GUIDELINES FOR THE CONTENT OF A DRAFT PUBLIC ENVIRONMENT REPORT

Chalumbin Wind Farm, near Ravenshoe, Queensland

(Reference: 2021/8983)

Environment Protection and Biodiversity Conservation Act 1999

GUIDELINES FOR A DRAFT PUBLIC ENVIRONMENT REPORT FOR

Chalumbin Wind Farm, near Ravenshoe, Queensland – Chalumbin Pty Ltd

PREAMBLE

Chalumbin Pty Ltd proposes to develop a wind farm within the Tablelands Regional Council Local Government Area approximately 15 km southwest of Ravenshoe in far north Queensland. The proposed action will involve the installation of up to 95 wind turbine generators and associated infrastructure, which includes, medium voltage overhead and underground powerlines and communication cables, high voltage overhead powerlines, permanent meteorological monitoring masts, access tracks and operation facilities. The proposed action will have a generation capacity of approximately 665 MW of power and will generate around 2170 GWh of renewable electricity per year. The proposed action will connect to the existing 275 kV Chalumbin to Worree transmission line. The project area is 31 802.2 ha, with a proposed footprint of 1250.26 ha.

The proposal was referred under the *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act) to the Minister for the Environment on 12th July 2021. On 10th August 2021, a delegate of the Minister for the Environment (the Minister) determined that the proposed action is a controlled action due to likely significant impacts on the following matters of national environmental significance (MNES) that are protected under Part 3 of the EPBC Act:

- Listed threatened species and ecological communities (s18 & s18A)
- Listed migratory species (s20 & s20A)
- The world heritage values of a World heritage property (s12 & s15A)
- The heritage values of a National heritage place (s15B & s15C)

On the same date, the delegate determined, that the proposed action will be assessed by a Public Environment Report (PER).

Information about the action and its relevant impacts, as outlined below, is to be provided in the PER.

This information should be sufficient to allow the Minister or the delegate to make an informed decision on whether or not to approve, under Part 9 of the EPBC Act, the taking of the action for the purposes of each controlling provision.

GENERAL ADVICE ON GUIDELINES

1 GENERAL CONTENT

The PER should be a stand-alone document that primarily focuses on MNES listed above. It should contain sufficient information to avoid the need to search out previous or supplementary reports. The PER should take into consideration the EPBC Act Significant Impact Guidelines and other relevant EPBC Act policy statements, that can be downloaded from the following web site: http://www.environment.gov.au/epbc/guidelines-policies.html.

The PER should enable interested stakeholders and the Minister to understand the environmental consequences of the proposed development. Information provided in the PER should be objective, clear, and succinct and, where appropriate, be supported by maps, plans, diagrams or other descriptive detail. The body of the PER is to be written in a clear and concise style that is easily understood by the general reader. Technical jargon should be avoided wherever possible. Cross-referencing should be used to avoid unnecessary duplication of text, but must be specific.

Detailed technical information, studies or investigations necessary to support the main text should be included as appendices to the PER. It is recommended that any additional supporting documentation and studies, reports or literature not normally available to the public from which information has been extracted be made available at appropriate locations during the period of public display of the PER.

After receiving the Minister or delegate's approval to publish the report, the proponent is required to make the draft PER available for a period of public comment. Specific instructions regarding publication requirements will be provided as part of the Minister or delegate's direction to publish.

If it is necessary to make use of material that is considered to be of a confidential nature, the proponent should consult with the department on the preferred presentation of that material, before submitting it to the Minister or delegate for approval for publication.

The level of analysis and detail in the PER should reflect the level of significance of the expected impacts on the environment. Any and all unknown variables or assumptions made in the assessment must be clearly stated and discussed. Further, any claims made (e.g. regarding the presence/absence of protected matters) need to be adequately justified and supported with evidence. The extent to which the limitations, if any, of available information may influence the conclusions of the environmental assessment should be discussed.

The proponent should ensure that the PER assesses compliance of the action with principles of Ecological Sustainable Development as set out in the EPBC Act, and the *objects of the Act* at Appendix A. A copy of Schedule 4 of the EPBC Regulations,

Matters to be addressed by draft public environment report and environmental impact statement, is at Appendix B.

2 FORMAT AND STYLE

The PER should comprise three elements, namely:

- the executive summary;
- the main text of the document, and
- appendices containing detailed technical information and other information that can be made publicly available.

The guidelines have been set out in a manner that may be adopted as the format for the PER. This format need not be followed where the required information can be more effectively presented in an alternative way. However, each of the elements must be addressed to meet the requirements of the EPBC Act and Regulations.

The PER should be written so that any conclusions reached can be independently assessed. To this end all sources must be appropriately referenced using the Harvard standard. The reference list should include the address of any web pages used as data sources.

The main text of the PER should include a list of abbreviations, a glossary of terms and appendices containing:

- a copy of these guidelines;
- a list of persons and agencies consulted during the PER;
- contact details for the proponent; and
- the names of the persons involved in preparing the PER and work done by each of these persons.

Maps, diagrams and other illustrative material should be included in the PER. The PER should be produced on A4 size paper capable of being photocopied, with maps and diagrams on A4 or A3 size and in colour where possible.

The proponent should consider the format and style of the document appropriate for publication on the Internet. The capacity of the website to store data and display the material may have some bearing on how the document is constructed.

SPECIFIC CONTENT

1 GENERAL INFORMATION

This should provide the background and context of the action including:

(a) the title of the action;

(b) the full name and postal address of the designated proponent;

(c) a clear outline of the objective of the action;

(d) the location of the action;

(e) the background to the development of the action;

(f) how the action relates to any other actions (of which the proponent should reasonably be aware) that have been, or are being, taken or that have been approved in the region affected by the action;

(g) the current status of the action;

(h) the consequences of not proceeding with the action;

(i) any consultation about the action including any consultation that has already taken place and any proposed consultation about relevant impacts of the action (see section 13.1 for Indigenous consultation); and

(j) identification of affected parties, including a statement mentioning any communities that may be affected and describing their views.

2 DESCRIPTION OF THE ACTION

This section must describe the proposal in sufficient detail to allow an understanding of all stages (including interdependencies between stages) and components of the proposal, and to determine potential environmental impacts associated with the proposal.

All construction, operational and (if relevant) decommissioning components of the action should be described in detail (including stages of development and their timing). This should include, the precise location (including coordinates) of all works to be undertaken, structures to be built or elements of the action that may have impacts on Matters of National Environmental Significance (MNES)/relevant controlling provisions.

The description of the action must also include details on how the works are to be undertaken (including stages of development and their timing) and design parameters for those aspects of the structures or elements of the action that may have relevant impacts.

An indicative layout plan for the proposed action area, including the location and type of land use, turbine locations, access tracks, key infrastructure, and the number and location of other relevant buildings and features. Include mapping and coordinates for each of the above.

Provide the total size (in hectares) of the project site and the total size (in hectares) of the disturbance footprint. If the disturbance footprint is the same as the project site this should be clearly stated. Provide the area of overlap in hectares of the project area and the Wet Tropics of Queensland (WTQ) region and the length of the boundary of the WTQ and the project area in kilometres.

The various elements of the project must be described in the text and illustrated with maps, diagrams, plans (at a suitable scale) and other information as required to provide sufficient context and basis for the identification and assessment of impacts.

Include updated information if any changes have been made to the project since the referral documentation was submitted.

3 FEASIBLE ALTERNATIVES

Describe any feasible alternatives to the proposed action, to the extent reasonably practicable, including:

(a) if relevant, the alternative of taking no action;

(b) a comparative description of the impacts of each alternative on the MNES protected by controlling provisions of Part 3 of the EPBC Act for the action; and

(c) sufficient detail to make clear why any alternative is preferred to another, as appropriate.

