














Chalumbin Wind Farm

Impacts to Spectacled flying-fox habitat

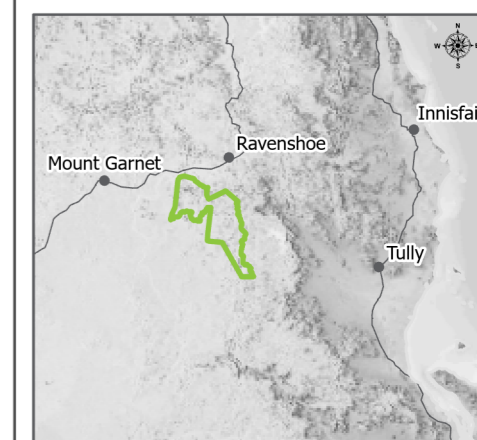
Sheet 3 of 4

Figure 8.5

-  Project Area Boundary
-  Turbine
-  Met-mast
- Clearance Envelope**
-  Stage 1
-  Stage 2
-  Facilities
-  Significant Residual Impact
-  Potential habitat
-  Existing HV Transmission Line
-  Watercourse
-  WTQ Boundary
-  Lot Boundary
-  Easement

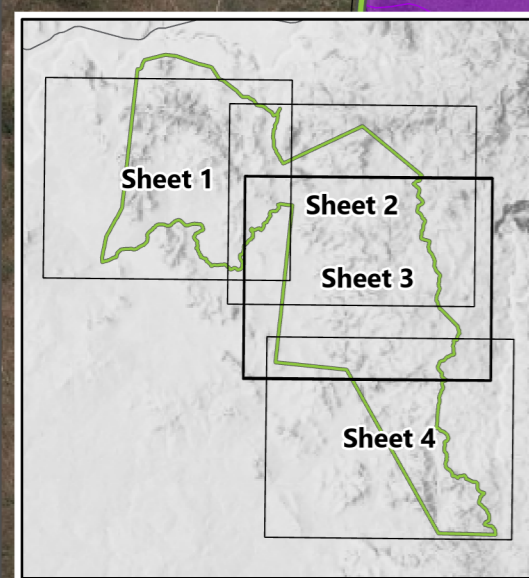
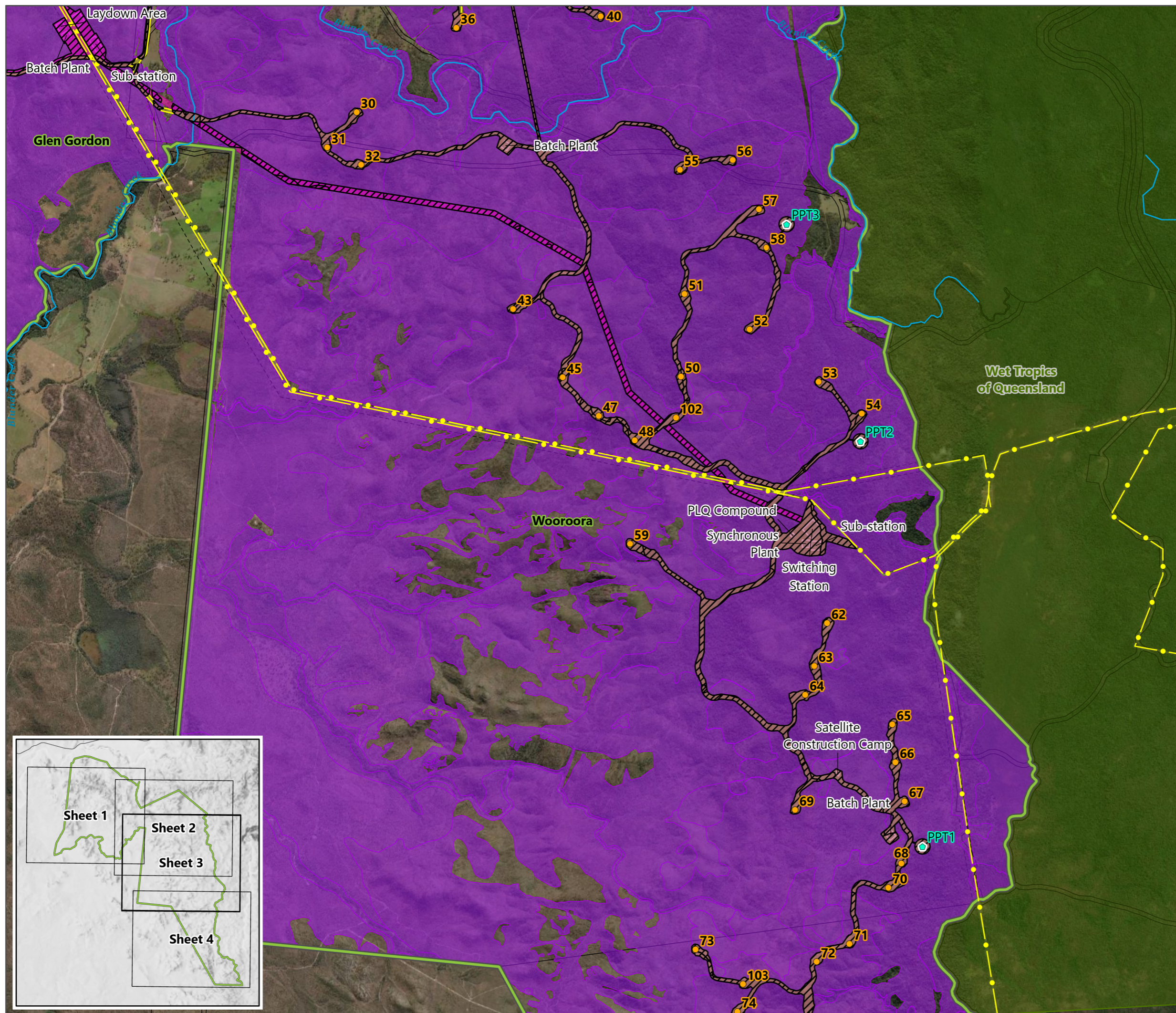
Date: 10/10/2022
Project: EPU-004

