- EBS Ecology (2005) Willogoleche Hill Vegetation Survey – February 2005.
- EBS Ecology (2010a) Willogoleche Wind Farm WTG01 – WTG026 Ecological Assessment.
- EBS Ecology (2010b) Willogoleche Wind Farm Extension, Ecological Assessment.
- EBS Ecology (2010c) Willogoleche Wind Farm Assessment against the EPBC Criteria for Iron-grass Grassland Threatened Ecological Community.
- EBS Ecology (2011a) Willogoleche Wind Farm SEB Area Assessment Report.
- EBS Ecology (2011b) Willogoleche Wind Farm Native Vegetation Clearance Report.
- EBS Ecology (2012) Willogoleche Wind Farm Regional Lomandra Assessment.
- EBS Ecology (2013) Willogoleche Wind Farm EPBC Offset Area Investigation.
- EBS Ecology (2017b) Willogoleche Wind Farm Offset Area Management Plan.

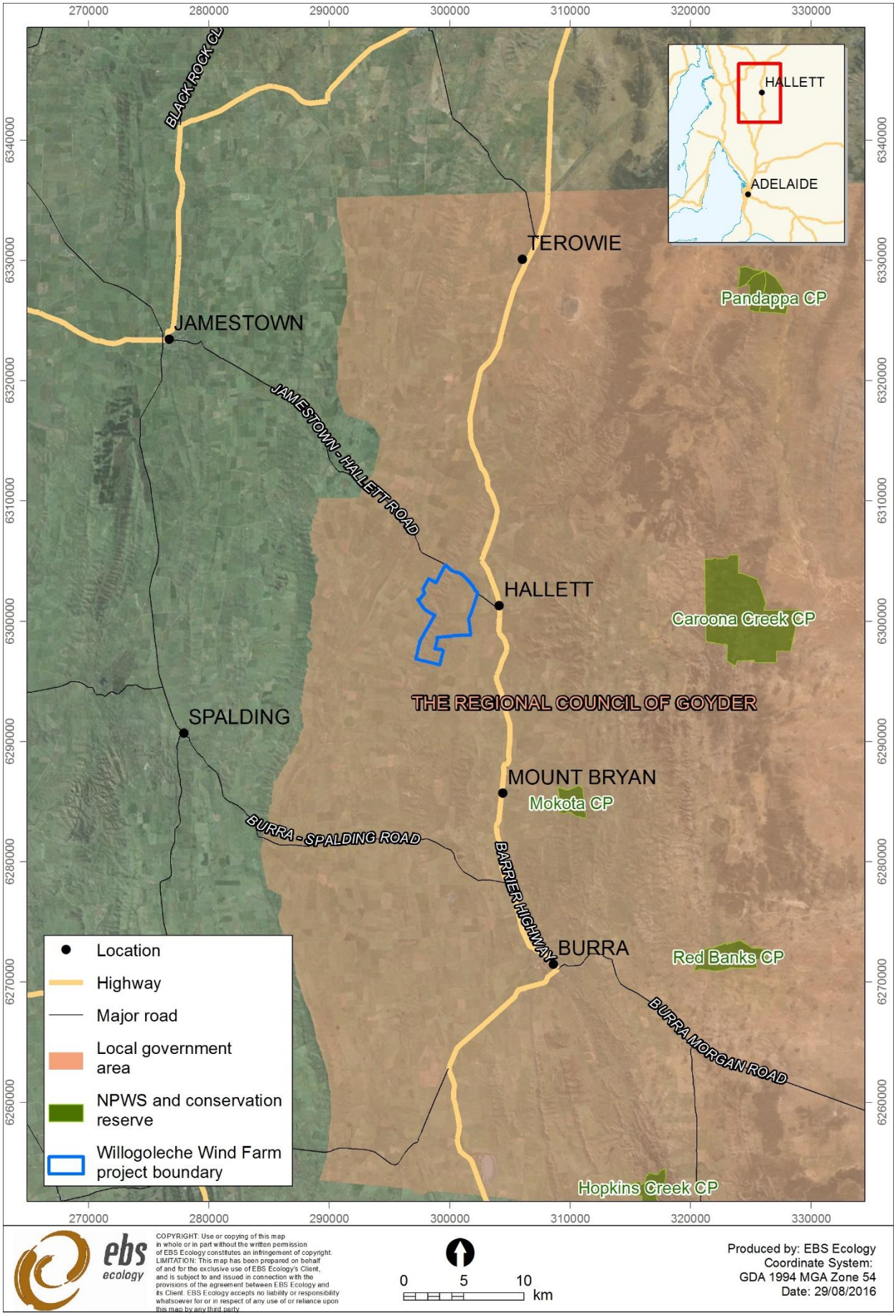

Figure 1. Location of Willogoleche Wind Farm, west of Hallett.

1.3 Objectives

The objectives of this OEMP are to minimise the potential impacts of operation of the WWF on the *Iron-Grass Natural Temperate Grassland of South Australia* (Iron-Grass NTG) TEC by:

- Identifying potential impacts to the Iron-Grass NTG TEC;
- Establishing management actions to avoid, minimise and/or mitigate the impacts;
- Monitoring and auditing to detect attributable impacts; and
- Implementing contingency responses and corrective actions where required.

1.4 Iron-Grass NTG TEC

The WWF site contains areas of *Lomandra multiflora* ssp. *dura* (Hard Mat-rush) Open / Very Open Tussock Grassland which were previously assessed against the EPBC Act listing for the Iron-Grass NTG TEC. Six areas were assessed as meeting the requirements for a Category B listing under the EPBC Act, while one area was assessed as Category C (Figure 2 to Figure 9).