Discuss the short, medium and long-term advantages and disadvantages of the alternative options.

If there are no feasible alternatives, provide sufficient information as to why this is the case.

4 DESCRIPTION OF THE ENVIRONMENT

4.1 General description of the environment

The PER must contain a description of the existing environment of the proposed action area and the surrounding areas that may be affected by the action (this may include outside of the project site). This should include details of current and historical land use of the area. It is recommended that this includes, but is not limited to, the following information:

(a) Listed threatened and migratory species and ecological communities that are likely to be present in the vicinity of the site, including the following details:

- Details of the scope, timing (survey season/s) and methodology for studies or surveys used to provide information on the listed threated and migratory species/community/habitat at the site (and in areas that may be impacted by the project).

(b) Details of surveys undertaken to determine impacts of the proposed action on the World Heritage and National Heritage values of the WTQ (see section 4.2.1 and 4.2.2 below) including assessments of visual amenities.

(c) A description of the hydrology in the project area including the major water courses within and adjacent to the project area including, but not limited to, the Herbert River and Blunder Creek.

4.2 Wet Tropics of Queensland

Provide a description of the World and National Heritage WTQ within and adjacent to the project area that may be impacted by the proposed action, including information about location, physical features, condition, historical context and current uses.

This must include the following:

(a) ecosystems and their constituent parts, including people and communities;

(b) natural and physical resources;

(c) the qualities and characteristics of locations, places and areas; and

(d) the social, economic and cultural aspects of items mentioned in (a), (b) or (c).

4.2.1 World Heritage Property

The outstanding universal values of WTQ World Heritage Property must be outlined in the PER. These can be accessed here: environment.gov.au/heritage/places/world/wet-tropics/. Information must be included in the PD that describes the outstanding universal values of the World and National Heritage WTQ site. This may include baseline data derived from field surveys, scientific evidence derived from research papers and expert advice, public consultation, other approval processes, and information collected from desktop research (e.g. Commonwealth and State government databases/websites, outcomes of previous field surveys, modelling, scientific investigations, etc.).

The department considers that the proposed action is likely to have impacts on all four outstanding universal values of the WTQ World Heritage Property.

4.2.2 National Heritage Place

The National Heritage values of the WTQ should be outlined in the PER. These values are available at: https://www.environment.gov.au/cgi-bin/ahdb/search.pl?mode=place_detail;search=place_name%3Dwet%2520tropics%3Bkeyword_PD%3Don%3Bkeyword_SS%3Don%3Bkeyword_PH%3Don%3Blatitude_1dir%3DS%3Blongitude_1dir%3DE%3Blongitude_2dir%3DE%3Blatitude_2dir%3DS%3Bin_region%3Dpart;place_id=105689

The values of the WTQ National Heritage Place are consistent with the four WTQ World Heritage outstanding universal values in addition to the following Indigenous values:

Indigenous Values

The Wet Tropics is the only place in Australia where Aboriginal people permanently inhabited a rainforest prior to European arrival and is of outstanding heritage value to the nation for its importance in the course of Australia's cultural history. The Wet Tropics contains camping places and archaeological sites that demonstrate year-round occupation of the rainforest by Aboriginal people.

Aboriginal traditions linked to the volcanic events at Lake Eacham provide indirect evidence for the antiquity of Aboriginal occupation of the area.

5 MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

Based on the information provided in your referral, and other available information, the department considers that the listed threatened species and communities, listed migratory species and the WTQ World Heritage Property and National Heritage place identified below may be significantly impacted by the proposed action.

It is the proponent's responsibility to be aware of any changes to the distribution of listed threatened and migratory species and ecological communities and information available in the Species Profile and Threats (SPRAT) Database. The proponent must ensure that a recent Protected Matters Search Tool (PMST) report has been generated and considered before finalising the draft PER. This PMST should be provided as an attachment to the PER.

Habitat assessments must be informed by desktop (including the Atlas of Living Australia, Queensland's WildNet resources) and field surveys (in accordance with departmental guidelines or as defined by best practice surveys), and with reference to relevant departmental documents (e.g. approved Conservation Advices, Recovery Plans, draft referral guidelines and Listing Advices, and the SPRAT Database), including published research and other relevant sources.

The department does not accept the consideration of only Queensland Regional Ecosystem (RE) mapping to determine habitat for listed threatened species.

The PER must provide information of the impacts to any MNES identified as potentially being significantly impacted by the proposed action, including, but not limited to:

(a) Listed threatened species and ecological communities

- Magnificent Brood Frog (*Pseudophryne covacevichae*) – vulnerable;
- Greater Glider (*Petauroides volans*) – vulnerable;
- Koala (*Phascolarctos cinereus*) – vulnerable;
- Red Goshawk (*Erythrotriorchis radiatus*) – vulnerable;
- White-throated Needletail (*Hirundapus caudacutus*) – migratory, vulnerable, marine;
- Masked owl (northern) (*Tyto novaehollandiae kimberli*) – vulnerable;
- Mountain Mist Frog (*Litoria nyakalensis*) – critically endangered;
- Southern cassowary southern population (*Casuarius casuarius johnsonii*) – endangered;
- Spotted tail quoll (North Queensland subspecies) (*Dasyurus maculatus gracilis*) – endangered;
- Northern Quoll (*Dasyurus hallucatus*) – endangered;
- Yellow-bellied Glider (Wet Tropics) (*Petaurus australis Wet Tropics subspecies*) – endangered;
- Spectacled Flying-fox (*Pteropus conspicillatus*) – endangered;
- Ghost bat (*Macroderma gigas*) – vulnerable;
- *Aponogeton bullosus* – endangered;
- *Prostanthera clotteniana* – critically endangered;
- *Homoranthus porteri* – vulnerable;
- *Triplarina nitchaga* – vulnerable;
- Mabi Forest (Complex Notophyll Vine Forest 5b) Threatened Ecological Community– critically endangered.

(b) Listed Migratory species

- Fork-tailed Swift (*Apus pacificus*) – marine, migratory;
- Black-faced monarch (*Monarcha melanopsis*) – marine, migratory;
- Latham's snipe (*Gallinago hardwickii*) – marine, migratory;

(c) World Heritage Property

- Wet Tropics of Queensland values

(d) National Heritage Place

- Wet Tropics of Queensland values

Note: The above list may not be a complete list of listed threatened and migratory species and ecological communities that will or are likely to be impacted by the proposed action. It is the proponent's responsibility to ensure that any listed threatened and migratory species and ecological communities at the time of the controlled action decision, which will or are likely to be impacted by the project, are assessed for the Minister or the delegate's consideration. Any listing events (e.g. the listing or up-listing of a species) that occur after the controlled action decision do not affect the assessment and approval process.

Note: Some of the listed migratory species requiring assessment are also listed as threatened under the EPBC Act. These species should be considered in accordance with their status as a threatened species. Assessment of these species does not need to be duplicated in the migratory species section.

In order to undertake a robust assessment of the nature and scale of the likely impacts of the proposed action, the PER must include a detailed assessment of the presence of individuals and suitable habitat for each of the above listed threatened and migratory species within and adjacent to the project site as well as relevant species associated with the values of the World Heritage Property and National Heritage Place of the WTQ. The PER must also include a detailed presence and habitat assessment for any other listed threatened and migratory species and and/or ecological community which will or is likely to be impacted by the proposed action.

