Environmental Management Plan Outline

Chalumbin Wind Farm

Prepared for:
Chalumbin Wind Farm Pty Ltd

March 2022

Document Information

DOCUMENT	Environmental Management Plan Outline
ATTEXO REF	EPU-004
DATE	4-03-2022
PREPARED BY	Shahn Nestor, Senior Consultant
REVIEWED BY	Chris Cantwell, Principal Consultant

Quality Information

REVISION	DATE	DETAILS	AUTHORISATION	
			Name/Position	Signature
A	03-02-2022	Draft for review		
0	04-03-2022	Final	Chris Cantwell Partner & Principal Consultant, CEnvP	

Prepared for:
Chalumbin Wind Farm Pty Ltd

Prepared by:
Attexo Group Pty Ltd
attexo.com.au
ABN 75 637 138 008

Contents

List of tables

1.0 Introduction

This Environmental Management Plan Outline (Plan) has been prepared to support the Public Environmental Report (PER) for the Chalumbin Wind Farm Project (the Project) and should be read in conjunction with the PER. Specifically, this Plan addresses section 7.2.1 of the *Guidelines for the Content of a Draft Public Environmental Report: Chalumbin Wind Farm, near Ravenshoe, Queensland (reference: 2021/8983)* (PER Guidelines), issued by the Department of Agriculture, Water and the Environment (DAWE) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), which relates to the development of a detailed outline of Environmental Management Plans (EMPs) to be prepared for the Project.

Section 7.2.1 of the PER Guidelines requires:

> *A detailed outline of an Environmental Management Plan (EMP) that sets out the framework for management, mitigation and monitoring of relevant impacts of the action, including any provision for independent environmental auditing.*
>
> *The EMP needs to address the project phases (construction, operation, decommission) separately. It must state the environmental objectives, performance criteria, monitoring, reporting, corrective action, responsibility and timing for each environmental issue.*
>
> *The EMP should also describe contingencies for events such as failure of sewerage systems and heavy or prolonged rainfall.*
>
> *In the construction phase of the EMP, include management around dust suppression and enforcement of reduced construction zone vehicle speeds.*

This Plan is not intended as an EMP for implementation purposes, nor as a stand-alone report, and therefore does not:

- describe the Project (a comprehensive Project description is provided within section 2.0 of the PER).
- describe the proposed Project construction works (a description of the proposed construction activities is provided within section 2.3 of the PER).
- provide a detailed analysis of aspects and impacts associated with Matters of National Environmental Significance (this analysis is provided within sections 4.0 and 5.0 of the PER).
- identify mitigation and management measures beyond those specifically requested for inclusion by DAWE (the proposed safeguards and mitigation measures are provided within section 6.0 of the PER).

If the Project is approved, subsequent construction EMPs will be developed for implementation in line with this Plan.

1.1 Definitions

The terms and acronyms used within this document are defined in **Table 1.1**.

Table 1.1 Definitions

Term / acronym	Meaning
Attexo	Attexo Group Pty. Ltd.
Approvals	Any approval or agreement, including any amendments, for the Project pursuant to the *Environment Protection and Biodiversity Conservation Act 1999 (Cwth),* the *Aboriginal Cultural Heritage Act 2003 (Qld)* or the *Planning Act 2016 (Qld).*
BBMP	Bird and Bat Management Plan
BoM	Bureau of Meteorology
BPEM	Best Practice Erosion and Sediment Control Manual 2008
CEMP	Construction Environmental Management Plan
Construction Contractor	The contractor appointed by the Project Owner to construct the Project
CWF	Chalumbin Wind Farm Pty. Ltd.
DAF	Queensland Department of Agriculture and Fisheries
DAWE	Commonwealth Department of Agriculture, Water and the Environment
EMP	Environmental Management Plan
EMS	Environmental Management System
EP Act 1994	*Queensland Environmental Protection Act 1994*
EPBC Act	*Commonwealth Environment Protection and Biodiversity Conservation Act 1999*
ESC	Erosion and Sediment Control
ESCP	Erosion and Sediment Control Plan
IECA	International Erosion Control Association
IECA 2008 BPESC Standard	IECA 2008 Best Practice Erosion and Sediment Control Standard
MNES	Matters of National Environmental Significance
OEMP	Operations Environmental Management Plan
PER	Public Environment Report
PER Guidelines	Guidelines for the Content of a Draft Public Environmental Report: Chalumbin Wind Farm, near Ravenshoe, Queensland (reference: 2021/8983)

Term / acronym	Meaning
Project area	Refers to the entire area of the land parcels within which the Project is located and excluding any part of the Wet Tropics of Queensland World Heritage Area
Project footprint	Refers to the maximum area potentially disturbed by construction of the Project within the Project area in accordance with the Approvals
Project Operator	The contractor appointed by the Project Owner to operate and maintain the Project
Project Owner	Chalumbin Wind Farm Pty Ltd
Regulatory Requirements	Any approvals, authorisations, permits, permissions or legislative requirements necessary for the construction, operation, maintenance and decommissioning of the Project under any Commonwealth, Queensland or Queensland Local Government Law other than the Approvals.
State Code 23	Queensland State code 23: Wind farm development (and associated Planning Guideline)
The Project	The Chalumbin Wind Farm Project
WTG	Wind Turbine Generator
WTQWHA	Wet Tropics of Queensland World Heritage Area

2.0 Construction environmental management plan outline

This section outlines the environmental management framework that will underpin the mitigation and management of potential impacts on Matters of National Environmental Significant (MNES) identified for the Project construction phase. This framework will inform the development and implementation of Construction Environmental Management Plans (CEMPs). Project CEMPs will also be required to adopt all specific measures identified within section 6.0 of the Project PER to avoid, mitigate and manage potential impacts to MNES relevant to construction works.

2.1 Environmental management systems

Project construction works will be undertaken under the Construction Contractor's management systems which, as a minimum, will comprise:

- A corporate **policy** which demonstrates a commitment to responsible environmental management.
- A corporate **environmental management system** currently certified to, or able to be certified to, AS14001:2015 (or later).
- Clearly defined **roles and responsibilities** for personnel regarding environmental management.
- Provision for the appropriate **induction and training** of personnel.
- Identification, allocation and maintenance of **appropriate resourcing**, being sufficient and suitably qualified environmental management personnel, to manage construction, operational and environmental risk in accordance with Approvals and Regulatory Requirements.
- **Monitoring and auditing** programs to assess compliance with procedures and the achievement of objectives.
- Provisions for **continual review and improvement** of environmental performance.
- A system of **reporting** for recording data and notification of relevant personnel.
- Processes for document and records management.