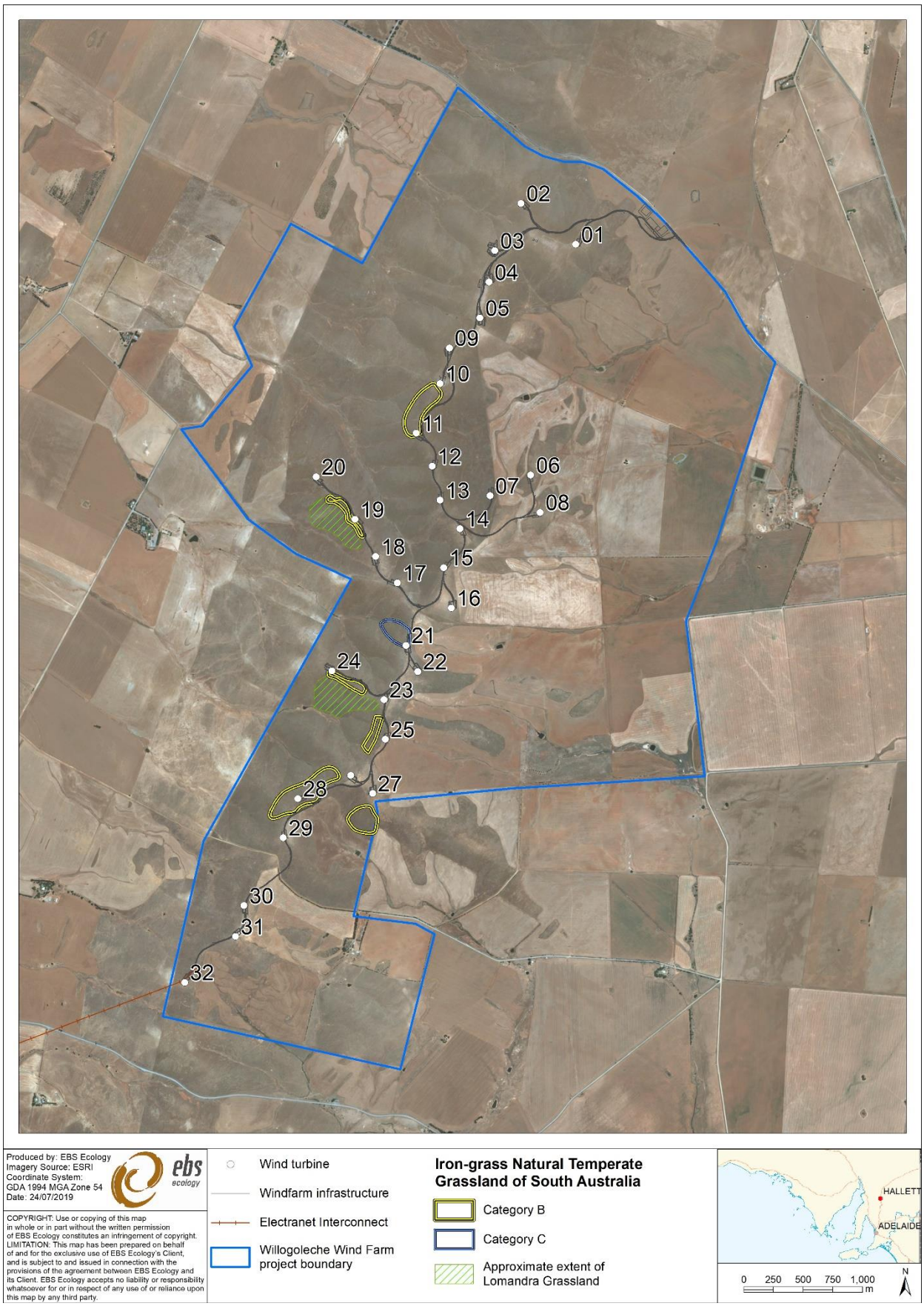

Figure 2. Location of all 7 patches of Iron-Grass NTG TEC within the WWF.

Figure 3. Location of Iron-Grass NTG TEC Patch 1, surrounding wind turbine 28.

Figure 4. Location of Iron-Grass NTG TEC Patch 2, south-west of wind turbine 27.

Figure 5. Location of Iron-Grass NTG TEC Patch 3, west of wind turbine 25.

Figure 6. Location of Iron-Grass NTG TEC Patch 4, south of the access track to wind turbine 24.

Figure 7. Location of Iron-Grass NTG TEC Patch 5, north-west of wind turbine 21.

Figure 8. Location of Iron-Grass NTG TEC Patch 6, west of wind turbine 19.

Figure 9. Location of Iron-Grass NTG TEC Patch 7, between wind turbines 10 and 11.

2 ENVIRONMENTAL ASPECTS AND IMPACTS

There is potential for environmental impacts, particularly to the Iron-Grass NTG TEC, during operation of the WWF. However, as the site is no longer subject to construction activities, the likelihood and risk of impact is significantly less than during construction works.

In assessing the potential environmental impacts, particularly to the Iron-Grass NTG TEC, associated with operation of the WWF, the following has been taken into consideration:

- The site of the WWF comprises farm land predominantly used for sheep grazing and cereal cropping;
- The site contains numerous natural drainage lines, some of which have been crossed for access purposes; and
- Operation activities are limited to the use of access tracks and hard stands at the base of each turbine.

The potential environmental impacts, particularly to the Iron-Grass NTG TEC, during operation of the WWF include:

- Introduction of new weeds and/or increase in weed occurrence;
- Increase in feral animals;
- Soil erosion and sedimentation; and
- Fire.

3 ENVIRONMENTAL MANAGEMENT PLAN

An overview of each of the potential environmental impacts is provided separately below. The specific management actions (and associated timeframes and responsibilities) required to be implemented during operation of the WWF to minimise the risk of adverse impact to the environment, particularly the seven Iron-Grass NTG TEC areas, and to aid compliance with legislative and/or statutory requirements are outlined in Table 1.

3.1 Weed Management

Under the *Natural Resources Management Act 2004* (NRM Act), landholders have a legal responsibility to manage declared pest plants and prevent land and water degradation. Weed species previously observed within the WWF site include:

- *Aira* sp. (Hair-grass);
- *Avena barbata* (Wild Oat / Bearded Oat);
- *Carthamus lanatus* (Saffron Thistle);
- *Cucumis myriocarpus* (Paddy Melon);
- *Echium plantagineum* (Salvation Jane) – Declared weed;
- *Heliotropium europaeum* (Common Heliotrope);
- *Lycium ferocissimum* (African Boxthorn) – Declared weed;
- *Moraea setifolia* (Thread Iris);
- *Onopordum acaulon* (Horse Thistle);
- *Salvia verbenaca* (Wild Sage);
- *Silene* sp. (Catchfly);
- *Sonchus* sp. (Rough Sow-thistle);
- *Trifolium* sp. (Clover); and
- *Vulpia* sp. (Rat's-tail Fescue).

The landholders will undertake all weed management. Due to the extensive experience of the current landholders in weed management, no weed identification or management training is proposed. However, if ownership of the property is transferred, this will be re-assessed and training undertaken with the new landholders / managers.

Some weeds can potentially be managed opportunistically, as this may be a more efficient way of operating in some cases. For example, if a small Boxthorn plant is observed, it may be convenient to remove the individual whilst in the area. Refer to Table 1 for the specific management actions, timeframes and responsibilities associated with weed management.

3.2 Feral Animal Management

Under the *Natural Resources Management Act 2004* (NRM Act), landholders have a legal responsibility to manage declared pest animals and prevent land and water degradation. As such the landholders will undertake all feral animal management. Rabbits, feral cats and foxes are the key feral animals which could potentially occur within the WWF site. Control effort for these species will be part of annual program undertaken by the landholders. Any rabbit warrens will be fumigated, or ripped, and if rabbit numbers rise (as determined by landholders through historical evidence on each property), a targeted baiting program may be developed and implemented. Refer to Table 1 for the specific management actions, timeframes and responsibilities associated with feral animal management.

3.3 Erosion and Sedimentation Management

Whilst no major construction activities are planned to occur during operation of the WWF, management of erosion and sediment will still be required to ensure the stability of the infrastructure and prevent sedimentation within the site, particularly the seven Iron-Grass NTG TEC areas. Refer to Table 1 for the specific management actions, timeframes and responsibilities associated with erosion and sedimentation management.

If existing site erosion and sediment control measures, such as constructed drainage lines, culverts, soil berms and rehabilitated areas, are found to be insufficient (i.e. if erosion and sedimentation is observed during environmental inspections and monitoring), corrective action will be required to prevent further erosion and sedimentation from occurring. The corrective action implemented will be site and issue specific and guided by Best Practice Erosion and Sediment Control (IECA 2008).

3.4 Fire Management

The WWF is located within South Australian Country Fire Service (CFS) Region 4 Flinders, Mid North and Pastoral Areas. Despite the low fire risk that wind farms present, the development of an effective emergency response plan or procedure is essential (CEC 2018). Fire management will comply with the *Fire and Emergency Services Act 2005* and associated *Fire and Emergency Services Regulations 2005*.