5.1 Species/communities and the Wet Tropics of Queensland general information

Information required	
5.1.1	Provide a habitat assessment for relevant listed threatened species and communities and listed migratory species. Include species considered as part of the values of the World and National Heritage WTQ (see section 6.5.1 for a list of potential species associated with the values that may be impacted).
5.1.2	Identify and describe known historical records of the listed threatened species and ecological communities and migratory species in the broader region. All known records must be supported by an appropriate source (i.e. Commonwealth and State databases, Queensland Government's WildNet, Atlas of Living Australia, published research, publicly available

	survey reports, etc.), the year of the record and a description of the habitat in which the record was identified.
5.1.3	Provide detailed mapping of suitable habitat for all listed threatened species and communities, migratory species and values of the National and World Heritage WTQ impacted by the action, which: • is specific to the habitat assessment undertaken for each listed threatened species and ecological community (i.e. does not only illustrate relevant Queensland Regional Ecosystems); • is within, adjacent to and downstream from the project area; • includes the total patch size of habitat which may include sections of the patch that fall outside of the project area (in hectares); • Identify any specific habitat requirements i.e. breeding, foraging, dispersal, known important habitat, suitable habitats, roosting etc.; • Consider the regional context, describe the connectivity of habitat in the broader landscape; • includes an overlay of the project disturbance footprint; • includes known records of individuals derived from desktop analysis and field surveys; and • is provided separately as attachments in JPEG format.
5.1.4	PER must include details of the scope, methodology, timing and effort of field surveys. Provide details of: • how surveys were, or will be, undertaken in accordance with relevant Commonwealth, State and/or best practice survey guidelines; and • if relevant, the justification for divergence from relevant Commonwealth, State and/or best practice survey guidelines.
5.1.5	Attach all relevant ecological surveys referenced in the referral and PER as supporting documents to the PER.
5.1.6	Where habitat for listed threatened species and communities, migratory species and species associated with the values of the World and National Heritage WTQ is identified in the project area, an assessment must be undertaken regardless of whether the species was recorded. As such, the potential for occurrence of these species and communities must also be considered and assessed.
5.1.7	Identify potential climate change refugia in the project area for listed threatened and migratory species and species associated with the values of the World and National Heritage values of the WTQ. (See Reside et al. 2014 for information on climate change refugia).

6 IMPACT ASSESSMENT

6.1 General impact information

(a) The PER must include a description of all the relevant impacts of the action (including, direct, indirect, cumulative and facilitated), including the magnitude, duration and frequency of the impacts. Impacts as a result of the proposed action must be assessed in accordance with relevant departmental policies and guidelines, including the SPRAT Database and the Significant Impact Guidelines 1.1. Relevant impacts are impacts that the action will have or is likely to have on an MNES. Impacts during both the construction, operational and (if relevant) the decommissioning phases of the project should be addressed, and the following information provided:

- a detailed assessment of the nature and extent of the likely short-term and long-term relevant impacts;
- a statement whether any relevant impacts are likely to be unknown, unpredictable or irreversible;
- which component/s and stage/s of the action and/or consequential actions are of relevance to impacts on each MNES;
- analysis of the significance of the relevant impacts; and
- any technical data and other information used or needed to make a detailed assessment of the relevant impacts.

(b) The PER should identify any indirect impacts of the project on MNES. This includes, but is not limited to, sediment and erosion associated with clearing and other activities impacting MNES within and adjacent to the project area including the WTQ, increased vehicle collisions with fauna, increased risk of fire incursion, introduction of pests, weeds and pathogens including Chytrid amphibian fungus, *Phytophthora cinnamomi* and Myrtle rust and site alienation resulting in fauna avoiding the project area.

(c) The PER should identify and address cumulative impacts, where potential project impacts are in addition to existing impacts of other activities (including known potential future expansions or developments by the proponent and other proponents in the region and vicinity including other wind farm projects (for example, Mt Fox Energy Park Wind Farm EPBC 2021/8910, Mount Emerald Wind Farm EPBC 2011/228, Windy Hill Wind Farm near Ravenshoe). The cumulative effects of climate change impacts on the environment must also be considered in the assessment of ecosystem resilience. Cumulative impacts can be considered over any temporal and geographical scales that may be appropriate. Where

relevant to the potential impact, a risk assessment should be conducted and documented.

(d) The PER should include facilitated impacts. These are impacts which result from further actions (including actions by third parties) which are made possible by the action.

(e) The PER should include information on how impacts of proposed road constructions transecting the State Biodiversity Corridor impact on MNES.

(f) The PER should include information on how interactions between the proposed action and extreme environmental events (e.g. long-term drought, floods, cyclones and bushfires) may impact on MNES.

(g) The PER should include impacts associated with water and site hydrology associated with the construction, operation and (if relevant) decommissioning phases of the proposed action and how these may impact on MNES including the values of the WTQ, including, but not limited to:

- Increased sediment and erosion run-off associated with vegetation clearing, earthworks, altered surface runoff, steep terrain and relatively high flow velocities,
- Changes to hydrological regimes within and downstream from, the project area, and
- Changes to water quality in the watercourses within and downstream from, the project area.

(h) The PER should include information on flood modelling to estimate erosion and sediment run-off within and adjacent to the project area. The department notes that a 1D-2D TUFLOW hydraulic model was provided in the referral material. Considering the limited historical rain gauge data used in the RFFE flood model, the following additional information should be included in the model (Rahman and Haddad, 2021):

- Natural flood storage: large flood storage areas in catchments with floodplains have the potential to attenuate flood peaks and result in flood estimates with overestimated peak flows; and,
- Drainage efficiency: steep catchments or catchments affected by large scale drainage or flood protection works can be expected to have less attenuation and thus higher peak flows, which may underestimate peak flows.

(i) Provide information on any dewatering required during excavation for the 800 m^3 concreate turbine foundations at each proposed location.

The department considers the proposed action may result in, but is not limited to, the following impacts:

- Disruption of visual amenities,
- Vegetation clearing and loss of habitat,
- Habitat degradation and fragmentation,
- Greenhouse gas emissions,
- Increased risk of fauna vehicle strike,
- Collision risk of birds and bats with wind turbines,
- Barotrauma risk of bats with wind turbines,
- Increased predation from introduced species,
- Downstream impacts, such as within catchment areas,
- Increased risk of fire incursion,
- Increase light and noise pollution, and
- Increased weed and pest invasion.

6.2 Impacts to threatened species and ecological communities

For listed threatened species and ecological communities, the PER should include impacts listed in table 6.1 in addition to the following impacts listed in table 6.2.

Table 6.2 Listed Threatened Species and Communities

Information required	
6.2.1	An assessment of the likely impacts associated with the construction, operation, maintenance and decommissioning stages and vegetation clearing of the project.
6.2.2	Include the direct and indirect loss and/or disturbance of MNES individuals and habitat as a result of the proposed action. This must include the quality of the habitat impacted and quantification of the individuals and habitat area (in hectares) to be impacted.
6.2.3	An assessment of the impacts of habitat fragmentation in the proposed action area and surrounding areas, including consideration of species' movement patterns.
6.2.4	An assessment of the likely duration of impacts to MNES as a result of the proposed action.

6.2.5	A discussion of whether the impacts are likely to be repeated, for example as part of maintenance.
6.2.6	A discussion of whether any impacts are likely to be unknown, unpredictable or irreversible.
6.2.7	Justification, with supporting evidence, how the proposed action will not be inconsistent with: • Australia's obligations under the Biodiversity Convention, the Convention on Conservation of Nature in the South Pacific (Apia Convention), and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES); and • a recovery plan or threat abatement plan.
6.2.8	Assess the impacts, including but not limited to, noise, vibration, dust and vehicle strike resulting from the construction and operation of the project to habitat and species in the project site and surrounding areas.
6.2.9	Assess the impacts of linear clearing for roads with 70-100 m widths on species and habitat including, but not limited to habitat fragmentation and fauna movement including Greater Glider gliding distance.