Chalumbin Wind Farm Pty Ltd (the Project Owner) will ensure that the successful contractor has robust systems in place for environmental management as part of the contractor selection process.

2.2 Roles and responsibilities

General roles and responsibilities relating to construction environmental management are described in **Table 2.1**. Responsibilities for monitoring, reporting and are identified within the threat management criteria tables provided in **Section 2.3.**

Table 2.1 Project construction environmental responsibilities

Role	Responsibilities
Project Owner	▪ Ensure that final Project design is in line with that which was considered during environmental studies and regulatory assessments. ▪ Ensure that all relevant approvals requirements: - Are communicated to construction contractors; - Are sufficiently addressed by construction tenders / bids; and - Are contractually binding.

Role	Responsibilities
	▪ Approve construction contractor management plans prior to commencement of works to ensure that they achieve or exceed Project environmental objectives and Approval and Regulatory Requirements. ▪ Undertake regular assurance activities, including auditing, to ensure that construction environmental management is being undertaken by the Construction Contractor in line with Project standards.
Construction Contractor	▪ Ensure that adequate processes, plans and procedures are in place to manage potential environmental impacts in line with Project standards. ▪ Develop and maintain CEMPs, Erosion and Sediment Control Plans (ESCPs) and all other plans as required to achieve Project construction environmental management requirements. ▪ Develop and implement an environmental assurance program, maintain associated records, and initiate improvement actions as required. ▪ Establish, monitor, maintain and audit effective environmental controls onsite. ▪ Allocate sufficient resources for environmental management. ▪ Respond to, report and investigate environmental incidents as appropriate and identify corrective actions to prevent reoccurrence. ▪ Ensure that reportable environmental incidents are communicated to the Project Owner and the relevant regulatory authority. ▪ Ensure that sufficient training is provided to construction personnel to achieve awareness of environmental management requirements. ▪ Develop and implement site rehabilitation plans.

2.3 Threat management criteria

The following sections determine the criteria to be adopted by Project CEMPs for each of the MNES issues identified for the Project.

2.3.1 Habitat loss and fragmentation

The management criteria to be adopted by CEMPs for the Project to minimise vegetation clearing and mitigate habitat fragmentation are identified in **Table 2.2**. Potential non-conformances and unplanned events involving habitat loss and fragmentation, and corrective actions identified to respond to these events, are identified in **Table 2.3.**

Table 2.2 Management criteria for habitat loss and fragmentation

Item	Details
Threat timing:	Vegetation clearing – from commencement of works and progressively throughout construction, finishing ahead of civil works.
Objectives:	▪ Zero instances of vegetation clearing beyond the approved Project footprint in accordance with the Approvals.

Item	Details	
	▪ Vegetation clearing within the Project footprint is limited to the minimum required for construction. ▪ Areas of temporary disturbance are progressively rehabilitated as they become redundant throughout the construction phase. ▪ All cleared areas beyond those required for operations are rehabilitated upon completion of construction.	
Performance criteria:	▪ All vegetation clearing is limited to the approved Project footprint. ▪ The vegetation clearing extent within the Project footprint is defined and limited to the minimum required for wind farm construction and commissioning. ▪ The construction schedule provides for sequential vegetation clearing and progressive rehabilitation. ▪ Sequential vegetation clearing and progressive rehabilitation is undertaken as per the construction schedule. ▪ Measures to minimise vegetation clearing are identified within the CEMP. ▪ Revegetation is undertaken as directed by Project specific rehabilitation plans, and as generally described in section 7.0 of the PER.	
Monitoring:	Project Owner	▪ Review incident reports provided by the construction Contractor and remain abreast of corrective action implementation. ▪ Monthly oversight of vegetation clearing and revegetation works via review of Contractor reports and use available aerial photography or satellite imagery. ▪ Minimum quarterly site inspections, to assesses construction Contractor compliance with vegetation clearing restrictions and implementation of corrective actions identified to address non-conformances. ▪ Annual audits of construction Contractor environmental performance by a suitably experienced, independent auditor.
	Construction Contractor	▪ Weekly monitoring of vegetation clearing underway, which specifically assesses adherence to vegetation clearing restrictions. ▪ Weekly monitoring of rehabilitation works underway, to assess outcomes against rehabilitation plan objectives.
Reporting:	Project Owner	▪ Project level regulatory reporting as per legislative requirements and permit conditions.
	Construction Contractor	▪ Regulatory reporting as per legislative requirements and permit conditions at the works / secondary permit level as agreed with the Project Owner. ▪ Any instances of over clearing are logged within incident management systems and reported to the Project Owner within 24 hours. ▪ Monthly reports are submitted to the Project Owner which: - Communicate the findings of weekly monitoring undertaken. - State the total area of vegetation cleared during the reporting period. - Describe rehabilitation undertaken during the reporting period. - List all environmental incidents that have occurred during the period.

Item	Details	
		- Provide details of incident investigation findings and corrective actions identified to prevent reoccurrence. - Provide progress updates regarding the implementation of corrective actions through to their completion.

Table 2.3 Habitat loss and fragmentation corrective actions.

Scenario	Corrective action
Vegetation clearing extends beyond the approved Project footprint.	▪ Stop work at that location. ▪ Physically mark the intended clearing extent. ▪ Immediately stabilise disturbed soils. ▪ Rehabilitate the disturbed area.
Vegetation clearing does not proceed sequentially or progressively.	▪ Adjust vegetation clearing processes and timing to align with the proposed sequential and progressive clearing practices.
Progressive rehabilitation falls behind schedule.	▪ Stabilise disturbed soils and increase weed control effort within rehabilitation areas in the short term. ▪ Take steps to prevent further disturbance of the area. ▪ Increase rehabilitation effort to meet the schedule.