It is expected that grazing will significantly minimise fuel loads across the wind farm and assist to minimise damage in the unlikely event of a fire. Refer to Table 1 for the specific management actions, timeframes and responsibilities associated with fire management.

3.5 Access Management

The WWF is located on private property within paddocks surrounded with stock fencing, which will assist in preventing access by the general public. As such, it is not currently open to indiscriminate access by the public and any access is managed by the property owners / managers. Therefore, no additional restrictions or specific management actions are proposed.

3.6 Iron-Grass NTG TEC Management

Management of weeds, feral animals, erosion and sediment, fire and access will minimise the risk of operation of the WWF causing an adverse impact on the seven Iron-Grass NTG TEC areas (Figure 2 to

Figure 9). Areas of the WWF, including the seven Iron-Grass NTG TEC areas, will be grazed by sheep, with grazing levels similar to historic levels across the site.

Monitoring of the seven Iron-Grass NTG TEC areas will be undertaken on an annual basis to evaluate the effectiveness of management activities and identify the need for any improvement or adjustment to management actions. The results will be documented in an Annual Iron-Grass NTG TEC Monitoring Report, which will be provided to DotEE.

Refer to Table 1 for the specific management actions, timeframes and responsibilities associated with Iron-Grass NTG TEC Management.

3.6.1 Rehabilitation of Iron-Grass NTG TEC

If a reduction in the quality of the seven Iron-Grass NTG TEC areas is identified during monitoring and attributable to operation of the WWF, then these areas will require rehabilitation.

The rehabilitation tasks will be dependent on the nature of the impacts from operation activities. However, it is most likely to involve targeted weed control and revegetation. Revegetating an Iron-grass NTG will require careful planning so that areas are enhanced and not degraded. Revegetation will need to be targeted with clear objectives set (based on the nature of the impacts and areas impacted). Refer to Appendix 2 for an Iron-Grass NTG TEC rehabilitation approach including species and possible methods.

Table 1. Operational phase management actions.

Aspect	Action	Timeframe	Responsibility	Performance criteria
Weeds	Prevent establishment of new weed species and/or infestations during the operational phase by implementing standard hygiene practices when bringing equipment, maintenance vehicles and other materials which have the potential to harbour weed seed or propagules, onto the WWF site (e.g. for maintenance purposes) and by practicing minimal disturbance methods.	On-going	GE Site Manager	• Hygiene practices implemented. • Minimal disturbance methods used. • No new weed outbreaks (checked during site inspections). • Annual weed survey completed. • Weed control undertaken (when required).
	Conduct an annual survey to identify and monitor the location, extent and abundance of weed species, particularly Declared weed species.	Annually in early Spring (for the life of the windfarm)	ENGIE Asset Manager	
	Undertake weed control such as (but not limited to) grazing, slashing, spraying, or physical removal, prior to the weeds setting seed.	On-going / as required	Property owner / land manager	
Feral Animals	Control pest animal species (especially rabbits, hares, foxes and feral cats) that may proliferate as a result of site activities.	On-going / as required	Property owner / land manager	• Control of pest animal species undertaken (when required) with minimal soil disturbance. • Waste unable to be accessed by pest animals (checked during site inspections).
	Ensure waste is unable to be accessed by pest animals.	On-going	GE Site Manager	
Erosion and Sediment	Minimise disturbance of soil and vegetation during all activities undertaken throughout the operational phase (including vehicle access, general infrastructure and site maintenance, weed control, fire management, grazing) within the WWF site by: • only driving on designated vehicle access tracks; • minimising driving (walk where possible); • not driving on waterlogged vehicle access tracks (this will only be considered in circumstances that threaten the safety of personnel or windfarm assets, and by approval of the GE Site Manager); • ensuring that all designated vehicle access tracks and site stormwater drainage is well maintained to prevent erosion and sedimentation from occurring; and • minimising digging and soil disturbance to only that which is required to implement the approved action, including ripping of rabbit warrens to control rabbits.	On-going	GE Site Manager	• Well maintained vehicle access tracks and site stormwater drainage. • No significant soil or vegetation disturbance observed during site inspections. Signs of disturbance include erosion and/or sedimentation as well as vehicle tyre tracks and flattened or damaged vegetation.

Aspect	Action	Timeframe	Responsibility	Performance criteria
Fire	Although it is expected that grazing will significantly minimise fuel loads across the wind farm, the following measures will be implemented to minimise damage in the unlikely event of a fire (adapted from CEC 2018): • Ensure access tracks and turn around areas are well maintained; • Ensure an up to date emergency response plan or procedure is available on site at all times (note: revisions should be completed in consultation with the relevant local Country Fire Service (CFS), which is most likely the Hallett CFS Station and/or SA CFS Region 4); • Ensure operations staff are familiar with emergency response procedures and have access to relevant plans or procedures; • Ensure the relevant local CFS (Hallett CFS and/or SA CFS Region 4 representatives) has up to date maps, access gate keys and turbine numbering information; and • Inform the relevant local CFS (Hallett CFS and/or SA CFS Region 4) of the maintenance schedule (if available) and any planned activities.	On-going / as required	GE Site Manager	• Vehicle access tracks and turn around areas are well maintained. • Emergency response plan is up to date and available. • Staff are familiar with emergency response procedures and have access to plans or procedures. • The local CFS has up to date site maps and can access the site. • The local CFS is aware of the maintenance schedule and any planned activities.
Iron-Grass NTG TEC (seven areas)	Continue low-level sheep grazing to ensure areas between tussock grasses is kept open.	On-going / as required	Property owner / land manager	• Biomass is measured and optimal biomass is maintained through sheep grazing. • Management actions are in accordance with the Recovery Plan. • Annual Iron-Grass NTG TEC monitoring is completed, (including photo-point photographs) and submitted to DotEE.
	Ensure all management actions are undertaken in accordance with the *National Recovery Plan for the Iron-grass Natural Temperate Grassland of South Australia ecological community 2012* (Turner 2012).	On-going	GE Site Manager	
	Undertake an annual Iron-Grass NTG TEC monitoring program to evaluate the effectiveness of management activities and identify the need for any improvement or adjustment to management actions. Ensure photographs are taken at the permanent photo-points within the seven Iron-Grass NTG TEC areas. Document the results in an Annual Iron-Grass NTG TEC Monitoring Report and provide to DotEE for information soon after the monitoring event.	Annually in Spring	ENGIE Asset Manager	

4 OEMP IMPLEMENTATION

This OEMP will be implemented on site during the entire operation period of the WWF. Any changes to the requirements for environmental management of the WWF, such as legislative changes, will result in the operational aspects of the plan being updated. Changes to management actions will result in review of this OEMP and re-submittal for approval by the relevant authorities (i.e. DotEE).

4.1 Roles and Responsibilities

The roles and responsibilities associated with implementing this OEMP are outlined in Table 2. ENGIE is responsible for appointing each of the roles and for ensuring the correct processes and procedures are followed.

Table 2. Outline of roles and responsibilities associated with this OEMP.