Author: TOD
Reviewed: NOD



Scale: 1:50,000@A3

Data Source(s):
Digital Cadastral Database - Department of Resources (2022)
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Chalumbin Wind Farm

Impacts to Spectacled flying-fox habitat

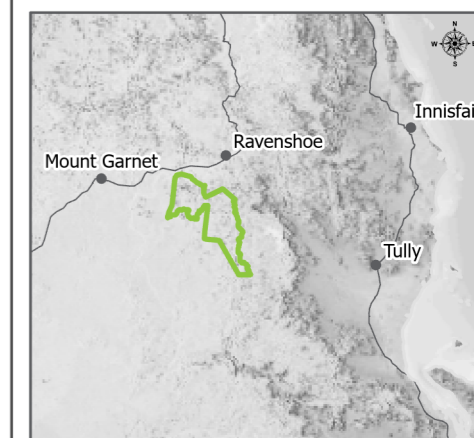
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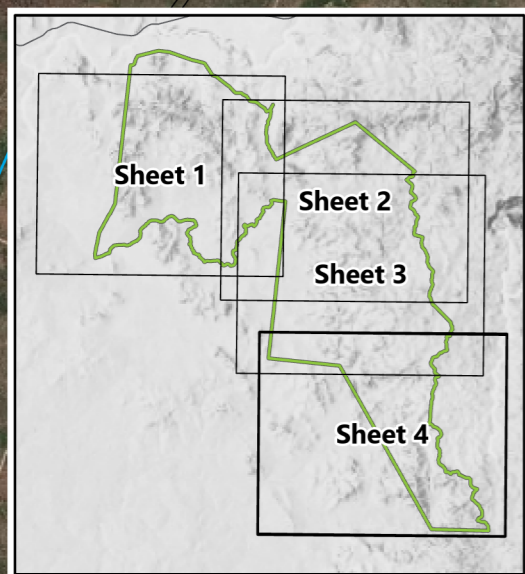
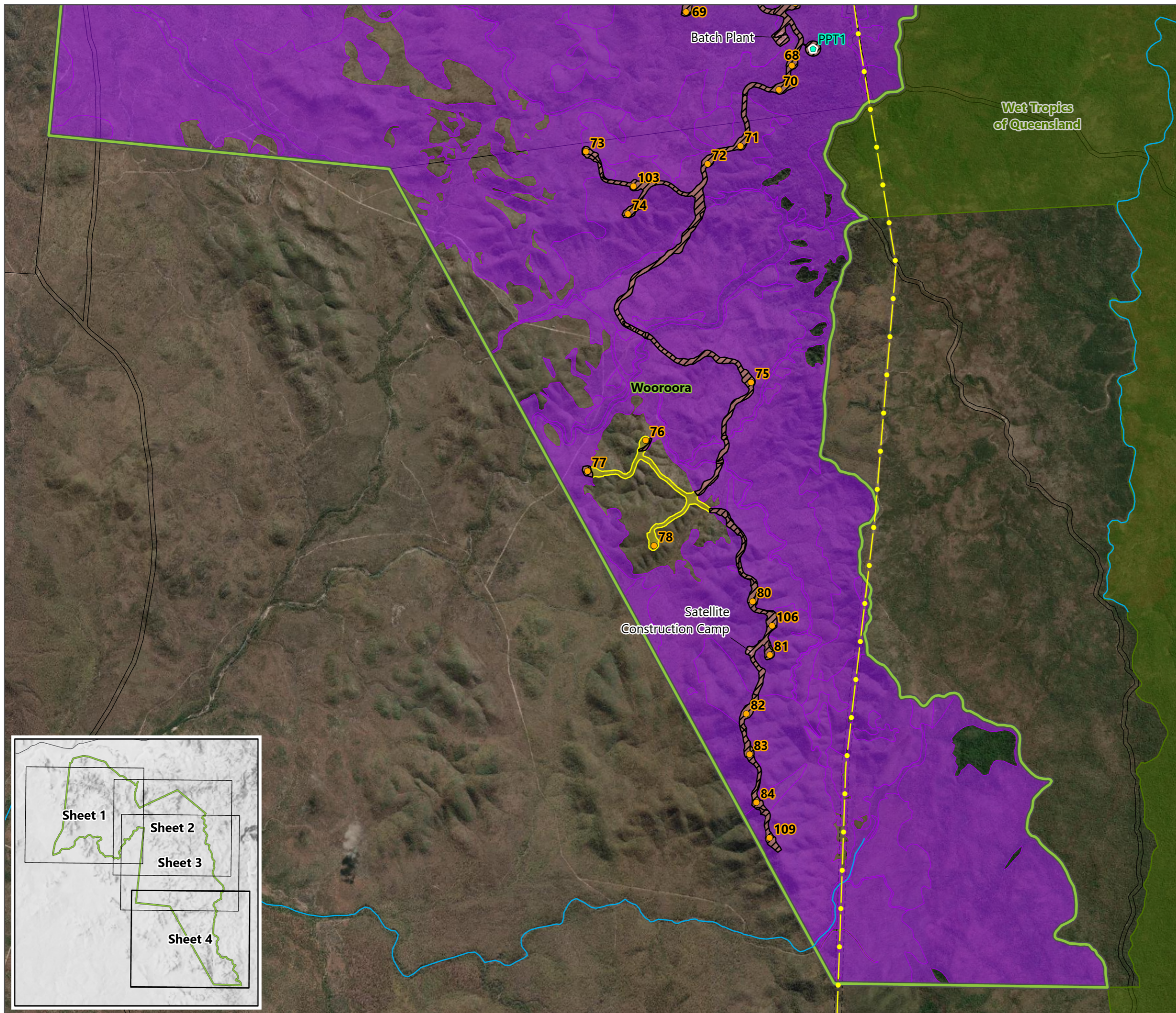
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8.6.10.2 Potential Operational Impacts from the Project and Relevant Mitigation

Potential operational impacts and proposed mitigation measures for the spectacled flying-fox are discussed in **Table 8-72**.