2.3.2 Physical interference with MNES fauna

The management criteria to be adopted by CEMPs for the Project to minimise MNES fauna injury and mortality are identified in **Table 2.4**. Corrective actions for occurrences that involve, or may lead to, direct physical harm to MNES fauna are identified in **Table 2.5.**

Table 2.4 Management criteria for physical interference with MNES fauna

Item	Details
Threat timing:	▪ Vehicle impact – early works through to operations. ▪ Vegetation clearing – early works and progressively throughout construction, finishing ahead of civil works. ▪ Excavation – throughout construction.
Objectives:	▪ Harm to MNES fauna is avoided in the first instance. ▪ In the event of impact, harm is minimised through effective response.
Performance criteria:	▪ Pre-clearance fauna surveys are undertaken within all nominated areas. ▪ All controls identified by the Project Threatened Species Management Plan and Species Management Program are implemented.

Item	Details	
	▪ All incidences of harm to MNES fauna are investigated and measures adopted to prevent reoccurrence of similar events. ▪ All injured fauna are assessed by fauna spotter catchers and either treated onsite or transported to a local vet or wildlife carer as appropriate.	
Monitoring:	Project Owner	▪ Review incident reports provided by the construction Contractor and remain abreast of corrective action implementation. ▪ Review of monthly reports provided by the construction Contractor. ▪ Minimum quarterly site inspections, to assesses construction Contractor compliance with management measures identified to prevent physical harm to fauna. ▪ Annual audits of construction Contractor environmental performance by a suitably experienced, independent auditor.
	Construction Contractor	▪ Weekly monitoring of activities with the potential to cause physical harm to fauna to assess the implementation and effectiveness of control measures. ▪ Opportunistic monitoring of vehicle speeds, vegetation clearing protocols and the treatment of excavations by the construction Management Team whilst undertaking routine work.
Reporting:	Project Owner	▪ Project level regulatory reporting as per legislative requirements and permit conditions.
	Construction Contractor	▪ Regulatory reporting as per legislative requirements and permit conditions at the works / secondary permit level as agreed with the Project Owner. ▪ Events involving physical harm to fauna caused by construction activities are logged within incident management systems and reported to the Project Owner within 24 hours. ▪ Potential hazards to fauna identified by Project personnel throughout construction, that have not previously been addressed, are logged according to the hazard identification process in place. ▪ Monthly reports are submitted to the Project Owner which: - Communicate the findings of weekly monitoring undertaken. - List new potential hazards to fauna identified during the reporting period and controls implemented to remove or mitigate the threat. - List all environmental incidents that have occurred during the period. - Provide details of incident investigation findings and corrective actions identified to prevent reoccurrence. - Provide progress updates regarding the implementation of corrective actions through to completion.

Table 2.5 Physical fauna impact corrective actions

Scenario	Corrective action
Pre-clearance surveys are not undertaken prior to commencement of vegetation works within MNES habitat.	▪ Stop work immediately and complete pre-clearance surveys. ▪ Recommence work once surveys have been completed following direction provided by fauna spotter catchers.
Controls identified within management plans to prevent physical harm to fauna are not fully implemented.	▪ Adjust work practices to implement controls. ▪ Ensure controls are adequately communicated to relevant personnel.
Harm to fauna occurs during vegetation clearing.	▪ Fauna spotter catcher to assess the animal, determine required treatment and transfer the individual to a vet or wildlife carer if required. ▪ Review management controls for adequacy and adjust or introduce new controls to prevent reoccurrence.
Harm to fauna is caused by vehicle collision.	▪ Fauna spotter catcher to assess the animal, determine required treatment and transfer the individual to a vet or wildlife carer if required. ▪ Assess speed limits, visibility, driver fatigue and other factors that may have led to the event and treat hazards as required to prevent reoccurrence.

2.3.3 Light, noise and vibrations

The management criteria to be adopted by CEMPs for the Project to minimise disturbance to fauna resulting from light, noise and vibrations are identified in **Table 2.6**. Corrective actions for occurrences that may lead to fauna disturbance are identified in **Table 2.7.**

Table 2.6 Management criteria for light, noise and vibrations

Item	Details
Threat timing:	▪ Lighting at site construction facilities - early works through to commissioning, most prominent during peak construction. ▪ Vehicles, machinery and equipment - throughout the construction period. ▪ Blasting – may occur at any time throughout construction.
Objective:	▪ Minimise disturbance to fauna caused by construction lighting, noise and vibrations.
Performance criteria:	▪ All reasonable and practical measures to avoid or minimise environmental harm are taken. ▪ Noise limits imposed by local laws are identified within the CEMP and abided. ▪ Compliance with the default noise standards for building work as stated within section 440R of the QLD EP Act 1994 and out of hours work protocols established by the CEMP in consultation with local Council.

Item	Details	
	▪ The release of sound to the environment from Project works is managed so that adverse effects on environmental values, including health and wellbeing and sensitive ecosystems, are prevented or minimised.	
Monitoring:	Project Owner	▪ Review incident reports provided by the Construction Contractor and remain abreast of corrective action implementation. ▪ Review of monthly reports provided by the Construction Contractor. ▪ Minimum quarterly site inspections, to assesses the implementation of controls identified to minimise noise and vibrations and the achievement of performance criteria. ▪ Annual audits of Construction Contractor environmental performance by a suitably experienced, independent auditor.
	Construction Contractor	▪ Monitoring of lighting at site facilities during housekeeping checks to identify light spill. ▪ Random checks of vehicle and machinery maintenance logs during weekly environmental inspections. ▪ Review and inspection prior to blasting activities to determine the risk of fauna disturbance on a site-specific basis. ▪ Opportunistic monitoring of light usage and the generation of noise and vibrations by the construction Management Team whilst undertaking routine work.
Reporting:	Project Owner	▪ Project level regulatory reporting as per legislative requirements and permit conditions.
	Construction Contractor	▪ Regulatory reporting as per legislative requirements and permit conditions at the works / secondary permit level as agreed with the Project Owner. ▪ Events involving the disturbance of fauna caused by light, noise and / or vibrations are logged within incident management systems and reported to the Project Owner within 24 hours. ▪ Monthly reports are submitted to the Project Owner which: - Communicate the findings of weekly monitoring undertaken. - List all environmental incidents that have occurred during the period. - Provide details of incident investigation findings and corrective actions identified to prevent reoccurrence. - Provide progress updates regarding the implementation of corrective actions through to completion.