Person(s) Responsible	Environmental Responsibilities
ENGIE Asset Manager	Acting as the principal contact point in relation to the environmental performance of the project.
	Understanding the requirements of this OEMP and ensuring that all the management actions, monitoring, auditing and reporting requirements outlined within it are implemented.
	Considering and advising on matters specified in this OEMP, and any relevant licences and approvals related to the environmental performance and impacts of the project during operation.
	Maintaining a master copy of this OEMP and all associated environmental documentation including: • register of inducted and trained personnel; • environmental inspections, monitoring and auditing reports; • completed management actions; • complaints register; • environmental incident register and reports; and • annual reports.
	Assisting the GE Site Manager to implement this OEMP.
	Approving the environmental induction training.
	Ensuring that all personnel complete an environmental induction prior to commencing any operation and maintenance activities.
	Ensuring that all operation and maintenance activities comply with relevant legislation, approvals, and procedures including this OEMP.
	Assisting contractors to fulfil their environmental responsibilities during operation and maintenance activities.
	Requiring reasonable steps be taken to avoid or minimise unintended or adverse environmental impacts, and failing the effectiveness of such steps, to recommend that relevant actions be ceased immediately should an adverse impact on the environment be likely to occur.
	Communicating any relevant changes to this OEMP or environmental legislation to all personnel.
GE Site Manager	Day to day management of the WWF site.
	Understanding the requirements of this OEMP and ensuring that all the management actions, monitoring, auditing and reporting requirements outlined within it are implemented, as agreed with the ENGIE Asset Manager.
	Assisting contractors to fulfil their environmental responsibilities during operation and maintenance activities.
	Undertaking environmental monitoring and inspections (as outlined in sections 5.1 and 5.2), identifying any corrective action required and ensuring it is completed in a timely manner, to ensure compliance with this OEMP, as agreed with the ENGIE Asset Manager.
	Maintaining monitoring records (environmental inspections) and corrective action lists.

4.2 Environmental Induction

All employees and contractors shall receive suitable environmental induction prior to commencing work on site to ensure that they are aware of their responsibilities and are competent to carry out the work. Environmental requirements will be explained to employees during the induction and on-going training such as via tool box meetings, briefings and notifications as required.

The environmental induction shall address general and project-specific environmental issues relevant to operation of the WWF, including:

- Conditions associated with the EPBC Act approval (as relevant);
- Purpose and objectives of this OEMP;
- Site specific environmental aspects such as the seven Iron-Grass NTG TEC areas;
- The potential environmental impacts associated with operation activities and the management actions required as outlined within this OEMP; and
- Emergency response procedures and reporting for environmental incidents.

Environmental induction materials will be reviewed at least annually and amended to reflect changes to project environmental risks, the status of community relations and the occurrence of incidents.

5 ENVIRONMENTAL MONITORING, AUDITING AND REPORTING

The environmental monitoring, auditing and reporting required to ensure that the specific management measures and actions contained within this OEMP are implemented and effective are outlined below.

5.1 On-going Environmental Monitoring

All personnel are responsible for reporting any environmental issues, hazards or impacts observed on site during daily work practices to the GE Site Manager, who will investigate and determine whether any corrective action is required and when it will be undertaken.

5.2 Environmental Inspections

Environmental inspections will be undertaken by the GE Site Manager (or delegate) on a monthly basis to verify compliance with this OEMP and the EPBC Act approval. The inspections will involve visual and physical checks throughout the entire WWF site. An Environmental Inspection Checklist will be completed and any corrective action required will be recorded (for example in an Environmental Corrective Action List) and allocated to appropriate personnel with an agreed timeframe for completing. The GE Site Manager will follow up on all current/open environmental corrective actions during each monthly environmental inspection to ensure that they are completed on site and within the agreed timeframe. Records (hard copy or electronic) of monthly Environmental Inspection Checklists and action lists will be kept on site and made available for review when required.

5.3 Iron-Grass NTG TEC Monitoring

The seven areas of Iron-Grass NTG TEC within the WWF will be monitored for potential impacts from operation of the wind farm and to ensure they are not reducing in condition / quality. Monitoring was undertaken during construction in 2017 and 2018 and is also required to be undertaken for the first five years post construction, which equates to 2019, 2020, 2021, 2022 and 2023. After this timeframe, the monitoring program and frequency will be reviewed and modified subject to approval by DotEE.

Monitoring reports will be prepared and submitted to DotEE at the completion of each monitoring event.

5.3.1 Monitoring Indicators

Overall, the desired outcomes are for the existing plants to be healthier, a highly functional soil surface condition, less bare ground, and ultimately a more diverse grassland, which will depend on seasonal factors to a large extent. Some of the following indicators can be measured annually and be directly linked to management changes.

Grassland health (% dead material)

Grassland health is related to health of the tussocks, amount of bare ground and surface litter. Monitoring will partly focus on whether the tussocks are actively growing, and whether the tussocks are large, or small and struggling. The percentage of dead material will be measured for each tussock along a permanent 50 metre (m) transect, so that the same individuals can be re-measured the following year.

Dominant species cover and abundance

Cover and abundance will be measured along the permanent 50 m transect using a 1 x 1 m quadrat to count tussocks per square metre. This can be averaged out over a number of repeated counts. Juvenile plants will also be recorded using this methodology. The Grassland communities with a high density of tussocks already may not show any significant change from year to year, so it may be more appropriate to measure changes in cover and abundance of shrub, herbaceous or regenerating tree species. Changes to exotic levels will also be measured here.

Vegetation composition (plant species diversity / presence / absence)

Maintaining native plant species diversity in TEC adjacent to construction and operation activities is one of the desired outcomes of the management plan, however the difficulty in monitoring diversity is that significant changes, or no change at all, cannot be directly attributed to changed management as plant recruitment is dependent on favourable seasonal conditions.

A 50 x 50 m quadrat will be established to measure plant species diversity, whilst presence/absence will be measured using the same permanent 50 m transect established to measure Grassland health, % bare ground and cover/abundance.

Seedling recruitment and regeneration

With strategic timing of grazing, perennial plants and grasses will have a greater opportunity to recruit seedlings into the population. Juvenile recruitment of perennial species will be monitored using the permanent 50 m transects and 30 x 30 m Quadrats.

Landscape Function Analysis (LFA) (soil surface condition)

LFA is a monitoring procedure developed by the CSIRO (Tongway & Hindley 2004). It provides a rapid, reliable, and easily applied method for assessing and monitoring landscape function and restoration. A series of overall soil health indicators including surface stability, infiltration capacity and nutrient cycling, will be used to interpret whether the natural resources of the site are being lost, maintained or enhanced over time. To effectively establish an LFA program, a series of analogue (reference sites) within the prominent vegetation communities across the site will be established to provide a ‘target range’ of values in which the TEC monitoring sites should occur within. LFA monitoring will provide data on a broader range of parameters rather than just vegetation based monitoring. Comparisons will be made between analogue and TEC sites to ensure the TEC sites are not reducing in condition / quality as a result of construction and operation activities.

5.4 Environmental Audits

Auditing of the WWF will be undertaken by the ENGIE Asset Manager (or a suitable delegate or consultant) on an annual basis, as a minimum, to ensure ongoing compliance with this OEMP and conditions associated with the Project’s EPBC Act approval. Audits will focus on:

- Application of procedures and practices;
- Implementation of management actions, monitoring and reporting requirements contained within this OEMP;

- Review of environmental issues, non-conformances and corrective actions identified during monitoring events; and
- Document control and review.