6.3 Impacts to listed migratory species

For listed migratory species, the PER should include impacts listed in table 6.1 and 6.2 in addition to the following impacts listed in table 6.3.

Table 6.3 Listed Migratory Species

Information required	
6.3.1	Justify, with supporting evidence, how the proposed action will not be inconsistent with Australia's obligations under: • The Bonn Convention; • China-Australia Migratory Bird Agreement; • Japan-Australia Migratory Bird Agreement; • International Agreement – Republic of Korea-Australia Migratory Bird Agreement; and • Any international agreement approved under subsection 209(4) of the EPBC Act.

6.4 Impacts to listed threatened and migratory bird and bat species associated with wind turbines

Further information is required in the PER, with supporting evidence, in relation to the utilisation of the project site and its surrounds by the listed threatened and migratory bird and bat species at risk of turbine strike and barotrauma (see Appendix C). This information is required to enable a robust assessment of potential impacts associated with individual mortality from turbine collision and barotrauma, and potential changes to species utilisation of the project site and its surrounds as a result of the proposed action.

Table 6.4 Impacts to birds and bats associated with wind turbines

Information required	
6.4.1	*Desktop assessment* To predict the potential for at risk threatened and migratory bird and bat species to be using the project site and its surrounds, the PER must include the process and outcomes of: • A preliminary site characterisation (desktop and/or initial site visit) for each species to identify all drivers of presence on the project site and utilisation of the project site. This characterisation must include, but not limited to, the consideration of: • Site characteristics: focal habitat features, topography, prevailing wind and weather patterns, wetlands (including adjacent to project site), and distance to potential nesting, roosting and foraging areas. • Species characteristics: behaviour, flight or demographic factors (e.g. species presence [ongoing, transitory/migratory]), site use (e.g. transit, roosting, breeding and/or foraging), flight paths (including migratory flight paths), flight heights, soaring, flocking, and population numbers.
6.4.2	*Site-specific assessment* To validate the outcomes of the desktop assessment, the PER must include a detailed discussion of how at-risk listed threatened and migratory bird and bat species are using the project site (both project site and proposed disturbance footprint). This discussion must be informed by site-specific and species-specific site utilisation surveys (undertaken by a suitably qualified expert) and supported by other relevant scientific evidence. Further, this discussion must include detailed information on: • How the design of the site utilisation surveys for each relevant species has been informed by its drivers of presence on the project site and

	utilisation of the project site and its surrounds (as determined through the preliminary site characterisation). • How site utilisation surveys for each relevant species have been designed to improve understanding of site utilisation on the project site and its surrounds, and support an ongoing Before-After, Control Impact (BACI) framework for an adaptive Bird and Bat Management Plan (BBMP). The proposed site utilisation survey methodology for each relevant species must be included as an appendix to the PER. At least 24 months of site utilisation surveys must be undertaken to provide sufficient baseline data about a relevant species potential to utilise the project site and its surrounds. Site utilisation surveys must be undertaken for each relevant season over a minimum two years (up to 8 survey events). Each site utilisation survey must be of an appropriate duration and spatial coverage (including taking into consideration the potential turbine layout and visibility) to adequately evaluate site utilisation. At a minimum, each site utilisation survey must record the relevant information specified in 'Species characteristics' of the 'Desktop Assessment' requirements for each relevant species.

6.5 Impacts to the Wet Tropics of Queensland World Heritage property and National Heritage Place

Describe and assess all direct, indirect, facilitated and cumulative impacts to the environment and values of the WTQ, including on any listed threatened species and ecological communities and listed migratory species that occur in the WTQ, in accordance with the general impact assessment requirements outlined under section 6.1 above. Furthermore, the impact assessment must include, but is not limited to:

a) details of the cultural heritage surveys completed in collaboration with Traditional Owners (or their representative bodies); and
b) a description of how the design of the proposed action was informed by the outcomes of the surveys to minimise impacts on the WTQ.

The PER must clearly demonstrate and discuss, with supporting evidence, how the proposed action adheres to, and is not inconsistent with, the:

- World and National Heritage values of the Wet Tropics of Queensland;

- *Wet Tropics Management Plan 2020* and *Wet Tropics Strategic Plan 2020–2030*; and
- World and National Heritage management principles as set out in Part 10 of the *Environment Protection and Biodiversity Conservation Regulations 2000*.

6.5.1 Impacts on the World Heritage Values

Outline the potential impacts of the proposed action on the outstanding universal values of the WTQ World Heritage Property outlined in section 4.2.1, including, but not limited to:

Criterion vii:

- Interruption to sweeping forest vistas. The department acknowledges that a visual amenity assessment was undertaken from within the WTQ. This visual assessment should be included in the PER.

Criterion viii:

- Loss or degradation of marsupial habitat, either directly (via degradation and fragmentation of landscape during the construction phase) or indirectly (via associated sound and light pollution resulting from increased human and mechanical activity);
- Loss or degradation of songbird habitat or disruption of flight paths, either directly (via degradation and fragmentation of landscape for construction purposes and physical interruption of airspace) or indirectly (via associated sound and light pollution resulting from the construction and operation phases of the action); and
- Potential damage to nesting behaviours of songbirds.

Criterion ix:

- Impacts of turbine operation on the flight paths and habitat connectivity of WTQ endemic birds and flying mammals;
- Indirect impacts to WTQ endemic flora and fauna include sound and light pollution spill from increased human and mechanical activity nearby;
- Impacts of construction activities and vegetation clearing on WTQ endemic amphibian species, and
- Impacts to the rainforest-sclerophyll forest transition zone on the western margin of the WTQ;

Criterion x:

- Disruption to behaviour and habitat of threatened species and WTQ endemic species that may utilise the project site, due to its proximity to the WTQ including high altitude taxa with unique habitat. WTQ endemic fauna species include, but are not limited to, Lumholtz's Tree Kangaroo (*Dendrolagus lumholtzi*), Green-eyed Tree Frog (*Litoria serrata*), Mountain Mistfrog (*Litoria nyakalensis*), Macleay's Fig Parrot (*Cyclopsitta diophthalma macleayana*), Rufous Owl (southern subspecies) (*Ninox rufa queenslandica*) and Tube-nosed Insectivorous Bat (*Murina florium*).

6.5.2 Impacts on National Heritage values

Outline the potential impacts of the proposed action on the values of the WTQ National Heritage Place outlined in section 4.2.2, including, but not limited to:

- Impacts to the indigenous values of the WTQ.

7 AVOIDANCE, MITIGATION AND MANAGEMENT MEASURES

Avoidance and mitigation measures are the primary methods of eliminating and reducing significant impacts on MNES. Where possible and practicable, it is best to avoid impacts. If impacts cannot be avoided, then they should be minimised or mitigated as much as possible. Avoidance and mitigation measures must be investigated thoroughly as a part of the assessment and be supported by evidence to demonstrate likely success.

Management commitments by the person proposing to take the action must be clearly distinguished from recommendations or statements of best practice made by the document author or other technical expert.

The SPRAT Database, conservation advice, recovery plans and associated statutory and policy documents, may provide relevant mitigation measures for listed threatened and migratory species, ecological communities and World Heritage Properties and National Heritage Places.

The PER must provide information on proposed safeguards and mitigation measures to deal with the relevant impacts of the action. Specific and detailed descriptions of proposed measures must be provided and substantiated, based on best available practices and must include the following elements.