Table 2.7 Light noise and vibrations corrective actions

Scenario	Corrective action
Construction noise and / or vibrations exceed acceptable thresholds identified by the CEMP.	▪ Undertake maintenance of plant or revise construction method to comply with thresholds.

Scenario	Corrective action
Light spill beyond specific areas where required for safety is identified during housekeeping inspections.	▪ Redirect lights or install light shields as appropriate to limit light to required areas.

2.3.4 Dust

Dust minimisation and suppression techniques applied during construction will comprise the application of water, soil binders and the reduction of vehicle speeds within dust prone areas as a minimum. Dust generating activities may also be limited during windy conditions where suppression techniques are insufficient to prevent harm to MNES. The implementation of dust controls will be as described within CEMPs and ESCPs.

The management criteria to be adopted by CEMPs for the Project to minimise dust impacts are identified in **Table 2.8**. Corrective actions for failures to adequately manage dust are identified in **Table 2.9.**

Table 2.8 Management criteria for dust.

Item	Details	
Threat timing:	▪ Vehicle movement – early works through to completion of construction. ▪ Earthworks – throughout construction. ▪ Blasting – may occur at any time throughout construction.	
Objective:	▪ Minimise harm to the environment caused by dust.	
Performance criteria:	▪ All reasonable and practicable measures to avoid or minimise environmental harm are taken. ▪ All vehicles abide by nominated speed limits at all times. ▪ Land clearing restrictions and site stabilisation timeframes identified by construction ESCPs are met. ▪ The release of dust to the atmosphere is managed to prevent or minimise adverse effects on environmental values.	
Monitoring:	Project Owner	▪ Review incident reports provided by the construction Contractor and remain abreast of corrective action implementation. ▪ Review of monthly reports provided by the construction Contractor. ▪ Minimum quarterly site inspections, to assesses the implementation and effectiveness of dust controls. ▪ Annual audits of construction Contractor environmental performance by a suitably experienced, independent auditor.
	Construction Contractor	▪ Monitoring of dust generation during weekly environmental inspections. ▪ Dust monitoring during blasting activities by blast crews. ▪ Opportunistic monitoring of dust generation and vehicle speeds by the construction Management Team whilst traversing the wind farm for routine work.
Reporting:	Project Owner	▪ Project level regulatory reporting as per legislative requirements and permit conditions.

Item	Details	
	Construction Contractor	▪ Regulatory reporting as per legislative requirements and permit conditions at the works / secondary permit level as agreed with the Project Owner. ▪ Events involving harm to flora and / or fauna due to excessive dust are logged within incident management systems and reported to the Project Owner within 24 hours. ▪ Monthly reports are submitted to the Project Owner which: - Communicate the findings of weekly monitoring undertaken. - List all environmental incidents that have occurred during the period. - Provide details of incident investigation findings and corrective actions identified to prevent reoccurrence. - Provide progress updates regarding the implementation of corrective actions through to completion.

Table 2.9 Dust corrective actions

Scenario	Corrective action
Dust generation resulting in impacts to MNES.	▪ Increase use of dust suppressants such as water and / or soil binders. ▪ Review speed limits on construction access tracks and reduce if beneficial for reducing dust.

2.3.5 Soil erosion and sedimentation

Soil erosion and sediment control (ESC) standards for construction are addressed in section 6.2.7 of the PER and the associated Sediment and Erosion Management Plan provided as an attachment to the PER. ESCPs for Project construction will be developed in line with the International Erosion and Sediment Control Association (IECA) Australasia Best Practice Erosion and Sediment Control Manual 2008 (IECA 2008 BPESC Standard). The IECA 2008 BPESC Standard bases the design of erosion, sediment and drainage controls on a nominated rainfall event, which is determined based on historical rainfall averages. Where rainfall received exceeds the design rainfall event, the capacity of controls may be exceeded resulting in sediment release.

The installation of erosion and sediment controls to cater for any potential rainfall event is not feasible, nor is it required by the IECA 2008 BPESC standard. Notwithstanding, to account for heavy or prolonged rainfall significantly above historical rainfall averages:

- Weather conditions will be monitored on a daily basis and wet weather preparedness maintained as determined by Project ESCPs.
- Bureau of Meteorology (BoM) climate outlooks will be monitored throughout construction to determine the likelihood of rainfall conditions significantly exceeding historical averages (i.e. such as due to a La Nina weather pattern, as opposed to rainfall generated by an isolated weather system).
- Where prevailing atmospheric conditions lend themselves to a particularly heavy wet season, the ESCP design rainfall event will be revised, and controls amended as appropriate to accommodate the increased risk.

The management criteria for soil erosion and sedimentation are provided in **Table 2.10**. Corrective actions for failures to adequately management soil erosion and prevent sediment transport off-site are identified in **Table 2.11.**

Table 2.10 Management criteria for soil erosion and sedimentation

Item	Details	
Threat timing:	▪ Earthworks (primary threat) – throughout construction. ▪ Vehicle movement – pre-construction through to operations. ▪ Blasting – may occur at any time throughout construction.	
Objective:	▪ Prevent impacts to watercourses and wetlands resulting from sediment release.	
Performance criteria:	▪ Erosion and sediment control meets the IECA 2008 BPESC Standard. ▪ The construction site is managed so that there are no actual or potential discharges of sediment from site that may cause adverse effects to watercourses or wetlands.	
Monitoring:	Project Owner	▪ Review incident reports provided by the construction Contractor and remain abreast of corrective action implementation. ▪ Review of monthly reports provided by the construction Contractor. ▪ Minimum quarterly site inspections, to assesses the implementation and effectiveness of soil erosion and sediment controls. ▪ Annual audits of construction Contractor environmental performance by a suitably experienced, independent auditor.
	Construction Contractor	▪ Monitoring of soil erosion and sediment controls as required by construction ESCPs. ▪ Opportunistic monitoring of erosion and sediment controls the construction Management Team whilst traversing the wind farm for routine work.
Reporting:	Project Owner	▪ Project level regulatory reporting as per legislative requirements and permit conditions.
	Construction Contractor	▪ Regulatory reporting as per legislative requirements and permit conditions at the works / secondary permit level as agreed with the Project Owner. ▪ Failures to meet ESCP objectives are logged within incident management systems and reported to the Project Owner within 24 hours. ▪ Monthly reports are submitted to the Project Owner which: - Communicate the findings of weekly monitoring undertaken. - List incidents that have occurred during the period. - Provide details of incident investigation findings and corrective actions identified to prevent reoccurrence. - Provide progress updates regarding the implementation of corrective actions through to completion. - Contain latest versions of construction ESCPs.