Any issues, non-conformances or corrective actions identified during these annual audits will be recorded in an audit report. The ENGIE Asset Manager will follow up on all issues, non-conformances or corrective actions identified, to ensure that they are rectified or implemented within an acceptable timeframe.

Auditing, including site inspection, may also be performed by DotEE to ensure that the WWF is compliant with EPBC approval conditions.

5.5 Annual Reporting Responsibilities

ENGIE will maintain appropriate records, including but not limited to, a register of inducted personnel, environmental monitoring data, environmental corrective action list, complaints register and environmental incident reports, to demonstrate implementation of this OEMP.

Furthermore, a number of annual reporting responsibilities are required to be completed by ENGIE to comply with the conditions of approval associated with the EPBC Act approval, as summarised in Table 3 below.

Table 3. Summary of annual reporting responsibilities.

Report	Timeframe
Iron-Grass NTG TEC (the seven areas within the WWF) monitoring report. (Refer to section 5.3.)	Completed annually with field work done in October / November and report submitted to DotEE.
Offset area monitoring report. (Refer to Offset Area Management Plan.)	Completed annually with field work done in October / November and report submitted to DotEE.
Annual audit report. (Refer to section 5.4.)	Completed annually prior to Annual EPBC Compliance Report (see next row).
Annual EPBC compliance report. (Refer to EPBC Act approval conditions.)	Completed between 4 September and 3 December each year and published on ENGIE's website no later than 3 December each year. Documentary evidence providing proof of the date of publication must be provided to DotEE at the same time as the compliance report is published.

6 COMPLAINTS AND INCIDENT MANAGEMENT

6.1 Complaints

Complaints from any source (for example, local community, general public or government authorities) relating to the environment will be recorded on an environmental complaints register, investigated by the ENGIE Asset Manager (or delegate) and addressed to enable satisfactory close-out.

The environmental complaints register will be established and maintained by the ENGIE Asset Manager who will receive, log, track and respond to complaints within 24 hours. In the case of an emergency, potential pollution/environmental incident or non-compliance, the complaint will be responded to immediately. The following details will be recorded in the register:

- Date and time;
- Type of communication (telephone, letter, meeting etc.);
- Name, address, contact number of complainant;
- Nature of complaint;
- Action taken in response, including who the complaint was referred to (if not resolved immediately); and
- Details of any monitoring undertaken to confirm that the complaint has been satisfactorily resolved.

Every effort will be made to ensure that concerns are addressed in a manner that results in a mutually acceptable outcome.

6.2 Environmental Incidents

Environmental incidents include matters such as, but not limited to, the following:

- Death or injury of terrestrial and avian fauna;
- Unapproved clearance of vegetation;
- Significant erosion and/or sedimentation;
- Discharges of contaminated waters to the environment;
- Hazardous material spills or leakages;
- Fires; and
- Environmental monitoring results indicating an impact to the environment or any person (water quality, noise, air quality).

All environmental incidents, including near misses and potential hazards shall be reported to the GE Site Manager who will investigate the incident, complete an environmental incident report and enter it onto the environmental incident register. The GE Site Manager will investigate the incident with the parties involved to identify the cause and implement appropriate corrective actions to prevent it from occurring again. Corrective actions must be recorded in the incident report, assigned to a responsible party and

implemented as soon as practicable. The environmental incident report must be completed within 24 hours of the incident occurring and signed by the parties involved as well as the ENGIE Asset Manager.

The ENGIE Asset Manager will determine if the environmental incident should be reported to the Environment Protection Authority (EPA) and determine any requirement to undertake remedial action.

Environmental incidents that may result in non-compliance with the WWF Project EPBC approval conditions, will be reported to DotEE in the next annual report, or earlier if deemed necessary by the ENGIE Asset Manager.

7 POTENTIAL RISKS TO SUCCESSFUL ENVIRONMENTAL MANAGEMENT

There are a number of potential risks to successful environmental management during operation of the WWF, which can be managed and/or mitigated by implementation of appropriate contingency measures, as outlined in Table 4 below. The EPBC approval and conditions attached to the approval form the basis for this OEMP and will remain in effect until 31 January 2044, which is the anticipated lifetime of the WWF.

Table 4. Potential risks to successful environmental management during operation of the WWF and associated contingency measures implemented to mitigate these risks.

Potential risks	Proposed contingency measures
Change of WWF owner and/or operator.	• EPBC approval (and conditions) and OEMP, including induction requirements, annual auditing and compliance reporting to DotEE.
Change of staff responsible for implementation of this OEMP (i.e. ENGIE Asset Manager and/or GE Site Manager).	• EPBC approval (and conditions) and OEMP, including induction requirements, annual auditing and compliance reporting to DotEE.
Poor implementation of this OEMP, including the environmental management actions/requirements outlined within it.	• Ongoing monitoring (including specific monthly inspections) to identify environmental issues and/or potential non-conformances with the requirements of this OEMP. • Implementation of corrective action (if required). • Auditing (internal and/or external) of OEMP implementation to identify potential non-conformances and associated corrective actions required.
General staff opposition/resistance to environmental management.	• Remind staff of company environmental policy and general environmental duty. • Demonstrate (or remind staff of) environmental commitment from management above (top down environmental commitment and leadership). • Specific education/training on WWF environmental management requirements (if required). • Undertake staff performance review and address underperformance as appropriate.

8 DECOMMISSIONING AND REHABILITATION PLAN

The anticipated wind farm operational lifetime is between 20 and 25 years, with an option to extend the leases for a further 25 years. Any extension is likely to involve a repowering of the site, meaning a commensurate change-out of turbines, towers and foundations to whatever new technology is available at that time. With operation commencing in 2019, final and complete decommissioning of this wind farm may occur around the year 2044 or after its second 25 year operational period, around the year 2069.

This Decommissioning and Rehabilitation Plan (DRP) has been developed in accordance with current good industry practice with reference to the Clean Energy Council *Best Practice Guidelines for the Australian Wind Industry* (CEC, 2018).

As wind farms are relatively new there is a lack of experience in decommissioning practices. As such it is likely that this DRP will be required to be refined during the operational life of the WWF to take cognisance of changing best practice, legislation and regulatory guidelines.

This DRP is based on the following:

- No wind turbine has been removed in Australia to date;
- As with any other power station the option to repower would be considered at end of design life;
- Nonetheless, the land owners associated with the WWF have a legal right to ask for removal under the terms of the lease, but excluding the foundations;
- Removal is expected to take around 2 to 3 months involving the same type of crane equipment as is required in the construction phase;
- Turbines are constructed in pieces and can be taken apart in the same fashion that they are erected and transported in the same way, so a separate plan is not needed;
- It is estimated it would cost less than $200,000 (2016 estimate) per turbine to dismantle; and
- It is assumed that the turbines will be dismantled for selling on the second-hand market or recycled for scrap value.

On cessation of WWF operations, all equipment and structures will be removed from the site. Decommissioning normally covers the removal of all turbines (rotors, nacelle and tower) and removal of the anemometry masts (if still in operation and on location), followed by rehabilitation of all affected areas. All underground cables, typically located one meter below ground level, will normally be left in place, or have their valuable and recyclable metals stripped out. All crane hard stands adjacent to turbines will be removed to below ploughing level and then reinstated and the land returned to agriculture, unless of value to ongoing farming activity.