Table 8-72 Potential Operational Impacts and Relevant Mitigation – Spectacled Flying-fox

Potential Impact	Assessment	Mitigation
Collision risk	There is a risk of spectacled flying-fox colliding with wind turbines during Project operation as the species does fly within the RSA height.	<p>The following measures will be implemented to mitigate and manage impacts from spectacled flying-fox collision risks as much as practicable during the operational phase:</p> <ul style="list-style-type: none"> • A Bird and Bat Management Plan (BBMP) will be prepared prior to the operation of the wind turbines. The BBMP will outline a monitoring program, identify if any threatened species are significantly impacted and define a strategy that manages and mitigates any significant impacts on these species. • The availability of perches in the vicinity of turbines will be reduced. • Lighting of turbines will be limited. • Use of onsite deterrents such as ultrasonic devices will be investigated. • The presence of standing water in the vicinity of turbines will be minimised. • Operational monitoring for bats will be undertaken and compared to baseline data. Triggers for adaptive management will be included. Annual bat surveys will be undertaken in line with Project approval conditions as part of monitoring to assess whether the Project area continues to be used by species and assess any changes in abundance that may influence BBMP risk ratings. • If the Project does result in death to individual spectacled flying-foxes due to collision with a turbine during operation, offsets may be required. In accordance with the EPBC Act, these may take the form of payment into a fund to support research on the species.
Barotrauma	The risk of barotrauma to the spectacled flying-fox is considered negligible as it is known to primarily affect microbat species due to their specific physiology.	None required.



Potential Impact	Assessment	Mitigation
Bushfire risk	During operational activities, there is potential for heightened fire risk due to the increased presence of maintenance and monitoring vehicles and personnel in the Project area. This is through the use of machinery that may generate sparks, use of flammable liquids and idling vehicles being present in areas of ground vegetation.	A Bushfire Management Plan will be prepared prior to construction and will be implemented during all on-site activities. Fuel loads will be monitored and managed through activities such as controlled grazing, cool mosaic burns and weed management.
Noise and lighting	There is limited scope for indirect impacts such as noise and lighting on this species resulting from Project operation.	Noise-generating activities during the operations phase will be negligible. Night lighting during the operations phase will be limited to that required for safety and security. Low luminance, directional lighting will be used in proximity to environmentally sensitive areas.
Weed and pest incursion	The Project has the potential to facilitate the spread of weeds and pest fauna through machinery, vehicles and materials brought to site from outside the Project area.	The Project area is currently subjected to existing weed and pest impacts. During operation of the Project, weed and pest control measures will be established to minimise the risk of the Project further exacerbating the issue.

8.6.10.3 Assessment of Significant Residual Impacts

The Project may have a significant residual impact on the spectacled flying-fox (Endangered) due to the temporary loss of foraging habitat. A full significance assessment following the Significant Impact Guidelines (DoE 2013) is presented in **Table 8-73**.

Table 8-73 Significant Residual Impacts on Spectacled Flying-fox

Significant Impact Criteria	Project Outcome
Lead to a long-term decrease in the size of a population	Unlikely The presence of spectacled flying-fox has not been definitively confirmed within the Project area. Potential foraging habitat is widespread across the Project area as there is a known camp within approximately 20 km of the site. Aside from the sensitive design measures already employed for the Project, the measures proposed to manage vegetation clearing and fragmentation are expected to be effective in ensuring that the Project does not lead to a long-term decrease in the size of the Project area's spectacled flying-fox population.
Reduce the area of occupancy of the species	Unlikely The proposed habitat removal associated with the Project is not concentrated in a manner that will remove one or more 4km ² grid squares from the spectacled flying-fox's area of occupancy.



Significant Impact Criteria	Project Outcome
Fragment an existing population into two or more populations	<p>Unlikely</p> <p>The Project area contains a large area of potential habitat for the species, the majority of which will be retained within the Project area. Risks of fragmentation are considered negligible as the species is readily able to cross the maximum clearing widths associated with the Project. Aside from the sensitive design measures already employed for the Project, the measures proposed to manage vegetation clearing and fragmentation are expected to be effective in ensuring that the Project does not lead to fragmentation of an existing population into two or more populations.</p> <p>Large tracts of spectacled flying-fox habitat will remain within the Project area post clearing which are connected to larger habitats in adjacent areas. These retained and adjacent habitats will support the species and provide connectivity. Rehabilitation activities will also aim to restore habitats that will provide spectacled flying-fox foraging habitats over short to medium term.</p>
Adversely affect habitat critical to the survival of a species	<p>Likely</p> <p>Foraging habitat for the spectacled flying-fox within the Project area may be considered habitat critical to the survival of the species. The Project will require clearing of 976.1 ha of this foraging habitat for the species.</p>
Disrupt the breeding cycle of a population	<p>Unlikely</p> <p>Spectacled flying-foxes give birth to one pup a year, between October and December. Camps would be most sensitive to disturbance during this time. There are no known camps within the Project area, with the nearest being located approximately 20 km to the northeast. The Project is not expected to disrupt the breeding cycle of a population.</p>
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	<p>Unlikely</p> <p>The Project area contains extensive potential foraging habitat for the species, the majority of which will be retained within the Project area. The Project will involve the removal of 976.1 ha of potential habitat for the spectacled flying-fox.</p> <p>Large tracts of spectacled flying-fox habitat will remain within the Project area post clearing which are connected to larger habitats in adjacent areas. These retained and adjacent habitats will support the species and provide connectivity. Rehabilitation activities will also aim to restore habitats that will provide spectacled flying-fox foraging habitats over short to medium term, with the expectation that rehabilitated areas would be sufficiently established to provide suitable forage for the species within 5-10 years post-construction. Aside from the sensitive design measures already employed for the Project, the measures proposed to manage vegetation clearing and fragmentation are expected to be effective in ensuring that the Project does not lead to a decline in the species.</p>