Table 7.1 Avoidance, mitigation and management measures

Information required	
7.1.1	A detailed summary of measures proposed to be undertaken by the Proponent to avoid, mitigate and manage relevant impacts of the proposed action on relevant MNES, for all stages of the proposed action.

7.1.2	The proposed measures must be based on best available practices, appropriate standards, evidence of success for other similar actions and supported by published scientific evidence.
7.1.3	All proposed measures for MNES must be drafted to meet the 'S.M.A.R.T' principle: • S – Specific (what and how) • M – Measurable (baseline information, number/value, auditable) • A – Achievable (timeframe, money, personnel) • R – Relevant (conservation advices, recovery plans, threat abatement plans) • T – Time-bound (specific timeframe to complete)
7.1.4	Wind farm noise mitigation and management information in relation to disturbance of wildlife, including songbirds (Zwart et al 2015).
7.1.5	Consideration of turbine placement and potential impacts to the visual amenity value of the World Heritage WTQ. Provide any considerations of painting turbine blades different colours and/or with different patterns in relation to the visual amenity of the WTQ World Heritage value.
7.1.6	Details about how the proposed measures are consistent with *Wet Tropics World Heritage Management Plan 2020* and *Wet Tropics Strategic Plan 2020–2030* should be provided in the PER.
7.1.7	Details of specific and measurable environmental outcomes to be achieved for relevant MNES. All commitments must be drafted using committal language (e.g. 'will' and 'must') when describing the proposed measures.
7.1.8	Details of the proposed measures to be undertaken to avoid, mitigate and manage the relevant impacts of the proposed action, including those required through other Commonwealth, State and local government approvals.
7.1.9	Information on the timing, frequency and duration of the proposed avoidance, mitigation, management and monitoring measures, and corrective actions to be implemented.

7.1.10	An assessment of the expected or predicted effectiveness of the proposed measures.
7.1.11	Any statutory or policy basis for the proposed measures, including reference to the SPRAT Database and relevant approved conservation advice, recovery plan or threat abatement plan, and a discussion on how the proposed measures are not inconsistent with relevant plans.
7.1.12	Details of ongoing management, including monitoring programs to support an adaptive management approach, that validate the effectiveness of the proposed measures and overall demonstrate that environmental outcomes will be achieved.
7.1.13	Details of tangible, on-ground corrective actions that will be implemented in the event the monitoring programs indicate that the environmental outcomes have not or will not be achieved.
7.1.14	Details of any measures proposed to be undertaken by Queensland and local governments, including the name of the agency responsible for approving each measure.

The department notes the referral documentation includes a detailed description of the proposed avoidance, mitigation and management measures to be implemented by the proponent during the construction and operation stages of the proposed action. The referral also states that several preliminary management plans are being developed including:

- Preliminary Construction Management Plan
- Preliminary Erosion and Sediment Control Plan
- Flora and Fauna Preliminary Management Plan

Table 7.2 Management Plans

The three proposed preliminary management plans mentioned above can be provided either as separate documents attached to the PER or provided as subsections in the PER. The following management plans should be included in the PER in relation to the proposed action, including any further management plans as appropriate:

7.2.1	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 provisions 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.
7.2.2	A weed and pest management plan that includes management of *Phytophthora cinnamomi*, Chytrid amphibian fungus, Myrtle Rust and any other relevant weeds and pests.
7.2.3	A sediment and erosion management plan outlining mitigation and monitoring of sediment loads. The Herbert River flows into the Great Barrier Reef Marine Park and is currently listed under high (orange) management priority for high sediment loads. The sediment and erosion management plan should outline how it takes into consideration the Reef 2050 Water Quality Improvement Plan, and how the project will be consistent with the Plan. This is available at: https://www.environment.gov.au/marine/gbr/long-term-sustainability-plan
7.2.4	A Bird and Bat Management Plan in relation to risk of turbine collision and barotrauma. A framework for this plan is provided in Appendix C.
7.2.5	If dewatering is required during turbine foundation installation, a dewatering groundwater management plan should be provided in the PER which includes: • Plans for extracted groundwater, • Plans for groundwater disposal. If the water table will be intersected during dewatering, a groundwater management plan should be provided in the PER.
7.2.6	A rehabilitation management plan which outlines management and mitigation associated with rehabilitation. Include information on whether any post construction rehabilitation sites will be subsequently cleared during the decommissioning stage.

8 REHABILITATION REQUIREMENTS

Information required

8.1	Rehabilitation acceptance criteria, including for the restoration of habitat for relevant listed threatened species and communities.
8.2	A summary of the procedures, including contingency measures, that will be undertaken to achieve the rehabilitation acceptance criteria.
8.3	A summary of a monitoring program to determine the success of rehabilitation activities implemented by the proponent.
8.4	The details of any rehabilitation activities proposed to be undertaken as required by Commonwealth, State or Territory, and local government legislation. Attach relevant Commonwealth, State or Territory, and local government approvals and permits as supporting documents to the preliminary documentation.
8.5	Maps showing the areas that will be rehabilitated within the project area and the size in hectares of these areas.

9 OFFSETS

Background

Environmental offsets are measures that compensate for the residual significant impacts of an action on the environment. Offsets provide environmental benefits to counterbalance the impacts that remain after consideration of avoidance and mitigation measures. It is important to consider environmental offsets early in the assessment process. Correspondence with the department regarding offsetting is highly encouraged. The department's *EPBC Act Environmental Offsets Policy* (2012) (Offsets Policy) is available at: www.environment.gov.au/epbc/publications/epbc-act-environmental-offsets-policy.

Include a draft Offset Management Strategy (OMS) or a draft Offset Area Management Plan (OAMP) as an appendix in the PER for assessment and approval. If an offset area has been nominated, then provide an OAMP. If not, provide an OMS. Further, the department is likely to recommend to the Minister (or delegate) that the conditions of approval require the environmental offset/s or the OAMP be approved and implemented prior to the commencement of the proposed action.

Considering the information provided in the referral documentation, the department considers that there may be significant residual significant impacts of the proposed action on listed threatened and migratory species and ecological communities and world and national heritage.

Table 9 Offset information required

Information required	
9.1	An assessment of the likelihood of residual significant impacts occurring on relevant MNES, after avoidance, mitigation and management measures have been applied.
9.2	A summary of the proposed environmental offset and key commitments to achieve a conservation gain for each protected matter.
9.3	If an offset area has not been nominated, include a draft OMS as an appendix to the PER. The draft OMS must meet the information requirements set out in Appendix D.1.
9.4	Where offset area/s have been nominated, include a draft OAMP as an appendix to the PER. The draft OAMP must meet the information requirements set out in Appendix D.2, and must be prepared by a suitably qualified ecologist and in accordance with the department's *Environmental Management Plan Guidelines* (2014), available at: www.environment.gov.au/epbc/publications/environmental-management-plan-guidelines.

10 OTHER APPROVALS AND CONDITIONS

The PER must include information on any other requirements for approval or conditions that apply, or that the proponent reasonably believes are likely to apply, to the proposed action. This must include:

(a) details of any local or State Government planning scheme, or plan or policy under any local or State Government planning system that deals with the proposed action, including:

- what environmental assessment of the proposed action has been, or is being, carried out under the scheme, plan or policy; and
- how the scheme provides for the prevention, minimisation and management of any relevant impacts;

(b) a description of any approval that has been obtained from a State, Territory or Commonwealth agency or authority (other than an approval under the Act), including any conditions that apply to the action;

(c) a statement identifying any additional approval that is required; and

(d) a description of the monitoring, enforcement and review procedures that apply, or are proposed to apply, to the action.