Table 2.11 ESC corrective actions

Scenario	Corrective action
One-off sediment release due to inadequate or poorly positioned ESC controls.	▪ Adjust controls and update ESCP as required to meet ESC objectives.

Scenario	Corrective action
Continued sediment releases over consecutive rainfall events.	▪ Seek expert advice from a Certified Professional in Erosion and Sediment Control (CPESC). ▪ Revise the ESCP and implement new / additional controls as advised.
Sediment release due to heavy or prolonged rainfall which is beyond the ESCP design rainfall event.	▪ Install additional temporary erosion, drainage and sediment controls to prevent further sediment loss in the short term. ▪ Review BoM climate outlooks to determine likelihood of prolonged rainfall conditions above historical averages. ▪ If BoM outlooks predict above average rainfall for an extended period (such as due to a La Nina weather pattern, as opposed to rainfall generated by an isolated weather system) revisit the design rainfall event used to develop the construction ESCP, update and implement the plan in line with expected conditions.

2.3.6 Hazardous substances

Management criteria for the transport, storage and handling of hazardous substances are outlined in **Table 2.12**. Corrective actions for failures to adequately contain hazardous substances are identified in **Table 2.13.** For the purpose of this Plan, the term "hazardous substance" is used to collectively refer to hazardous chemicals, dangerous goods, regulated waste, waste from ablutions, or any other substance introduced by Project construction that may cause harm to MNES.

Table 2.12 Management criteria for hazardous substances

Item	Details	
Threat timing:	▪ All activities - pre-construction through to completion of commissioning.	
Objective:	▪ Prevent impacts to MNES values resulting from the transport, storage and handling of hazardous substances.	
Performance criteria:	▪ The storage and handling of hazardous chemicals and dangerous goods includes effective means of secondary containment to prevent or minimise releases to the environment from spillage or leaks. ▪ Contingency measures prevent or minimise adverse effects on the environment due loss of containment of hazardous substances. ▪ The transport of hazardous chemicals is as per the *Queensland Work Health and Safety Regulation 2011*. ▪ The transport of Dangerous Goods is as per the current revision of *Australian Code for the Transport of Dangerous Goods by Road and Rail*. ▪ Regulated waste is transported by an appropriately licenced Contractor.	
Monitoring:	Project Owner	▪ Review incident reports provided by the construction Contractor and remain abreast of corrective action implementation. ▪ Review of monthly reports provided by the construction Contractor.

Item	Details	
		▪ Minimum quarterly site inspections, to assesses the implementation and effectiveness of controls intended to prevent the release hazardous substances. ▪ Annual audits of construction works to assess the implementation and adequacy of controls in place to manage hazardous substances by a suitably experienced, independent auditor.
	Construction Contractor	▪ Weekly inspections of hazardous substance management during routine environmental inspections. ▪ Opportunistic monitoring of hazardous substance management measures by the construction Management Team accessing wind farm sites for routine work.
Reporting:	Project Owner	▪ Project level regulatory reporting as per legislative requirements and permit conditions.
	Construction Contractor	▪ Regulatory reporting as per legislative requirements and permit conditions at the works / secondary permit level as agreed with the Project Owner. ▪ Releases of hazardous substances are logged within incident management systems and reported to the Project Owner within 24 hours. ▪ Monthly reports are submitted to the Project Owner which: - Communicate the findings of weekly monitoring undertaken. - List incidents that have occurred during the period. - Provide details of incident investigation findings and corrective actions identified to prevent reoccurrence. - Provide progress updates regarding the implementation of corrective actions through to completion.

Table 2.13 Hazardous substances corrective actions

Scenario	Corrective action
Chemical release due to leak or spill.	▪ Implement chemical spill response procedures. ▪ Contain and dispose of contaminated waste (including impacted soils) via a licensed regulated waste contractor. ▪ Investigate the incident, identify root cause and contributing factors and take action to prevent reoccurrence.
Failure of sewage systems causing unintended release of sewage waste to the environment.	▪ Immediately cease use of facilities linked to the failed system. ▪ As best as possible, without compromising the safety of personnel, contain the release to the smallest area possible. ▪ Engage a specialist contractor to attend site and remediate impacted area. ▪ Investigate the incident, identify root cause and contributing factors and take action to prevent reoccurrence.

2.3.7 Biosecurity

Criteria for the management of biosecurity threats are identified in **Table 2.14**. Corrective actions for pest outbreaks are identified in **Table 2.15.**

Table 2.14 Management criteria for weeds and pest fauna

Item	Details	
Threat timing:	▪ Vehicle movement - pre-construction through to operations. ▪ Earthworks – throughout construction. ▪ Provision of pathways for access by feral animals – early works through to operations.	
Objective:	▪ Prevent impacts to MNES values as a result of the introduction and / or spread of pest plants and animals.	
Performance criteria:	▪ The introduction of new pest plants and animals to the Project site is avoided. ▪ The spread of pre-existing weeds is prevented. ▪ The encroachment of feral animals into new areas is managed to prevent harm to MNES.	
Monitoring:	Project Owner	▪ Review incident reports provided by the construction Contractor and remain abreast of corrective action implementation. ▪ Review of monthly reports provided by the construction Contractor. ▪ Minimum quarterly site inspections, to assesses the implementation and effectiveness of controls intended to prevent the introduction and / or spread of pest species. ▪ Annual audits of construction works to assess the implementation and adequacy of controls in place to manage biosecurity threats by a suitably experienced, independent auditor.
	Construction Contractor	▪ Pre-construction assessment of weeds and pests within the Project footprint. ▪ Occurrences of pest species introduced to the Project area are logged within incident management systems and reported to the Project Owner within 24 hours. ▪ Occurrences of increased pest species presence beyond pre-construction levels are logged within incident management systems and reported to the Project Owner within 24 hours. ▪ Weekly monitoring for weeds and pests within the construction footprint during routine environmental inspections. ▪ Opportunistic monitoring of pest species occurrent by the construction Management Team whilst accessing wind farm sites for routine work.
Reporting:	Project Owner	▪ Project level regulatory reporting as per legislative requirements and permit conditions.
	Construction Contractor	▪ Regulatory reporting as per legislative requirements and permit conditions at the works / secondary permit level as agreed with the Project Owner. ▪ Logged biosecurity incidents are reported to the Project Owner within 24 hours. ▪ Monthly reports are submitted to the Project Owner which:

Item	Details	
		- Communicate the findings of weekly monitoring undertaken. - List incidents that have occurred during the period. - Provide details of incident investigation findings and corrective actions identified to prevent reoccurrence. - Provide progress updates regarding the implementation of corrective actions through to completion.