Significant Impact Criteria	Project Outcome
<p>Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the critically endangered or endangered species' habitat</p>	<p>Unlikely</p> <p>Clearing activities associated with the Project have the potential to open up areas that may be subject to weed incursion and increased prevalence of pest fauna.</p> <p>Areas of retained vegetation will be managed, including weed and pest animal control to maintain the retained areas in good condition and reduce threats. Hygiene protocols in the operational areas will also be implemented to reduce any weeds or disease being introduced to the Project area or spread from the Project area.</p> <p>Based on implementing the proposed mitigation measures it is not expected the Project will result in an increase of invasive species in the spectacled flying-fox habitat.</p>
<p>Introduce disease that may cause the species to decline</p>	<p>Unlikely</p> <p>It is not expected that the Project will introduce disease that may cause the species to decline.</p>
<p>Interfere substantially with the recovery of the species</p>	<p>Unlikely</p> <p>The overall objectives of the National Recovery Plan for Spectacled Flying-Fox (DERM 2010) are to secure the long-term protection of the species through a reduction in the impact of threats to species' survival and to improve the standard of information available to guide recovery. Specific recovery objectives are to:</p> <ul style="list-style-type: none"> • Research practicable and cost effective flying-fox deterrent systems for commercial fruit growers; • Identify and protect native foraging habitat critical to the survival of the spectacled flying-fox; • Accurately assess the short and long term population size and population trends of the spectacled flying-fox; • Improve the public perception of the spectacled flying-fox and the standard of information available to guide recovery; • Increase knowledge of spectacled flying-fox roosting requirements and protect important camps; • Improve understanding of incidence of tick paralysis and actions to minimise paralysis mortality in flying-foxes; • Implement strategies to reduce incidence of electrocution and entanglement of spectacled flying-fox; and • Investigate the causes of birth abnormalities such as cleft palate syndrome. <p>The Project will result in clearing of 976.1 ha of native foraging habitat for the spectacled flying-fox which could be considered critical to the survival of the species. This represents 3.4 % of the foraging habitat available within the Project area and less than 1 % of the foraging habitat within the broader Study area. Clearing of habitat will be undertaken sequentially, and large areas of potential foraging habitat</p>



Significant Impact Criteria	Project Outcome
	<p>will be retained across the Project area. This availability and connectivity of foraging habitat will ensure any spectacled flying-fox within the Project area will have available foraging resources. Fire will also be managed on site to ensure hot wildfires are minimised. Rehabilitation activities will also aim to restore habitats that will provide spectacled flying-fox foraging habitats over short to medium term, with the expectation that rehabilitated areas would be sufficiently established to provide suitable forage for the species within 5-10 years post-construction.</p> <p>Large tracts of habitat will remain within the Project area which are connected to larger habitats in adjacent areas. These retained and adjacent habitats will support the species and provide connectivity and maintain gene flow for the species.</p>

8.6.11 Spotted-tailed Quoll

As discussed in **Section 4.7.11**, the spotted-tailed quoll has not been recorded within the Project area despite a survey effort of nearly 6,000 camera trap nights over the course of 11 months. In the absence of a confirmed population of spotted-tailed quoll, no habitat critical to the survival of the species has been mapped within the Project area. Preferred potential habitat has been mapped as rainforest, notophyll, mesophyll and wet sclerophyll forest above 900 m asl whilst marginal potential habitat has been mapped as these same forest types below 900 m asl.

8.6.11.1 Potential Construction Impacts from the Project and Relevant Mitigation

Approximately 112 ha of preferred potential habitat and approximately 3,341 ha of marginal potential habitat is present within the Project area. Approximately 2,255 ha of preferred potential habitat and approximately 14,687 ha of marginal potential habitat is present within the broader Study area.

The Project will require clearing of approximately 7.1 ha of preferred potential habitat and approximately 117.6 ha of marginal potential habitat for the spotted-tailed quoll. Potential construction impacts and proposed mitigation measures for the spotted-tailed quoll are discussed further in **Table 8-74**.

Table 8-74 Potential Construction Impacts and Relevant Mitigation – Spotted-tailed Quoll

Potential Impact	Assessment	Mitigation
Vegetation and habitat clearance	The Project will not lead to the clearing of any habitat critical to the survival of the species but could result in clearing of 124.7 ha of potential habitat for the species.	<p>There is no mapped critical habitat within the Project area. Large areas of potential spotted-tailed quoll habitat throughout the Project area will be retained.</p> <p>Design has sought to avoid and minimise clearing within mapped areas of potential spotted-tailed quoll habitat.</p> <p>If practical during construction, micro-siting of access tracks will seek to avoid boulder piles and large hollow-bearing trees that could support dens.</p>



Potential Impact	Assessment	Mitigation
		<p>Vegetation clearing will be minimised as much as practicable through micrositing within the proposed Project footprint.</p> <p>Project infrastructure including laydown areas, construction compounds and substation have been sited in cleared areas where practicable to avoid clearing of potential quoll habitat.</p> <p>Existing access tracks within the Project area are prioritised as part of the design to minimise any further clearing and fragmentation of vegetation communities.</p> <p>Clearing of quoll habitat will occur sequentially and in accordance with an approved Species Management Program.</p> <p>Unavoidable impacts to potential den sites will be mitigated through relocation of the den sites (particularly hollow logs and stags) into adjacent undisturbed habitat where practicable under the supervision of an appropriately trained fauna spotter catcher.</p>
<p>Fragmentation (of populations and habitat)</p>	<p>The Project could result in fragmentation through clearing of 124.7 ha of potential habitat for the species.</p>	<p>It is likely that the protected area estate adjacent to the Project area provides critical habitat for the spotted-tailed quoll, although the most recent record of the species from that area dates from 1994. Project infrastructure has been designed to avoid fragmenting potential spotted-tailed habitat on site from these larger areas of habitat to the east, with Project access roads approaching from the west instead.</p> <p>Retained vegetation will be maintained through implementation of a Vegetation Management Plan to reduce hazards from fire, pest species, degradation and other potential impacts. This will assist in maintaining the integrity of the vegetation as habitat and will reduce disturbance to surrounding habitat and conservation areas.</p> <p>Project design has sought to minimise the width of access tracks in areas of potential spotted-tailed quoll habitat.</p> <p>Construction personnel will be educated on the potential presence of spotted-tailed quoll. Off-track driving will not be permitted and reduced speed limits will be enforced in areas of potential quoll habitat, with appropriate signage on site.</p>