11 CONSULTATION

Any consultation about the action, including:

(a) any consultation that has already taken place;

(b) proposed consultation about relevant impacts of the action;

(c) if there has been consultation about the proposed action, any documented response to, or result of, the consultation; and

(d) identification of affected parties, including a statement mentioning any communities that may be affected and describing their views.

The department notes that the referral documentation stated that there has been engagement with the local indigenous people. Further details on this engagement should be provided in the PER (see section 13.1).

12 ENVIRONMENTAL RECORD OF PERSON(S) PROPOSING TO TAKE THE ACTION

The information provided must include details of any proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against:

(a) the person proposing to take the action; and

(b) for an action for which a person has applied for a permit, the person making the application.

If the person proposing to take the action is a corporation, details of the corporation's environmental policy and planning framework must also be included.

13 ECONOMIC AND SOCIAL MATTERS

The economic and social impacts of the action, both positive and negative, must be analysed. Matters of interest may include:

- details of any public consultation activities undertaken, and their outcomes;
- projected economic costs and benefits of the project, including the basis for their estimation through cost/benefit analysis or similar studies;
- employment opportunities expected to be generated by the project (including construction and operational phases).

Economic and social impacts should be considered at the local, regional and national levels. Details of the relevant cost and benefits of alternative options to the proposed action, as identified in section 3 above, should also be included.

13.1 Indigenous engagement

Identify existing or potential native title rights and interests, including any areas and objects that are of particular significance to Indigenous peoples and communities, possibly impacted by the proposed action and the potential for managing those impacts.

Describe any Indigenous consultation that has been undertaken, or will be undertaken, in relation to the proposed action and their outcomes.

The department considers that best practice consultation, in accordance with the *Guidance for proponents on best practice Indigenous engagement for environmental assessments under the EPBC Act* (2016) includes:

- identifying and acknowledging all relevant affected Indigenous peoples and communities;
- committing to early engagement;
- building trust through early and ongoing communication for the duration of the project, including approvals, implementation and future management;
- setting appropriate timeframes for consultation; and
- demonstrating cultural awareness.

Describe any state requirements for approval or conditions that apply, or that the proponent reasonably believes are likely to apply, to the proposed action with regards to Indigenous peoples and communities.

14 INFORMATION SOURCES PROVIDED IN THE PER

For information given in a draft Public Environment Report, the draft must state:

(a) the source of the information;

(b) how recent the information is;

(c) how the reliability of the information was tested; and

(d) what uncertainties (if any) are in the information.

15 CONCLUSION

An overall conclusion as to the environmental acceptability of the proposal should be provided, including discussion on compliance with principles of ESD and the objects and requirements of the EPBC Act. Reasons justifying undertaking the proposal in the manner proposed should also be outlined.

Measures proposed or required by way of offset for any unavoidable impacts on MNES, and the relative degree of compensation, should be restated here.

References

Rahman A, and Haddad K 2021. *Limits of Applicability* | *Regional Flood Frequency Estimation Model*. [online] Rffe.arr-software.org. Available at: <https://rffe.arr-software.org/> [Accessed 19 July 2021].

Reside AE, Welbergen JA, Phillips BL, Wardell-Johnson GW, Keppel G, Ferrier S, Williams SE, Vanderwal J, 2014, Characteristics of climate change refugia for Australian biodiversity. Austral Ecology 39: 887-897, DOI:10.1111/aec.12146.

Zwart M, Dunn J, McGowan P, Whittingham M, 2015, Wind farm noise suppresses territorial defence behaviour in a songbird, *Behavioural ecology,* 27:101-108, DOI: 10.1093/beheco/arv128.

APPENDIX A

THE OBJECTS AND PRINCIPLES OF THE

ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

SECTIONS 3 AND 3A

3 Objects of the Act

(a) to provide for the protection of the environment, especially those aspects of the environment that are matters of national environmental significance;

(b) to promote ecologically sustainable development through the conservation and ecologically sustainable use of natural resources;

(c) to promote the conservation of biodiversity;

(d) to promote a co-operative approach to the protection and management of the environment involving governments, the community, land-holders and indigenous peoples;

(e) to assist in the co-operative implementation of Australia's international environmental responsibilities;

(f) to recognise the role of indigenous people in the conservation and ecologically sustainable use of Australia's biodiversity; and

(g) to promote the use of indigenous peoples' knowledge of biodiversity with the involvement of, and in co-operation with, the owners of the knowledge.

3A Principles of Ecologically Sustainable Development

The following principles are principles of ecologically sustainable development.

(a) Decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations.

(b) If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

(c) The principle of inter-generational equity – that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.

(d) The conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making.

(e) Improved valuation, pricing and incentive mechanisms should be promoted.

APPENDIX B

MATTERS THAT MUST BE ADDRESSED IN A PER

(SCHEDULE 4 OF THE EPBC REGULATIONS 2000)

1 General information

1.01 The background of the action including:

(a) the title of the action;

(b) the full name and postal address of the designated Proponent;

(c) a clear outline of the objective of the action;

(d) the location of the action;

(e) the background to the development of the action;

(f) how the action relates to any other actions (of which the Proponent should reasonably be aware) that have been, or are being, taken or that have been approved in the region affected by the action;

(g) the current status of the action; and

(h) the consequences of not proceeding with the action.

2 Description

2.01 A description of the action, including:

(a) all the components of the action;

(b) the precise location of any works to be undertaken, structures to be built or elements of the action that may have relevant impacts;

(c) how the works are to be undertaken and design parameters for those aspects of the structures or elements of the action that may have relevant impacts;

(d) relevant impacts of the action;

(e) proposed safeguards and mitigation measures to deal with relevant impacts of the action;

(f) any other requirements for approval or conditions that apply, or that the Proponent reasonably believes are likely to apply, to the proposed action;

(g) to the extent reasonably practicable, any feasible alternatives to the action, including:

(i) if relevant, the alternative of taking no action;

(ii) a comparative description of the impacts of each alternative on the matters protected by the controlling provisions for the action; and

(iii) sufficient detail to make clear why any alternative is preferred to another;

(h) any consultation about the action, including:

(i) any consultation that has already taken place;

(ii) proposed consultation about relevant impacts of the action; and

(iii) if there has been consultation about the proposed action — any documented response to, or result of, the consultation; and

(i) identification of affected parties, including a statement mentioning any communities that may be affected and describing their views.

3 Relevant impacts

3.01 Information given under paragraph 2.01(d) must include

(a) a description of the relevant impacts of the action;

(b) a detailed assessment of the nature and extent of the likely short term and long term relevant impacts;

(c) a statement whether any relevant impacts are likely to be unknown, unpredictable or irreversible;

(d) analysis of the significance of the relevant impacts; and

(e) any technical data and other information used or needed to make a detailed assessment of the relevant impacts.

4 Proposed safeguards and mitigation measures

4.01 Information given under paragraph 2.01(e) must include:

(a) a description, and an assessment of the expected or predicted effectiveness of, the mitigation measures;

(b) any statutory or policy basis for the mitigation measures;

(c) the cost of the mitigation measures;

(d) an outline of an environmental management plan that sets out the framework for continuing management, mitigation and monitoring programs for the relevant impacts of the action, including any provisions for independent environmental auditing;

(e) the name of the agency responsible for endorsing or approving each mitigation measure or monitoring program; and

(f) a consolidated list of mitigation measures proposed to be undertaken to prevent, minimise or compensate for the relevant impacts of the action, including mitigation measures proposed to be taken by State governments, local governments or the Proponent.