Table 2.15 Biosecurity corrective actions

Scenario	Corrective action
Introduction of new weeds to the Project area or spread of existing weeds.	▪ Treat weed infestations early and as per Queensland Department of Agriculture and Fisheries (DAF) advice.
Increased presence of pest fauna is observed within Project area.	▪ Engage a suitably experienced subcontractor to undertake feral animal control as per DAF advice.

2.3.8 Bushfire

The management criteria for bushfire are identified in **Table 2.16**. Corrective actions in the instance of a bushfire occurring are identified in **Table 2.17.**

Table 2.16 Management criteria for bushfire

Item	Details	
Threat timing:	▪ Operation of vehicles, machinery and other equipment – pre-construction through to operations. ▪ Storage and handling of flammable materials – pre-construction through to operations. ▪ Hot works – may occur at any time during construction.	
Objective:	▪ Prevent bushfire resulting from construction works.	
Performance criteria:	▪ Zero incidences of bushfire resulting from construction works. ▪ Construction works are undertaken in accordance with the Project Bushfire Management Plan.	
Monitoring:	Project Owner	▪ Review incident reports provided by the construction Contractor and remain abreast of corrective action implementation. ▪ Review of monthly reports provided by the construction Contractor. ▪ Minimum quarterly site inspections, to assesses the implementation and effectiveness of controls implemented to prevent bushfire. ▪ Annual audits of construction works to assess the implementation and adequacy of controls in place to prevent bushfire by a suitably experienced, independent auditor.

Item	Details	
	Construction Contractor	▪ Weekly monitoring for weeds and pests within the construction footprint during routine environmental inspections. ▪ Opportunistic monitoring of bushfire hazards by the construction Management Team whilst accessing wind farm sites for routine work.
Reporting:	Project Owner	▪ Project level regulatory reporting as per legislative requirements and permit conditions.
	Construction Contractor	▪ Regulatory reporting as per legislative requirements and permit conditions at the works / secondary permit level as agreed with the Project Owner. ▪ All bushfire occurrences resulting from Project activities are logged within incident management systems and reported to the Project Owner as soon as possible, and no later than 6 hours from identification. ▪ All bushfire hazards, that have not previously been addressed, are logged according to the hazard identification process in place. ▪ Monthly reports are submitted to the Project Owner which: - Communicate the findings of weekly monitoring undertaken. - List all bushfire related hazards identified during the reporting period. - List all incidents that have occurred during the period. - Provide details of incident investigation findings and corrective actions identified to prevent reoccurrence. - Provide progress updates regarding the implementation of corrective actions through to completion.

Table 2.17 Bushfire corrective actions

Scenario	Corrective action
Fire caused by construction.	▪ Small fires – extinguish using onsite firefighting equipment in accordance with safety procedures. ▪ Larger fires – initiate emergency response procedures and engage external emergency services.
Fire within the Project Area not caused by construction.	▪ Initiate emergency response procedures and engage external emergency services. ▪ Cooperate with external emergency service providers for fire response and follow all direction given.

2.3.9 Construction vehicle activity

Where vehicle activity is identified as a potential threat to MNES, vehicle speed is often a contributing factor. Examples of potential threats that may be exacerbated by vehicle speed include:

- Fauna collision.
- Dust generation.

- Accident whilst transporting hazardous substances causing release to the environment.

Vehicle speed limits will be imposed on construction access tracks during the Project construction phase. Speed limits will be determined based on risks associated with local conditions, prior to commencement of construction. Vehicle speed limits established for environmental protection will be specified within Project CEMPs. Signage identifying speed limits will be placed at the site entrance and other key locations.

3.0 Operations environmental management plan outline

This section outlines the environmental management framework that will underpin the mitigation and management of potential MNES impacts identified for Project operations. This framework will inform the development and implementation of Operations Environmental Management Plans (OEMPs).

OEMPs will also be required to adopt all measures identified within 6.3 of the PER to avoid, mitigate and manage potential impacts to MNES relevant to Project operations.

3.1 Environmental management systems

Site operations will be undertaken under the Operator's management systems which, as a minimum, will comprise:

- A corporate **policy** which demonstrates a commitment to responsible environmental management.
- A corporate **environmental management system** currently certified to, or able to be certified to, AS14001:2015 (or later).
- Clearly defined **roles and responsibilities** for personnel regarding environmental management.
- Provision for the appropriate **induction and training** of personnel.
- Identification, allocation and maintenance of **appropriate resourcing**, being sufficient and suitably qualified environmental management personnel, to manage construction, operational and environmental risk in accordance with Approvals and Regulatory Requirements.
- **Monitoring and auditing** programs to assess compliance with procedures and the achievement of objectives.
- Provisions for **continual review and improvement** of environmental performance.
- A system of **reporting** for recording data and notification of relevant personnel.
- Processes for document and records management.

The Project Owner will ensure that the site Operator has robust systems in place for environmental management as part of the service provider selection process.

3.2 Roles and responsibilities

General roles and responsibilities relating to operations environmental management are described in **Table 3.1**. Responsibilities for monitoring, reporting and corrective actions in relation to the management of specific threats are identified within the threat management criteria tables provided in **Section 3.3.**

Table 3.1 Project Operations Environmental Responsibilities

Role	Responsibilities
Project Owner	▪ Ensure that environmental commitments made during Project approvals processes: - Are communicated to the Project Operator; and - Are captured by Operator procurement documents and selection criteria. ▪ Review Project Operator management plans to ensure that they are sufficient to achieve Project environmental objectives.