Potential Impact	Assessment	Mitigation
		<p>Targeted revegetation of parts of the Project footprint not required for operation will occur using tree species likely to form large hollows suitable for the spotted-tailed quoll.</p>
Weed and pest incursion	<p>The Project has the potential to facilitate the spread of weeds and pest fauna through machinery, vehicles and materials brought to site from outside the Project area. Feral cats and cane toads are both listed as known threats to the spotted-tailed quoll.</p>	<p>The Project area is currently subjected to existing weed and pest impacts, with cane toads and feral cats both prevalent on site. During construction of the Project, weed and pest control measures will be established to minimise the risk of the Project further exacerbating the issue, including feral cat control to reduce predation on the species.</p> <p>A preliminary Weed and Pest Management Plan has been prepared (see Appendix F) and includes management of weed spread (with specific advice for key identified species), management of pest infestations and monitoring effectiveness of control measures. This plan will be further developed by the Construction Contractor prior to works commencing on site.</p>
Species mortality (vehicle collision, vegetation clearance)	<p>During vegetation clearing, there is potential for direct mortality if spotted-tailed quoll are present (i.e. denning in the hollow-bearing trees to be cleared). There is also a risk of vehicle strike during construction.</p>	<p>Clearing of habitat could potentially result in significant injury or death to individual spotted-tailed quoll, however clearing operations will be conducted in accordance with the provisions outlined in a sequential clearing procedure including the use of a fauna spotter catcher and retention of potential denning habitat overnight. The process will significantly mitigate any potential impacts associated with clearing operations ensuring spotted-tailed quoll are detected, provided procedures are followed and spotters are allowed ample opportunity to check areas prior to construction. Boulder piles, hollow-bearing trees and hollow logs will be marked and inspected where possible for the presence of fauna prior to clearing. Clearing protocols will be developed including methods for clearing hollow-bearing trees (e.g. remove surrounding trees on previous day) and check for any injured species. Capture and release those healthy individuals. Any injured quolls will be taken to a vet for treatment.</p> <p>Standard construction hours (6.30am to 6.30pm) will reduce the likelihood of construction vehicles driving within spotted-tailed quoll habitat when this nocturnal species</p>



Potential Impact	Assessment	Mitigation
		is active. Construction personnel will be educated on the potential presence of spotted-tailed quoll. Off-track driving will not be permitted and reduced speed limits will be enforced in areas of potential quoll habitat, with appropriate signage on site.
Erosion and sedimentation	Construction activities may alter surface water overland flow, leading to increased erosion of suitable habitat.	A preliminary Erosion and Sediment Control Plan (ESCP) (Appendix I) and a Sediment and Erosion Management Plan (Appendix J) have been prepared for the Project and will be further developed by the Construction Contractor prior to works commencing on site. Implementation of these plans will minimise soil loss from the disturbance areas.
Reduced air quality	Construction activities have the potential to degrade spotted-tailed quoll habitat through smothering by dust.	Generally, dust is not expected to pose a significant risk in this high-rainfall area. Dust generating activities will be minimised during dry, windy conditions and areas of exposed soils will be rehabilitated as soon as practicable, to minimise dust emissions. Dust suppression (water spraying) will be used during the dry season as necessary.
Noise and vibration	Vibration from construction activities has the potential to damage or destroy spotted-tailed quoll den sites within boulder piles. Noise emissions may cause general disturbance to spotted-tailed quoll.	The need for rock blasting has not yet been confirmed. Should it be required, an assessment will be undertaken of the blast pressure zone to consider whether any potential spotted-tailed quoll den sites are at risk of being damaged or destroyed, and additional abatement measures will be developed as required. Blasting will be avoided within potential spotted-tailed quoll habitat between May and November as far as practicable, when quolls are breeding. Construction equipment will be fitted with noise reduction devices where practicable and switched off when not in use.
Light emissions	The spotted-tailed quoll is a nocturnal species and therefore may be disturbed by light emissions associated with the Project.	Standard construction work hours will generally be between 6.30am and 6.30pm, therefore site lighting will be kept to the minimum required for safety. Where necessary, construction lighting will be directed to the required areas and designed to minimise light spill to adjacent areas.
Bushfire risk	Inappropriate fire regimes are a threat to this species. The Project is not expected to increase the risk of	A Bushfire Management Plan will be prepared prior to construction and will be implemented during all on-site activities. Fuel loads will be



Potential Impact	Assessment	Mitigation
	high intensity bushfires in the Project area.	monitored and managed through activities such as controlled grazing, cool mosaic burns and weed management.

8.6.11.2 Potential Operational Impacts from the Project and Relevant Mitigation

Potential operational impacts and proposed mitigation measures for the spotted-tailed quoll are discussed in **Table 8-75**.

Table 8-75 Potential Operational Impacts and Relevant Mitigation – Spotted-tailed Quoll

Potential Impact	Assessment	Mitigation
Species mortality (vehicle collision)	Increased traffic around the Project area has the potential to kill or injure fauna on impact although traffic levels will be greatly reduced during operations compared to the construction phase and more geared towards light or medium vehicles.	Mitigation measures outlined in Section 6.0 will reduce risks associated with increased vehicle presence on site.
Bushfire risk	During operational activities, there is potential for heightened fire risk due to the increased presence of maintenance and monitoring vehicles and personnel in the Project area. This is through the use of machinery that may generate sparks, use of flammable liquids and idling vehicles being present in areas of ground vegetation.	A Bushfire Management Plan will be prepared prior to construction and will be implemented during all on-site activities. Fuel loads will be monitored and managed through activities such as controlled grazing, cool mosaic burns and weed management.
Noise and lighting	There is limited scope for indirect impacts such as noise and lighting on this species resulting from Project operation.	Noise-generating activities during the operations phase will be negligible. Night lighting during the operations phase will be limited to that required for safety and security. Low luminance, directional lighting will be used in proximity to environmentally sensitive areas.
Weed and pest incursion	The Project has the potential to facilitate the spread of weeds and pest fauna through machinery, vehicles and materials brought to site from outside the Project area.	The Project area is currently subjected to existing weed and pest impacts, with feral cats and cane toads prevalent across the site. During operation of the Project, weed and pest control measures will be established to minimise the risk of the Project further exacerbating the issue. Feral cat control will be undertaken – this will assist to reduce predation on spotted-tailed quolls.