The substation, which is to be located 2.4 km to the southwest of the closest wind turbine, is owned by ElectraNet and expected to continue as a transmission asset beyond the life of the wind farm, assuming likely increases in population size and power demand in South Australia over the next 25 to 50 years. In any case, this asset is not part of this DRP and is subject to a separate development approval under the control of ElectraNet.

The decommissioning and rehabilitation works will be similar to construction and it is expected that the environmental impacts will be less than construction activities. Similar plant and manpower will be employed as during construction and the original design related documentation used to construct the WWF farm shall be referenced.

Pollution prevention, ecological and hydrological monitoring, waste management and other good practices should be employed at least to the standard performed at construction (in accordance with the COEMP). Best practice wind farm construction techniques are constantly evolving and best known methods will be employed as required during decommissioning and rehabilitation at the end of the 25 to 50 year wind farm lifetime.

Where infrastructure is to remain post decommissioning then the obligations for maintenance and repair shall pass to the landowner.

Good practice dictates that rehabilitation works should take place in the spring and summer growing season to maximise the benefits of natural regeneration.

This DRP is subject to review and should be considered following a reassessment of the ecology that has developed over the WWF lifetime. The decommissioning scheme will also be informed by learnings, changed policy settings, revised industry guidelines and continuous improvement on site over the life of the project.

Upon completion of the decommissioning and rehabilitation works a review should be undertaken by relevant authorities and any further remedial works agreed before the civil engineering contractor leaves the site.

Wind Turbine Generators (WTG)

The wind turbine generators are assembled from the following components, delivered to site separately and connected together; the decommissioning is a reverse of assembly:

1. Tower sections (3 to 4 per turbine);
2. Nacelle (housing on top of the tower, containing gearbox drive-train, generator and associated equipment);
3. Rotor hub (the ‘nose-cone’ supporting the turbine blades and associated infrastructure);
4. Rotor blade set (3 blades per turbine);
5. Control cabinets and converter module; and
6. Internal grid transformer and associated switchgear.

The turbine is erected and dismantled in sequence using a pair of cranes (typically 500 – 650 tonne main crane and 100 tonne tailing crane) located on the adjacent crane pad. The dismantling activity is based on the ability to separate the turbine into component parts in reverse order to the turbine manufacturer’s erection instructions. In future, there may be the opportunity to dismantle the turbines by alternative means using larger cropping equipment able to safely shear the towers without any dismantling. However, for the purposes of preparing this DRP the current conventional method of dismantling the turbines has been assumed.

Turbine unit transformers and switchgear located inside the turbines would be removed from site for re-use or scrap.

Following the dismantling of the turbines, the component parts have to be removed from site. The most likely cost-effective method of dismantling and removal (if the turbines are not to be re-used elsewhere) is to cut the blades and tower sections down to the largest manageable sizes able to fit on the trailer of a standard Heavy Goods Vehicle (HGV). This removes the need for specialised haulage provisions and the requirement for an off-site cutting compound.

The off-site haulage activities assume that low-loader trucks will remove the dismantled turbine components off the site in normal HGV-sized transport and onwards towards a local recycling facility. Only the blades are presently assumed to be worthless and may require to be landfilled. There may be future uses for recycled blade composite materials in, for example, cement production. It is highly likely that at the time of decommissioning that there will be a value in the blade material and landfilling will not be an acceptable means of disposal.

It is likely that on-site wind turbine crane hard standings would remain post decommissioning either for repowering the wind farm and/or possible agricultural use; therefore, no complete reinstatement is expected. This proposal would be revisited nearer the time of cessation of operations and the decision would be highly dependent on the opinion of the relevant authorities and the landowner's requirements. At present the land is used for grazing and cereal cropping and some hard standings generally can aid farming practices, e.g. dry feeding areas for cattle and sheep.

The current proposal is to strip topsoil on the crane hard standings adjacent to the turbine locations for use in reinstating the peripheral boundary/shoulders of the hard standing relatively level to surrounding ground elevations, and rehabilitating these sites following topsoil stripping and placement.

Reinstatement of Access Tracks

During decommissioning and rehabilitation, it is proposed that the access tracks will be left in-situ and the road shoulders would be dressed back by approximately 1 m per side; with an allowance for re-seeding to meet performance targets.

On site cabling

The network of underground cables linking turbines to the substation will be located within ducts in cable trenches. It is proposed that these aluminum conductor cables will be pulled out of the ducts and sold for scrap. Due to the cables being installed in ducts the disturbed soils will be kept to a minimum as only pulling pits will be required to remove the cables. Any disturbed soils will be restored thus leaving only plastic ducts, sand and cable bedding materials in the trenches at a depth of approximately one meter.

9 REVIEW OF OEMP

This OEMP must be reviewed and updated as outlined in Table 5. All information and actions detailed within this plan must be reviewed to ensure that management requirements are meeting the required outcomes. Data collected during the site inspections, monitoring events and audits will be used to inform any potential changes required during each review. Any changes or updates to this OEMP must be highlighted and submitted to DotEE for approval prior to implementing any changes. Once approved by DotEE the changes shall be communicated to the WWF project team and then implemented.

Table 5. OEMP review schedule.

Timing of review	Reasoning
One year post construction / into operation.	To inform ongoing implementation of this OEMP during the operational phase.
Mid-point of the operational phase.	To inform ongoing implementation of this OEMP during the operational phase.
Prior to the end of the operational phase.	To inform the decommissioning phase.
As soon as possible in response to a major environmental incident.	To prevent the environmental incident occurring again and inform any changes to this OEMP as a result of the incident.
As soon as possible after any significant changes to environmental legislation.	To ensure this OEMP meets legislative requirements.

10 REFERENCES

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11 APPENDICES

Appendix 1. Relevant Legislation

South Australian Legislation

Environment Protection Act 1993

The *Environment Protection Act 1993* (the Act) is the primary pollution control legislation in South Australia. Section 25 of the Act requires a 'general environmental duty' of all persons undertaking an activity that may pollute to take all reasonable and practicable measures to prevent or minimise any resulting environmental harm. Specific offences also exist under the Act including for:

- Causing serious or material environmental harm or an environmental nuisance by polluting the environment
- Failing to inform the Environment Protection Authority (EPA) of an incident that has caused, or threatens to cause, serious or material environmental harm as soon as reasonably practicable
- Failing to notify the EPA of site contamination that threatens or affects groundwater.

Environment Protection (Water Quality) Policy

The *Environment Protection (Water Quality) Policy 2015* (Water Quality Policy) prohibits the pollution of storm water systems and the state's natural waters. Clause 17 of the Water Quality Policy states that a person must not discharge or deposit a pollutant listed in Schedule 4 of the Policy into any waters or onto land where it might enter waters. The pollutants listed in Schedule 4 specific to this project include:

- cleaning agents;
- detergents and their by-products;
- fuel dispensing area wash water;
- wash down water from cleaning vehicles, plant or equipment;
- oil, grease, lubricants and petroleum products;
- rubbish; and
- solvents.

In addition, clause 11 of the Water Quality Policy states that a person who is undertaking an activity, or is an occupier of land, must take all reasonable and practicable measures (not being measures that themselves cause environmental harm) to avoid the discharge or deposit of waste from that activity or land into any waters; or onto land in a place from which it is reasonably likely to enter any waters.