5 Other Approvals and Conditions

5.01 Information given under paragraph 2.01(f) must include:

(a) details of any local or State government planning scheme, or plan or policy under any local or State government planning system that deals with the proposed action, including:

(i) what environmental assessment of the proposed action has been, or is being carried out under the scheme, plan or policy; and

(ii) how the scheme provides for the prevention, minimisation and management of any relevant impacts;

(b) a description of any approval that has been obtained from a State, Territory or Commonwealth agency or authority (other than an approval under the Act), including any conditions that apply to the action;

(c) a statement identifying any additional approval that is required; and

(d) a description of the monitoring, enforcement and review procedures that apply, or are proposed to apply, to the action.

6 Environmental record of person proposing to take the action

6.01 Details of any proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against:

(a) the person proposing to take the action; and

(b) for an action for which a person has applied for a permit, the person making the application.

6.02 If the person proposing to take the action is a corporation — details of the corporation’s environmental policy and planning framework.

7 Information sources

7.01 For information given the PER/EIS must state:

(a) the source of the information; and

(b) how recent the information is; and

(c) how the reliability of the information was tested; and

(d) what uncertainties (if any) are in the information.

APPENDIX C

BIRD AND BAT MANAGEMENT PLAN (BBMP)

The following table outlines the framework to assist in the preparation and submission of a draft BBMP as an appendix to the public environment report (as required by Section 7 above). The purpose of the BBMP is to enable a robust long-term approach to mitigate and manage potential impacts of the proposed action associated with individual mortality from turbine collision and barotrauma, and potential changes to species utilisation of the project site and its surrounds on relevant listed threatened and migratory bird and bat species.
The draft BBMP must be prepared by a suitably qualified ecologist and in accordance with the department's *Environmental Management Plan Guidelines* (2014), available at: www.environment.gov.au/epbc/publications/environmental-management-plan-guidelines, and includes the following key requirements at a minimum. The draft BBMP must be informed by desktop and field-derived information, best available practices, appropriate standards, evidence of effectiveness for other similar actions and supported by published scientific evidence.

C1. Pre-commissioning requirements* *The department considers that these requirements must be completed during the EPBC Act assessment process.	
C1.1	**Desktop assessment: Preliminary site characterisation** To predict the potential for the listed threatened and migratory bird and bat species identified in Section 2 above (at a minimum) to be using the project site and its surrounds, the BBMP must include the process and outcomes of: • A preliminary site characterisation (desktop and/or initial site visit) for each species to identify all drivers of presence on the project site and utilisation of the project site. This characterisation must include, but not limited to, the consideration of: ○ site characteristics: focal habitat features, topography, prevailing wind and weather patterns, wetlands (including adjacent to project site), and distance to potential nesting, roosting and foraging areas. ○ species characteristics: behaviour, flight or demographic factors (e.g. species presence [ongoing, transitory/migratory]), site use (e.g. transit, roosting, breeding and/or foraging), flight paths (including migratory flight paths), flight heights, soaring, flocking, and population numbers.
C1.2	**Site-specific assessment: Site utilisation surveys**

	To validate the outcomes of the desktop assessment, the BBMP must include a detailed discussion of how at-risk listed threatened and migratory bird and bat species are using the project site (both project site and proposed disturbance footprint). This discussion must be informed by site-specific and species-specific site utilisation surveys (undertaken by a suitably qualified expert), and supported by other relevant scientific evidence. Further, this discussion must include detailed information on: • How the design of the site utilisation surveys for each relevant species has been informed by its drivers of presence on the project site and utilisation of the project site (as determined through the preliminary site characterisation). • How site utilisation surveys for each relevant species have been designed to improve understanding of site utilisation on the project site and its surrounds; and support the proposed ongoing BACI framework in this BBMP. The site utilisation survey methodology for each relevant species must be included as an attachment to the BBMP. **Note:** At least 24 months of site utilisation surveys must be undertaken to provide sufficient baseline data about a relevant species' potential to utilise the project site and its surrounds. Site utilisation surveys must be undertaken for each relevant season over a minimum two years (up to 8 survey events). Each site utilisation survey must be of an appropriate duration and spatial coverage (including taking into consideration the potential turbine layout and visibility) to adequately evaluate site utilisation. At a minimum, each site utilisation survey must record the relevant information specified in 'Species characteristics' of the 'Desktop assessment: Preliminary site characterisation' (Section 1.1 above).

C1.3	**Long-term impact risk assessment**
	To enable a robust assessment of potential impacts of the proposed action associated with individual mortality from turbine collision and barotrauma, and potential changes to species utilisation of the project site and its surrounds on relevant species, the BBMP must include, but not be limited to:
	• An assessment of the potential impact pathways on each relevant species (based on the desktop assessment [Section 1.1 above] and site utilisation surveys [Section 1.2 above]) including, but not limited to:
	  ○ direct mortality from turbine collision and barotrauma; and
	  ○ potential changes to site utilisation during construction and operation of the proposed action.
	• Identification of potential impacts to each relevant species from direct mortality, including but not limited to:

	○ analysis and mapping of suitable habitat, territories and activity/utilisation patterns/rates (‘heat maps’) in the project site and its surrounds; • Mathematical Collision Risk Modelling (CRM), which must: ○ incorporate a project site-wide assessment and identify high risk turbines; ○ incorporate baseline data collected during the minimum 24 months of site utilisation surveys; ○ incorporate the recommendations of a model peer review (the peer review must be included as an appendix to the public environment report); and ○ include a literature review, justification of the choice of the model used, and a statement of all assumptions and uncertainties. The BBMP must clearly demonstrate how relevant departmental policies and guidelines, and the SPRAT Database have been used to assess the potential impacts of direct mortality from turbine collision and barotrauma, and potential changes to site utilisation during construction and operation of the proposed action on relevant listed threatened and migratory bird and bat species. The BBMP must include a map for each relevant species which identifies area/s in the project site and its surrounds which have been determined as ‘high risk’ based on the outputs of the CRM.

C2. Post-Commissioning requirements	
C	**Environmental outcomes** To enable a robust long-term approach to mitigate and manage potential impacts associated with individual mortality from turbine collision and barotrauma, and potential changes to species utilisation of the project site and its surrounds on relevant species, the BBMP must include specific environmental outcomes to be achieved by the implementation of the BBMP. This may include, but is not limited to: • An improved understanding of the risk of turbine collision and barotrauma impacts on listed bird and bat species. • An improved understanding of whether or how project site usage changes as a result of wind farm construction and operation. • An improved monitoring approach for the timely identification of turbine collisions and the timely collection and analysis of data.

	• An improved approach to the timely and regular validation and update to the CRM using monitoring data, and support a robust adaptive management approach. • The development and implementation of tangible, on-ground management measures and corrective actions to promote a long-term reduction in the risk of turbine collision and barotrauma impacts on listed bird and bat species.
C2.2	**Long-term site utilisation surveys** To detect potential long-term changes to species utilisation of the project site and its surrounds on relevant species as a result of operation, the BBMP must include a long-term site utilisation survey program (prepared by a suitably qualified expert) for each relevant species. The program must, at a minimum: • be designed to ensure that species behaviour responses, including avoidance of turbines, and changes to project site utilisation, can be detected; • be designed to support a BACI monitoring framework; • include site utilisation survey methodologies, and proposed timings, which are consistent with the pre-commissioning site utilisation survey methodologies; • be undertaken by a suitable qualified expert; • be statistically reliable; • be able to inform adaptive mitigation and management measures, and corrective actions, to ensure environmental outcomes will be achieved.
C2.3	**Long-term turbine collision and barotrauma monitoring** To manage potential long-term mortality impacts on relevant species as a result of turbine collision and barotrauma, the BBMP must include a long-term monitoring and CRM update approach. The approach must, at a minimum: • Include details of the nature, timing and frequency of monitoring to inform progress against achieving the environmental outcomes, and be sufficient to determine whether the BBMP is likely to achieve those environmental outcomes in adequate time to implement all necessary corrective actions. • Demonstrate how site-specific and species-specific risks and uncertainties have informed the design of the monitoring program (e.g. scavenger activity, searcher efficiency, etc.). • Include a proposed timeframe for the regular validation and update of the CRM using site-specific data collected through ongoing monitoring activities.