8.6.11.3 Assessment of Significant Residual Impacts

The Project is not expected to have a significant residual impact on the spotted-tailed quoll (Endangered). A full significance assessment following the Significant Impact Guidelines (DoE 2013) is presented in **Table 8-76**.

Table 8-76 Significant Residual Impact – Spotted-tailed Quoll

Significant Impact Criteria	Project Outcome
Lead to a long-term decrease in the size of a population	<p>Unlikely</p> <p>Desktop assessment and extensive field surveys have not confirmed the presence of spotted-tailed quoll within the Project area. Potential habitat has been mapped within the Project area on a precautionary basis.</p> <p>The National recovery plan for the spotted-tailed quoll (DELWP 2016) states that all habitats within its current distribution that are known to be occupied are considered important; the Project area does not meet this definition.</p> <p>Aside from the sensitive design measures already employed for the Project, the measures proposed to manage vegetation clearing and fragmentation are expected to be effective in ensuring that the Project does not lead to a long-term decrease in the size of the Project area's spotted-tailed quoll population, should it be present.</p>
Reduce the area of occupancy of the species	<p>Unlikely</p> <p>The proposed removal of potential habitat associated with the Project is not concentrated in a manner that will remove one or more 4km² grid squares from the spotted-tailed quoll's area of occupancy.</p>
Fragment an existing population into two or more populations	<p>Unlikely</p> <p>The presence of spotted-tailed quoll has not been confirmed within the Project area, despite extensive surveys. The Project area contains potential habitat for the species and the vast majority of this habitat will be retained within the Project area.</p> <p>Risks of fragmentation are likely to be highest where access roads cross areas of potential habitat. Aside from the sensitive design measures already employed for the Project, the measures proposed to manage vegetation clearing and fragmentation are expected to be effective in ensuring that the Project does not lead to fragmentation of an existing population into two or more populations.</p> <p>Large tracts of spotted-tailed quoll habitat will remain within the Project area post clearing which are connected to larger habitats in adjacent areas. These retained and adjacent habitats will support the species and provide connectivity. Rehabilitation activities will also aim to restore habitats that will provide spotted-tailed quoll foraging habitats over the short to medium term, and denning habitat in the longer term. The Project is not expected to fragment an existing population into two or more populations.</p>
Adversely affect habitat critical to the survival of a species	<p>Unlikely</p>



Significant Impact Criteria	Project Outcome
	<p>The Project will not involve the removal of habitat critical to the survival of the species, the presence of which has not been confirmed within the Project area.</p>
<p>Disrupt the breeding cycle of a population</p>	<p>Unlikely</p> <p>Spotted-tailed quolls breed between June and September. To avoid and minimise potential impacts on spotted-tailed quoll breeding habitat and young, fauna spotter catchers will be present prior to and during clearing to check for the presence of the species and potential dens. If potential dens are to be cleared procedures will be put in place to minimise impacts to the species as outlined in a Species Management Plan. All identified suitable dens will be replaced on a 1:1 basis with suitable nest boxes for the species based on current best practice, or salvaged hollows from the cleared area. The Project is not expected to disrupt the breeding cycle of a population.</p>
<p>Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline</p>	<p>Unlikely</p> <p>The spotted-tailed quoll has not been confirmed present but the Project area does contain potential habitat for the species. The vast majority of this habitat will be retained within the Project area. Nevertheless, the Project will involve the removal of 124.7 ha of potential habitat for the spotted-tailed quoll.</p> <p>Large tracts of spotted-tailed quoll habitat will remain within the Project area post clearing which are connected to larger habitats in adjacent areas. These retained and adjacent habitats will support the species and provide connectivity. Rehabilitation activities will also aim to restore habitats that will provide spotted-tailed quoll foraging habitats over the short to medium term, and denning habitat in the longer term. Aside from the sensitive design measures already employed for the Project, the measures proposed to manage vegetation clearing and fragmentation are expected to be effective in ensuring that the Project does not lead to a decline in the species.</p>
<p>Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the critically endangered or endangered species' habitat</p>	<p>Unlikely</p> <p>Feral cats and cane toads are known threats to the spotted-tailed quoll and both are prevalent within the Project area. Clearing activities associated with the Project have the potential to open up areas that may be subject to weed incursion and increased prevalence of pest fauna.</p> <p>Areas of retained vegetation will be managed, including weed and pest animal control to maintain the retained areas in good condition and reduce threats. Hygiene protocols in the operational areas will also be implemented to reduce any weeds or disease being introduced to the Project area or spread from the Project area.</p> <p>Based on implementing the proposed mitigation measures it is not expected the Project will result in an increase of invasive species in the spotted-tailed quoll habitat.</p>
<p>Introduce disease that may cause the species to decline</p>	<p>Unlikely</p>



Significant Impact Criteria	Project Outcome
	It is not expected that the Project will introduce disease that may cause the species to decline.
Interfere substantially with the recovery of the species	<p>Unlikely</p> <p>The strategy of recovery for the spotted-tailed quoll is to focus on reducing the impact of threatening processes throughout the species' range and subsequently halt the current decline in its distribution and abundance.</p> <p>The Project is not expected to interfere substantially with the recovery of the species, the presence of which has not been confirmed. Clearing of habitat will be undertaken sequentially, and large areas of potential habitat will be retained across the Project area. This availability and connectivity of foraging and breeding habitat will ensure any spotted-tailed quoll within the Project area will have available foraging and breeding resources. Fire will also be managed on site to ensure hot wildfires are minimised and potential den sites protected.</p> <p>Large tracts of habitat will remain within the Project area which are connected to larger habitats in adjacent areas. These retained and adjacent habitats will support the species and provide connectivity and maintain gene flow for the species.</p>

8.6.12 Yellow-bellied Glider

As discussed in **Section 4.7.12**, one yellow-bellied glider was recorded during spotlighting surveys in June 2021, within the WTQWHA and just outside the north-eastern boundary of the Project area. Across the Project area, denning habitat has been mapped as eucalypt forest with *Eucalyptus grandis* dominant or sub-dominant whilst foraging habitat has been mapped as eucalypt vegetation containing *E. resinifera* and/or *Syncarpia glomulifera* within 1 km of potential denning habitat.