Native Vegetation Act 1991

The *Native Vegetation Act 1991* provides for the conservation, protection and enhancement of the native vegetation of South Australia and, in particular, the limitation of the clearance of native vegetation.

Natural Resources Management Act 2004

The *Natural Resources Management Act 2004* promotes sustainable and integrated management of South Australia's natural resources. This includes the management and protection of water resources and the control of animals and plants.

Work Health and Safety Act

The *Work Health and Safety Act 2012* aims to secure the health, safety and welfare of persons at work while eliminating risks at their source. It also aims to protect the public against risks to health and safety from activities of persons at work and the use and operation of various types of plant and machinery.

Fire and Emergency Services Act

The *Fire and Emergency Services Act 2005* provides for the prevention, control and suppression of fires and for the handling of certain emergency situations.

Aboriginal Heritage Act

The *Aboriginal Heritage Act 1988* provides for the protection of any Aboriginal site, objects or remains, whether previously recorded or not.

It is an offence under Section 23 of the *Aboriginal Heritage Act 1988* to damage, disturb or interfere with an Aboriginal site, objects or remains unless written authorisation from the Minister for Aboriginal Affairs and Reconciliation has been obtained. Penalties for an offence under this section are up to $10,000 or six months' imprisonment in the case of an individual, or $50,000 in the case of a corporate body.

Commonwealth Legislation

Environment Protection and Biodiversity Act 1999 (EPBC)

The objectives of the EPBC Act are to:

- Provide for the protection of the environment, especially matters of national environmental significance;
- Conserve Australian biodiversity;
- Provide a streamlined national environmental assessment and approvals process;
- Enhance the protection and management of important natural and cultural places;
- Control the international movement of plants and animals (wildlife), wildlife specimens and products made or derived from wildlife; and
- Promote ecologically sustainable development through the conservation and ecologically sustainable use of natural resources.

Appendix 2. Iron-Grass Rehabilitation Plan

(Refer to the following pages.)

Willogoleche Wind Farm Iron-Grass NTG Rehabilitation Plan

Willogoleche Wind Farm Iron-Grass NTG Rehabilitation Plan

17th January 2017

Version 4.2

Prepared by EBS Ecology for Wind Prospect

Document Control					
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INTRODUCTION

EBS Ecology has been engaged by Wind Prospect (on behalf of Willogoleche Power Pty Ltd) to prepare a rehabilitation plan for Iron-Grass natural temperate grasslands within the Willogoleche Wind Farm. Several areas within the wind farm footprint which will be subjected to works have the nationally listed threatened ecological community (TEC), *Iron-grass Natural Temperate Grassland of South Australia* (Iron-Grass NTG) as the dominant component of the vegetation structure. A small proportion of the community will be impacted (0.82 ha) during the construction of wind farm infrastructure and a plan is required to protect the biodiversity values and manage the natural habitat currently provided by this community.

Objectives

The broad objective of this plan is to detail the methods and requirements for the reinstatement of Iron-Grass NTG and ongoing management. More specifically, the plan aims to:

- Establish a cost effective method of reinstatement of Iron-Grass NTG across areas that are likely to be temporarily disturbed as part of the wind farm construction, but not required as part of the long term development footprint.

- Develop the criteria for what is considered to be successful Iron-Grass NTG rehabilitation (benchmarks set that can be measured against to show when the grassland has been successfully rehabilitated).

- Plan for the control of pest plants and animals.

- Manage natural habitat and protect biodiversity values.

BACKGROUND INFORMATION

EBS Ecology has conducted numerous ecological assessments on this site and all background information regarding this proposal should be referred to in the below reports:

- EBS (2010) *Willogoleche Wind Farm B-WTG01 – BWTG10 and B-WTG12, Ecological Assessment.*
- EBS (2010) *Willogoleche Wind Farm Extension, Ecological Assessment.*
- EBS (2010) *Willogoleche Wind Farm Assessment against the EPBC Criteria for Iron-grass Grassland Threatened Ecological Community*
- EBS (2011) *Willogoleche Wind Farm Native Vegetation Clearance Report.*

Site Details

The community occurs on private and public lands, across a range of land tenures, land uses and management regimes. 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, 2010).

BENCHMARK CRITERIA

Very little published material is available as to the benchmarks that define condition of this community other than the EPBC criteria. These criteria primarily assess the condition as a measure of species diversity. EPBC listed Iron-Grass NTG subjected to ongoing grazing pressure, can realistically only be defined by surrounding vegetation onsite by way of a reference site.

Goals for successful rehabilitation

Site specific goals for the successful rehabilitation of the grassland community are determined by using 'reference sites' as a benchmark for annual measuring and monitoring.

Lomandra ssp. and key perennial shrub species density

Due to the nature of the disturbance, *Lomandra* ssp. (Iron-grass) and other key perennial species can be replanted at densities which are consistent with surrounding areas. This can be assessed by undertaking a point centered quarter survey to gain the density and composition of a given species (Bonham 1989). This method can be undertaken along a linear transect at regular intervals that avoid counting the same individual more than once (Mitchell 2007). A one hundred metre transect with 5 intervals would be suitable for this stratum. This method will also act as the basis for evaluating the trends in rehabilitation over time enabling a quantitative analysis to assess the community against the target values obtained from the reference site community.

Key species which are suitable for individual assessment of density and subsequent replanting are listed below in Table 1. Excluding *Lomandra multiflora* subsp. *Dura,* the other species listed are generally not known to be difficult to propagate from seed.

Table 1. Key perennial species for tube stock plantings.

Family	Species	Common name
COMPOSITAE	*Lomandra multiflora* subsp. *dura*	Hard Mat Rush*
CARRYOPHYLLACEAE	*Scleranthus pungens*	Prickly knawel
RHAMNACEAE	*Cryptandra amara*	Long Flowered Cryptandra
LEGUMINOSAE	*Eutaxia microphylla*	Common Eutaxia

* Lomandra species sometimes difficult to propagate

Perennial grass and forbs

Species listed in Table 2 are those which will be measured against the reference site target values and presented as a percentage of the total grass tussocks present. Seed will be collected from all species and will be planted using a direct seeding method within the Iron-Grass NTG rehabilitation areas. The grass species listed in Table 2 are all known to be successful revegetation species.

Table 2. Species for direct seeding works.

Family	Species	Common name
GRAMINEAE	*Austrostipa spp.*	Spear Grass
	Aristida behriana	Brush Three Awn
	Rhytidosporum spp.	Wallaby Grass
COMPOSITAE	*Vittadinia gracilis*	Woolly New Holland Daisy
	Vittadinia blackii	Western New Holland Daisy

Monitoring

Ongoing monitoring of the re-vegetated areas, as well as the reference sites, using the 'centered point quarter' method will allow for tracking of tussock density for the range of species selected during the initial baseline survey. Together with qualitative data from photo points this will provide a measure of success for rehabilitation of the *Lomandra* ssp. stratum. Annual monitoring of these should be sufficient to gain a long term view of overall success of each site, providing data to facilitate ongoing replacement of lost revegetated individuals until the required densities are met. It is anticipated that reinstated areas will take 5 -10 years to be restored to original condition, however the active management phase is planned for a 4 year period.