	• Include a commitment to DNA test carcasses that cannot be otherwise identified by a bird or bat expert. • Include a commitment for carcass persistence trials to maximise turbine collision detection in a timely manner. • Include a commitment for searcher efficiency trials to maximise carcass detection in a timely manner.
C2.4	**Reporting requirements to the department** The BBMP must include, at a minimum, the following reporting commitments (and proposed timeframes) for the provision of site-specific and species-specific information to the department: • Annual turbine strike reports comprising raw strike data and strike notifications, survey methodologies, results of detection/persistence trials, environmental/meteorological conditions and associated statistical analysis. • Estimations of annual mortality rate for each relevant species, comprising supporting evidence from case studies of EPBC species carcass size classes, results of persistence trials, searcher efficiency trials and substitute carrion trials, and annual probability of detection and monthly strike monitoring. • Species occurrence records in accordance with the department's *Guidelines for biological survey and mapped data* (2018) using the species observation data template on the department's website (sensitive ecological data must be identified and treated in accordance with the department's *Sensitive Ecological Data – Access and Management Policy V1.0* (2016) or subsequent revision).

C2.5	**Adaptive management framework**
	To ensure the environmental outcomes will be achieved for relevant species, the BBMP must include an adaptive management framework. The adaptive management framework must, at a minimum:
	• Be designed to clearly demonstrate the linkages between:
	  ○ environmental outcomes;
	  ○ implementation of mitigation and management measures;
	  ○ monitoring, reporting and investigations; and
	  ○ implementation of corrective actions to ensure environmental outcomes will be achieved.
	• Be designed to incorporate site-specific data collected through ongoing monitoring activities (see requirement 2.4 above), and take into account changes to turbine risk ratings based on the CRM outputs.

	• Identify, with proposed timeframes for implementation, tangible, on-ground corrective actions to be implemented if monitoring activities indicate the environmental outcomes have not been achieved.

APPENDIX D

INFORMATION REQUIREMENTS FOR EPBC ACT OFFSET PROPOSALS

D1. Minimum Requirements for a draft Offset Management Strategy:	
D1.1	Specific details of the nature of the conservation gain to be achieved for relevant MNES, including the creation, restoration and revegetation of habitat in the proposed offset area/s.
D1.2	Details of the environmental offset/s (in hectares) to compensate for the residual significant impacts of the proposed action on relevant MNES.
D1.3	Details of the potential offset area/s (including a map) to compensate for the residual significant impacts of the proposed action on relevant MNES.
D1.4	The methodology, with justification and supporting evidence, used to inform the inputs of the Offsets Assessment Guide in relation to the project site for each relevant MNES, including: • total area of habitat (in hectares); and • habitat quality (e.g. using the Queensland Government Guide to determining terrestrial habitat quality: A toolkit for assessing land based offsets under the Queensland Environmental Offsets Policy [2020]).
D1.5	Details, with supporting evidence, of how the environmental offset/s meets the requirements of the department's EPBC Act Environmental Offsets Policy (2012) (Offsets Policy), available at: www.environment.gov.au/epbc/publications/epbc-act-environmental-offsets-policy.
D1.6	The methodology, with justification and supporting evidence, used to inform the inputs of the Offsets Assessment Guide in relation to each potential offset area/s for each relevant MNES, including: • time over which loss is averted (max. 20 years); • time until ecological benefit; • risk of loss (%) without offset; • risk of loss (%) with offset; and • confidence in result (%).
D1.7	Evidence that the relevant MNES, and/or their habitat, can be present in the potential offset area/s.
D1.8	Information about how the potential offset area/s provides connectivity with other relevant habitats and biodiversity corridors.

D1.9	Details and execution timing of the mechanism to legally secure the environmental offset/s (under Queensland legislation or equivalent) to provide enduring protection for the potential offset area/s against development incompatible with conservation.
D2. Minimum Requirements for a draft Offset Area Management Plan:	
D2.1	Specific, committal and measurable environmental outcomes which detail the nature of the conservation gain to be achieved for relevant MNES, including the creation, restoration and revegetation of habitat in the proposed offset area/s.
D2.2	Details, with supporting evidence, to demonstrate how the environmental offset/s compensate for residual significant impacts of the proposed action on relevant MNES, and/or their habitat, in accordance with the principles of the Offsets Policy and all requirements of the Offsets Assessment Guide including: • time over which loss is averted (max. 20 years); • time until ecological benefit; • risk of loss (%) without offset; • risk of loss (%) with offset; and • confidence in result (%).
D2.3	A description of the offset area/s, including location, size, condition, environmental values present and surrounding land uses.
D2.4	Baseline data and other supporting evidence that documents the presence of the relevant MNES, and the quality of their habitat within the offset area/s.
D2.5	An assessment of the site habitat quality for the offset area/s (e.g. using the Queensland Government *Guide to determining terrestrial habitat quality: A toolkit for assessing land based offsets under the Queensland Environmental Offsets Policy* [2020]).
D2.6	Details of how the offset area/s will provide connectivity with other habitats and biodiversity corridors and/or will contribute to a larger strategic offset for the relevant MNES.
D2.7	Maps and shapefiles to clearly define the location and boundaries of the offset area/s, accompanied by the offset attributes (e.g. physical address of the offset area/s, coordinates of the boundary points in decimal degrees, the relevant MNES that the environmental offset/s compensates for, and the size of the environmental offset/s in hectares).

D2.8	Specific offset completion criteria derived from the site habitat quality to demonstrate the improvement in the quality of habitat in the offset area/s over a 20-year period.
D2.9	Details of the management actions, and timeframes for implementation, to be carried out to meet the offset completion criteria.
D2.10	Interim milestones that set targets at 5-yearly intervals for progress towards achieving the offset completion criteria.
D2.11	Details of the nature, timing and frequency of monitoring to inform progress against achieving the 5-yearly interim milestones (the frequency of monitoring must be sufficient to track progress towards each set of milestones, and sufficient to determine whether the offset area/s are likely to achieve those milestones in adequate time to implement all necessary corrective actions).
D2.12	Proposed timing for the submission of monitoring reports which provide evidence demonstrating whether the interim milestones have been achieved.
D2.13	Timing for the implementation of tangible, on-ground corrective actions to be implemented if monitoring activities indicate the interim milestones have not been achieved.
D2.14	Risk analysis and a risk management and mitigation strategy for all risks to the successful implementation of the OAMP and timely achievement of the offset completion criteria, including a rating of all initial and post-mitigation residual risks in accordance with a risk assessment matrix.
D2.15	Evidence of how the management actions and corrective actions take into account relevant approved conservation advices and are consistent with relevant recovery plans and threat abatement plans.
D2.16	Details and execution timing of the mechanism to legally secure the proposed offset area/s, such that legal security remains in force over the offset area/s for at least 20 years to provide enduring protection for the offset area/s against development incompatible with conservation.
D2.17	All proposed management actions, monitoring approach and corrective actions must be written using committed language (e.g. ‘will’ and ‘must’).