8.6.12.1 Potential Construction Impacts from the Project and Relevant Mitigation

Approximately 23 ha of potential denning habitat and 977 ha of potential foraging habitat occurs within the Project area, with 1,683 ha of potential denning habitat and 8,285 ha of potential foraging habitat within the broader Study area.

No potential denning habitat and approximately 28.1 ha of potential foraging habitat will require clearing for construction. Potential construction impacts and proposed mitigation measures for the yellow-bellied glider are discussed further in **Table 8-77**.

Table 8-77 Potential Construction Impacts and Proposed Mitigation – Yellow-bellied Glider

Potential Impact	Assessment	Proposed Mitigation
Vegetation and habitat clearance	The Project will not lead to the clearing of any critical habitat. Approximately 28.1 ha of potential foraging habitat for the species.	Large areas of potential foraging habitat throughout the Project area will be retained. The Project design has sought to avoid and minimise clearing within potential habitat.



Potential Impact	Assessment	Proposed Mitigation
		<p>Vegetation clearing will be minimised as much as practicable through micro-siting within the proposed Project footprint.</p> <p>Project infrastructure including laydown areas, construction compounds and substation have been sited in cleared areas where practicable to avoid clearing of potential habitat.</p> <p>Clearing of yellow-bellied glider habitat will occur sequentially and in accordance with an approved Species Management Program.</p> <p>Impacts to yellow-bellied glider habitat are generally restricted to access track and overhead transmission line crossings of riparian environments; the turbines and hardstands are located primarily on elevated ridgelines where there is less suitable habitat for the species.</p>
<p>Fragmentation (of populations and habitat)</p>	<p>Clearing of vegetation for the creation of Project access roads can isolate populations, fragment habitat and increase the risk of predation. TSSC 2020 notes that gaps in habitat of over 50 m can act as dispersal barriers to the nominate subspecies and that the same is likely to apply to the Wet Tropics subspecies.</p>	<p>Existing access tracks within the Project area were prioritised as part of the design to minimise any further clearing and fragmentation of vegetation communities.</p> <p>Vegetation clearing will be minimised as much as practicable through micro-siting within the proposed Project footprint.</p> <p>Retained vegetation will be maintained through implementation of a Vegetation Management Plan to reduce hazards from fire, pest species, degradation and other potential impacts. This will assist in maintaining the integrity of the vegetation as habitat and will reduce disturbance to surrounding habitat and conservation areas.</p> <p>Areas cleared for construction that are not required for the operational footprint will be sequentially rehabilitated as soon as practicable following construction.</p>
<p>Weed and pest incursion</p>	<p>The Project has the potential to facilitate the spread of weeds and pest fauna through machinery, vehicles and materials brought to site from outside the Project area. Predation by feral cats is a known threat to the species</p>	<p>The Project area is currently subjected to existing weed and pest impacts, including an established population of feral cats. During construction of the Project, weed and pest control measures will be established to minimise the risk of the Project further exacerbating the issue.</p> <p>A preliminary Weed and Pest Management Plan has been prepared (see Appendix F) and includes management of weed spread (with specific advice for key identified species), management of pest infestations and monitoring effectiveness of control measures. This plan will</p>



Potential Impact	Assessment	Proposed Mitigation
Species mortality (vehicle collision, vegetation clearance)	<p>The Project will not lead to the clearing of any critical or potential denning habitat for the species therefore direct mortality during clearing is not expected.</p> <p>The risk of vehicle strike is negligible.</p>	<p>be further developed by the Construction Contractor prior to works commencing on site.</p> <p>Clearing of habitat could potentially result in significant injury or death to individual yellow-bellied gliders, however no clearing of critical or denning habitat is proposed. Generally, clearing operations will be conducted in accordance with the provisions outlined in a sequential clearing procedure including the use of a fauna spotter catcher and retention of habitat trees overnight. This will significantly mitigate any potential impacts associated with clearing operations ensuring yellow-bellied gliders are detected providing procedures are followed and spotters are allowed ample opportunity to check trees before felling. Hollow-bearing trees will be marked and hollows inspected where possible for the presence of arboreal fauna prior to tree-felling. Clearing protocols will be developed including methods for clearing hollow-bearing trees (e.g. remove surrounding trees on previous day) and check for any injured species. Capture and release those healthy individuals. Any injured gliders will be taken to a vet for treatment.</p> <p>Where practicable, dead standing timber and living, hollow-bearing trees should be retained. The use of barbed wire as the top strand of fences will be avoided if practical.</p>
Erosion and sedimentation	<p>The yellow-bellied glider is unlikely to be directly impacted by erosion and reduced water quality resulting from Project construction.</p>	<p>A preliminary Erosion and Sediment Control Plan (ESCP) (Appendix I) and a Sediment and Erosion Management Plan (Appendix J) have been prepared for the Project and will be further developed by the Construction Contractor prior to works commencing on site. Implementation of these plans will minimise soil loss from the disturbance areas.</p>
Noise and lighting	<p>As the yellow-bellied glider is a nocturnal species, there is the potential for it to be disturbed by noise and lighting impacts during Project construction.</p>	<p>Standard construction work hours will generally be between 6.30am and 6.30pm, therefore site lighting will be kept to the minimum required for safety. Where necessary, construction lighting will be directed to the required areas and designed to minimise light spill to adjacent areas. Construction equipment will be fitted with noise reduction devices where practicable and switched off when not in use</p>