Restoration of the tussock density is important in forming a functional landscape that is indicated by;

- Lack of sheeting and movement of resources down a gradient
- Even distribution of water diversions and flow regulation to store moisture in the topsoil zone such as grass tussocks, soil crusts and organic matter
- Microbial activity

(Tongway & Ludwig 2011)

REVEGETATION

As part of overall planning, the revegetation success of the grasslands is partly reliant upon the timing of works to be conducted. Native species are often slow growing and are easily outcompeted for resources by exotic species. Timing of planting to allow the success of indigenous species is perhaps the most important factor. Many of the native grass species perform at their best during the warm season, as opposed to annual exotic species which flourish in the winter when soil moisture is highest. Allowing the native species to establish prior to the growing season is also critical to allow them to survive the driest summer period.

Pre-construction

Several factors need consideration prior to construction being undertaken. Prior to installation of wind farm infrastructure seed sourcing, viability testing and stripping of the top soil is recommended.

Seed sourcing and seedling production

Seed for the re-vegetation is best sourced using indigenous species with local provenance, as these are adapted to the conditions which exist onsite. Plants have adapted on this site to live in extremely shallow soils with low nutritional value and poor availability of resources. Unfortunately, the viability of seed from these species is not high with germination rates often as low as 10%. Prior to any other activities, accessing seed from local species for direct seeding, should be first tested for viability. This will assist in ascertaining the required quantity of seed required to successfully reach germination rates and required plants per hectare.

Lomandra multiflora ssp. *dura* is known to be difficult to germinate from seed, however seedlings can be sourced from organisations such as State Flora for revegetation projects.

Collection of seed for other native species needs to be undertaken for both direct seeding and tubestock seedlings. Timing is crucial to getting the seed at full maturity while not shedding the seed to the ground. This period may change sporadically with seasonal changes.

Native species can grow very slowly and this is particularly true with *Lomandra, Cryptandra* and *Scleranthus* species. A suitable length of time is required to establish tube stock plants and enable the best chance of survival for these.

Soil bank stripping and stockpiling

Due to the prevalence of herbaceous species in the understorey at this site it is recommended to strip the top soil at a depth of 100-150 mm where possible.

Stockpiling and the subsequent reapplication of the topsoil, allows for planting conditions that are closer to the pre-disturbance condition than planting on the subsoil layers that remain (Strohmeyer 1999).

This soil carries seed from indigenous and exotic species but due to the diversity and seasonal fluctuation of species such as *Stackhousia, Convolvulus, Rhodanthe*, etc. these species need to be given the potential to re-establish on the bare earth area. The rocky nature of the site may present difficulties in stripping soil at an even depth so it is recommended that pre-ripping with a grader or similar is conducted at the required depth. This will serve two purposes, one is that an even depth of soil rock mix can be removed and stockpiled at an adjacent area dominated by exotic cover. The second reason is that this will give a finer mix which will give a suitable soil bed mix that will ensure good contact with the seed and soil in the follow up replacement and direct seeding of perennial species.

The stockpiles should be placed in rows at heights not exceeding one metre to reduce the amount of compaction, loss of mycorrhizal soil fungi and creation of anaerobic conditions due to increased water holding capacity (Strohmeyer 1999).

Post construction

Re-laying stockpile

Following installation of wind farm infrastructure, the seedbed needs to be smoothed back to original contours. The relaying of the stockpile soil can be leveled back to the same depth as taken out, and smoothed to reduce the visual aspect of any windrows or changes in level. Harrowing of this seed bed to a fine tilth may be required to provide good contact between soil and seed which will increase germination success and provide a better planting medium for tubestock.

Direct seeding

Following the adequate preparation of the seedbed direct seeding of the species noted in Table 2 can be applied. This will be a mix of Monocots (Grasses) and Dicots (Herbaceous species). Monocot seeding would include both C3 (*Austrostipa*, *Rhytidosporum*) and C4 (*Aristida*) grasses. The premium sowing time is early autumn after the summer heat has diminished (i.e. late April early June). The C4 warm season growth phase species *Aristida behriana* will have seed remain in the soil until the warmer season before germinating.

Tubestock planting

Tubestock is required to be planted from seed collected onsite and grown at a nursery with experience in these types of species.

Revegetation plantings will occur in late autumn or early winter after suitable rainfall has occurred. A planting bowl is prepared using an auger that will hold approximately 10 litres of water. Fertilizer and soil additive are then added prior to the plant being planted.

Maintenance and pest control

Bushcare work within areas of native vegetation is aimed at reducing invasive weed species and their impact on native vegetation. It will potentially include targeted herbicide spraying, hand weeding in

sensitive areas, brushcutting, and cutting of woody weeds. Combining of the seed mix does present the problem of not being able to use selective herbicides to target species which will germinate naturally following seeding. Selective spot spraying of species such as *Echium plantagineum* (Salvation Jane) will be required to ensure these do not cover ground spaces for germinating native species.

At least one or both of the common white snail (*Cernuella virgata*) and white Italian snail (*Theba pisana*) are present at this site. Snail control may not be required following field experiments in the Murray region which gave evidence that this species is too mobile to get any real control and that trial plots that had been baited showed no difference in abundance of seedlings (Linke & New 2007).

Grazing regimes where possible should be restricted for the first three months as a minimum in the revegetated area. This will allow the establishment of most species prior to the warmer spring growing season. Where possible, fencing may need to be installed to reduce the ability of stock and native grazing species which will selectively graze young native grasses and seedlings.

TIMING OF MANAGEMENT PHASES

Table 3 summarises the timing of management phases over a four year period.

Table 3. Timing of management phases.

Activity	Details	Timing	Comment
Year 1, Site preparation			
Seed collection, Lomandra and Key perennials	Collect seed in autumn for planting at later date.	April -October	Flowering into winter seed collection can take place once seed hardens
Undertake centre point quarter assessment and photo points	Select reference sites for quantitative data. Can also use these as photo points.	July - August	Get an accurate representation of density of perennial species for tube stock plantings and direct seeding.
Seed collection Direct seeding species	All perennial grasses and Vittadinia will have seed ready around late October onwards	October – January the following year	Collect from as many different grass types as possible at differing times to ensure best mix.
Viability testing of seed	Start trials of seed propagation to ensure viability of direct seeded materials	December – March the following year	Testing will give indication of seeding rates per hectare required
Year 2 : Site preparation & direct seeding			
Plant Supply	Order 2013 plants (primarily for nodes)	Jan-march	
Ripping of top soil layer and stockpiling	100-150mm depth rip and scrape of top soil for stockpiling at other area	Feb - March	Stockpile in low berms 1m or less high
Works undertaken	Installation of wind farm infrastructure	April	
Direct seeding	Direct Seed	May / June	Direct seed C3 and C4 grasses
Planting	Tubestock, perennial species	June / July	create planting bowls
Spot spraying	Spraying of weed species which have germinated following direct seeding	August - November	
Year 3 & 4 Maintain direct seeding and plant additional nodes and infill species			
Plant Supply	Order infill and node plants	Jan	
Planting	Plant nodes and infill plants.	June / July	create planting bowls
Slashing	Slash direct seeded areas	September / October	
Spot spraying	Spot spray perennial broadleaf and grasses	Ongoing	
Monitoring	Assess density of individuals against a reference area.	November	

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EBS Ecology
125 Hayward Avenue
Torrensville, SA 5031
www.ebsecology.com.au
t. 08 7127 5607