Role	Responsibilities
	▪ Undertake assurance activities to ensure that environmental management is being properly undertaken by the Operator.
Project Operator	▪ Ensure that adequate processes, plans and procedures are in place to manage operations environmental impacts in line with Project commitments, legislative requirements and permit conditions. ▪ Develop and maintain OEMPs and other plans as required to guide operations environmental management. ▪ Develop and implement an environmental assurance program, maintain associated records and initiate improvement actions as required. ▪ Establish, monitor and maintain effective environmental controls onsite. ▪ Allocate sufficient resources for environmental management. ▪ Respond to, report and investigate environmental incidents as appropriate and identify corrective actions to prevent reoccurrence. ▪ Ensure that reportable environmental incidents are communicated with the Project Owner and the relevant regulatory authority if required. ▪ Ensure that sufficient training is provided to operations personnel to achieve awareness of environmental management requirements.

3.3 Threat management criteria

3.3.1 Barotrauma and collision risk

Barotrauma and collision with wind farm infrastructure such as turbine blades and electricity transmission lines have been identified as a threat to local birds and bats associated with the operation of the Project. These issues are described in section 5.3.2 of the PER. Management criteria and corrective actions relating to bird and bat impacts are detailed at length within the Project Bird and Bat Management Plan (BBMP) provided as an attachment to the PER. Management requirements identified by the BBMP will be implemented via the OEMPs.

3.3.2 Vehicle strike

The management criteria to be adopted by the Project OEMP to minimise MNES fauna injury and mortality from vehicle strike are identified in **Table 3.4**. Corrective actions for occurrences that involve, or may lead to, direct physical harm to MNES fauna are identified in **Table 3.5.**

Table 3.2 Management Criteria for MNES fauna strike by operational vehicles

Item	Details
Threat timing:	▪ Throughout operations
Objectives:	▪ Harm to MNES fauna is avoided in the first instance. ▪ In the event of impact, harm is minimised through effective response.
Performance criteria:	▪ Operational vehicles observe site speed limits at all times.

Item	Details	
	▪ All vehicle collisions with MNES fauna are reported, investigated and measures adopted to prevent reoccurrence. ▪ All injured fauna are transported to a local vet or wildlife carer for treatment. ▪ All fauna carcasses are recovered and stored as per the Project BBMP.	
Monitoring:	Project Owner	▪ Review incident reports provided by the Operator and remain abreast of corrective action implementation. ▪ Review of annual operational updates provided by the Operator. ▪ Review Operator compliance with OEMP on an annual basis. ▪ Initiate a full audit of Operator environmental management systems and OEMP implementation, by a suitably experienced and independent auditor, at least once within the first two years of contract award (post commissioning) and at least 5-yearly thereafter.
	Project Operator.	▪ Undertake routine monitoring of operational vehicle speeds in line with safety protocols.
Reporting:	Project Owner	▪ Report operational impacts to MNES fauna as per legislative requirements and licence conditions.
	Project Operator.	▪ Regulatory reporting as per legislative requirements and licence conditions at the works / secondary permit level as agreed with the Project Owner. ▪ Events involving physical harm to fauna are logged within incident management systems and reported to the Project Owner within 24 hours. ▪ Include a summary of all vehicle collisions with fauna that occurred during the reporting period within annual operations reports.

Table 3.3 Corrective actions for vehicle impact with MNES fauna

Scenario	Corrective action
Vehicle collision with native fauna.	▪ Stop vehicle and assess fauna injury. - If injury is mild, allow animal to disperse. - If injury is significant, transport animal to a local vet or wildlife carer. - If the injury is fatal, humanely euthanise the injured animal and recover and store the carcass as per the BBMP. ▪ If the vehicle impact is fatal, recover and store the carcass as per the BBMP for use during scavenger surveys.

3.3.3 Noise and light

The management criteria to be adopted by the Project OEMP to minimise operational noise and light disturbance are identified in **Table 3.6**. Corrective actions for specific occurrences that may lead to fauna disturbance are identified in **Table 3.7.**

Table 3.4 Management criteria for operational noise and light generation

Item	Details	
Threat timing:	▪ Throughout Project operations	
Objective:	▪ Minimise disturbance to fauna caused by noise and artificial lighting generated by Project operations.	
Performance criteria:	▪ Operational noise is maintained below the acoustic criteria identified by the *Queensland State code 23: Wind farm development* and the associated *Planning Guideline* (State Code 23). ▪ All infrastructure design specifications adopted to minimise noise and light impacts are maintained. ▪ Night lighting is limited to the minimum required for safety and security. ▪ All lighting is directed at required areas only and light spill beyond these areas is prevented.	
Monitoring:	Project Owner	▪ Initiate and oversee the bird and bat monitoring program specified within the Project BBMP. ▪ Review of bird and bat monitoring outcomes. ▪ Review information provided by the Project Operator pertaining to fauna sightings. ▪ Review incident reports provided by the Operator and remain abreast of corrective action implementation.
	Project Operator	▪ Opportunistic monitoring of native fauna activity during routine operational activities.
Reporting:	Project Owner	▪ Project level regulatory reporting as per legislative requirements and permit conditions.
	Project Operator	▪ Report observations of fauna attraction by site lighting Project owner. ▪ Events involving the disturbance of fauna caused by Project lighting and / or noise are logged within incident management systems and reported to the Project Owner within 24 hours. ▪ Include a summary of fauna impacts due to noise and lighting that occurred during the reporting period within annual operations reports.

Table 3.5 Corrective actions for fauna impacts relating to operational noise and lighting

Scenario	Corrective action
Operational noise generated by the facility exceeds standard thresholds identified by *State Code 23*.	▪ Identify the source and cause of noise exceedance and undertake maintenance on equipment to reduce noise emissions.
Nocturnal MNES fauna are observed congregating at lit Project facilities.	▪ Review lighting requirements at that location and: - Consider alternative safety and security measures that would allow the removal of lighting.

Scenario	Corrective action
	- Consider reducing the intensity and coverage of lighting present. ▪ Seek advice from a fauna specialist if the potential for harm is identified.

3.3.4 Hazardous substances

The use of hazardous substances for windfarm operations has been identified as a potential threat to MNES values. For the purposes of this Plan, the term "hazardous substance" collectively refers to hazardous chemicals, dangerous goods, regulated waste, waste from ablutions, or any other substance introduced by Project operations that may cause harm to MNES.

Management criteria for the transport, storage and handling of hazardous substances are outlined in **Table 3.8**. Corrective actions for failures to adequately contain hazardous substances are identified in **Table 3.9.**

Table 3.6 Management criteria for the operational use of hazardous substances

Item	Details	
Threat timing:	▪ Throughout Project operations.	
Objective:	▪ Prevent impacts to MNES values resulting from the transport, storage and handling of hazardous substances.	
Performance criteria:	▪ The storage and handling of hazardous chemicals and dangerous goods includes effective means of secondary containment to prevent or minimise releases to the environment from spillage or leaks. ▪ Contingency measures prevent or minimise adverse effects on the environment due loss of containment of hazardous substances. ▪ The transport of hazardous chemicals is as per the *Queensland Work Health and Safety Regulation 2011*. ▪ The transport of Dangerous Goods is as per the current revision of *Australian Code for the Transport of Dangerous Goods by Road and Rail*. ▪ Regulated waste is transported by an appropriately licenced Contractor.	
Monitoring:	Project Owner	▪ Review incident reports provided by the Operator and remain abreast of corrective action implementation. ▪ Review of annual operational updates provided by the Operator. ▪ Review Operator compliance with OEMP on an annual basis. ▪ Initiate a full audit of Operator environmental management systems and OEMP implementation, by a suitably experienced auditor, at least once within the first two years of contract award (post commissioning) and at least 5 yearly thereafter.
	Project Operator	▪ Monitor the implementation of hazardous substance controls at the intervals nominated within the OEMP.

Item	Details	
Reporting:	Project Owner	▪ Project level regulatory reporting as per legislative requirements and permit conditions.
	Project Operator	▪ Regulatory reporting as per legislative requirements and permit conditions at the works / secondary permit level as agreed with the Project Owner. ▪ Releases of hazardous substances are logged within incident management systems and reported to the Project Owner within 24 hours. ▪ Provide a summary of all environmental incidents, including chemical spills, that occurred during the reporting period within annual operations reports.

Table 3.7 Corrective actions for incidents involving hazardous substances

Scenario	Corrective action
Chemical release due to a leak or spill.	▪ Implement chemical spill response procedures. ▪ Contain and dispose of contaminated waste (including impacted soils) via a licensed regulated waste contractor. ▪ Investigate the incident, identify the root cause and contributing factors and take action to prevent reoccurrence.
Failure of sewage systems causing unintended release of sewage waste to the environment.	▪ Immediately cease use of facilities linked to failed system. ▪ As best as possible, without compromising the safety of personnel, contain the release to the smallest area possible. ▪ Engage a specialist contractor to attend site and remediate impacted area. ▪ Investigate the incident, identify the root cause and contributing factors and take action to prevent reoccurrence.

3.3.5 Bushfire

Bushfire caused by Project operations has been identified as a potential threat to MNES. Criteria for bushfire management during operations are identified in **Table 3.10**. Corrective actions in the instance of a bushfire occurring are identified in **Table 3.11.**

Table 3.8 Criteria for managing operational bushfire hazards

Item	Details
Threat timing:	▪ Throughout Project operations
Objective:	▪ Prevent bushfire resulting from Project operations.
Performance criteria:	▪ Zero incidences of bushfire resulting from wind farm operations. ▪ The facility is operated in accordance with a Bushfire Management Plan. ▪ Project infrastructure is maintained in line with relevant safety standards.

Item	Details	
Monitoring:	Project Owner	▪ Review incident reports provided by the Operator and remain abreast of corrective action implementation. ▪ Review of annual operational updates provided by the Operator. ▪ Review Operator compliance with OEMP on an annual basis. ▪ Initiate a full audit of Operator environmental management systems and OEMP implementation, by a suitably experienced auditor, at least once within the first two years of contract award (post commissioning) and at least 5 yearly thereafter.
	Project Operator	▪ Monitor the implementation of controls identified to mitigate bushfire risk at the intervals nominated within the OEMP.
Reporting:	Project Owner	▪ Project level regulatory reporting as per legislative requirements and licence conditions.
	Project Operator	▪ Regulatory reporting as per legislative requirements and permit conditions at the works / secondary permit level as agreed with the Project Owner. ▪ All occurrences of fire attributable to facility operations are logged within incident management systems and reported to the Project Owner as soon as possible. ▪ All bushfire hazards, that have not previously been addressed, are logged according to the hazard identification process in place. ▪ Provide a summary of all incidences of fire, that occurred during the reporting period within annual operations reports.

Table 3.9 Corrective actions for fire caused by Project operation

Scenario	Corrective action
Fire caused by operations and / or maintenance activities.	▪ Small fires – extinguish using onsite firefighting equipment in accordance with safety procedures. ▪ Larger fires – initiate emergency response procedures and engage external emergency services.
Fire within the Project Area not caused by operations and / or maintenance activities.	▪ Initiate emergency response procedures and engage external emergency services. ▪ Cooperate with external emergency service providers for fire response and follow all direction given.

4.0 Decommissioning

The initial operational life of the Project is expected to be 30 years. Infrastructure may be repowered with new equipment for a further 30-year operating life. Upon decommissioning, the wind farm site will be rehabilitated to facilitate continuation of the current land use at that time. All above-ground infrastructure will be removed and the land will be rehabilitated in line with development permit conditions and specific landowner agreements. Some infrastructure (such as hardstand areas and access tracks) may remain in-situ depending on landowner preferences. Decommissioning activities will be undertaken in accordance with the relevant legislation and Approval requirements.

5.0 References

This EMP Outline has been developed with reference to the following:

- Attexo (2022) Chalumbin Wind Farm Project Public Environment Report, unpublished.
- Attexo (2022) Chalumbin Wind Farm Bird and Bat Management Plan, unpublished.
- DAWE (2021) Guidelines for the content of a draft PER, Chalumbin Windfarm, near Ravenshoe, Queensland (Reference: 2021/8983), Commonwealth Government of Australia, Canberra, ACT.
- IECA (2008) *Best Practice Erosion and Sediment Control*, International Erosion Control Association (Australasia), Picton, NSW.
- Queensland Department of Infrastructure, Local Government and Planning (DILGP) (2017), *State Code 23: Wind farm development: Planning Guideline*, State of Queensland, Brisbane, QLD.