Potential Impact	Assessment	Proposed Mitigation
Dust emissions	There is limited scope for indirect impacts from dust emissions on this species resulting from Project construction	Generally, dust is not expected to pose a significant risk in this high-rainfall area. Dust generating activities will be minimised during dry, windy conditions and areas of exposed soils will be rehabilitated as soon as practicable, to minimise dust emissions. Dust suppression (water spraying) will be used during the dry season as necessary.
Bushfire risk	Inappropriate fire regimes are a known threat to this species. The Project is not expected to increase the risk of high intensity bushfires in the Project area.	A Bushfire Management Plan will be prepared prior to construction and will be implemented during all on-site activities. Fuel loads will be monitored and managed through activities such as controlled grazing, cool mosaic burns and weed management.

8.6.12.2 Potential Operational Impacts from the Project and Relevant Mitigation

Potential operational impacts and proposed mitigation measures for the yellow-bellied glider are discussed in **Table 8-78**.

Table 8-78 Potential Operational Impacts and Proposed Mitigation – Yellow-bellied Glider

Potential Impact	Assessment	Proposed Mitigation
Species mortality (vehicle collision)	Increased traffic around the Project area has the potential to kill or injure fauna on impact although traffic levels will be greatly reduced during operations compared to the construction phase and more geared towards light or medium vehicles.	Mitigation measures outlined in Section 6.0 will reduce risks associated with increased vehicle presence on site.
Bushfire risk	During operational activities, there is potential for heightened fire risk due to the increased presence of maintenance and monitoring vehicles and personnel in the Project area. This is through the use of machinery that may generate sparks, use of flammable liquids and idling vehicles being present in areas of ground vegetation.	A Bushfire Management Plan will be prepared prior to construction and will be implemented during all on-site activities. Fuel loads will be monitored and managed through activities such as controlled grazing, cool mosaic burns and weed management.
Noise and lighting	There is limited scope for indirect impacts such as noise and lighting	Noise-generating activities during the operations phase will be negligible.



Potential Impact	Assessment	Proposed Mitigation
	on this species resulting from Project operation.	Night lighting during the operations phase will be limited to that required for safety and security. Low luminance, directional lighting will be used in proximity to environmentally sensitive areas.
Weed and pest incursion	The Project has the potential to facilitate the spread of weeds and pest fauna through machinery, vehicles and materials brought to site from outside the Project area.	The Project area is currently subjected to existing weed and pest impacts. During operation of the Project, weed and pest control measures will be established to minimise the risk of the Project further exacerbating the issue.

8.6.12.3 Assessment of Significant Residual Impacts

The Project is unlikely to have a significant residual impact on yellow-bellied glider (Endangered). A full significance assessment following the Significant Impact Guidelines (DoE 2013) is presented in **Table 8-79**.

Table 8-79 Significant Residual Impact – Yellow-bellied Glider

Significant Impact Criteria	Project Outcome
Lead to a long-term decrease in the size of a population	Unlikely There is no critical habitat for yellow-bellied glider within the Project area. There is also no clearing of potential denning habitat proposed. Only one observation of a yellow-bellied glider was recorded for a survey effort of 68 person-hours of spotlighting; this observation was just outside the Project area within the Wet Tropics WHA. The nearest proposed Project infrastructure is approximately 2 km from this location. Aside from the sensitive design measures already employed for the Project, the measures proposed to manage vegetation clearing and fragmentation are expected to be effective in ensuring that the Project does not lead to a long-term decrease in the size of the Project area's yellow-bellied population.
Reduce the area of occupancy of the species	Unlikely Project infrastructure has been sited to avoid any clearing of habitat critical to the survival of the yellow-bellied glider.
Fragment an existing population into two or more populations	Unlikely Project infrastructure has been sited to avoid any clearing of habitat critical to the survival of the yellow-bellied glider (including potential denning habitat), thereby avoiding fragmentation of the species' population.
Adversely affect habitat critical to the survival of a species	Likely The Project will not involve the removal of any critical habitat for the yellow-bellied glider.
Disrupt the breeding cycle of a population	Unlikely



Significant Impact Criteria	Project Outcome
	<p>Yellow-bellied gliders preferentially den in <i>Eucalyptus grandis</i>-dominated forests. The Project has been designed to avoid clearing any of this habitat. To further minimise the risk of impacts on yellow-bellied glider breeding habitat and young, fauna spotter catchers will be present prior to and during clearing to check for the presence of the species and hollow-bearing trees. When hollow-bearing trees are cleared procedures will be put in place to minimise impacts to the species. Procedures will then be put in place to ensure impacts are minimised through retaining the hollow-bearing trees for another 24-48 hours while adjacent trees are cleared to allow species to vacate the hollows overnight. These measures will be outlined in a Species Management Plan. All identified suitable yellow-bellied glider hollows will be replaced on a 1:1 basis with suitable nest boxes for the species based on current best practice, or salvaged hollows from the cleared area. The Project is not expected to disrupt the breeding cycle of a population.</p>
<p>Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline</p>	<p>Unlikely</p> <p>The Project will not involve the removal of any critical habitat for the yellow-bellied glider, nor any potential denning habitat.</p> <p>Aside from the sensitive design measures already employed for the Project, the measures proposed to manage vegetation clearing and fragmentation are expected to be effective in ensuring that the Project does not lead to a decline in the species.</p>
<p>Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the critically endangered or endangered species' habitat</p>	<p>Unlikely</p> <p>Clearing activities associated with the Project have the potential to open up areas that may be subject to weed incursion and increased prevalence of pest fauna.</p> <p>No clearing is proposed within critical habitat for yellow-bellied glider. Areas of retained vegetation will be managed, including weed and pest animal control to maintain the retained areas in good condition and reduce threats. Hygiene protocols in the operational areas will also be implemented to reduce any weeds or disease being introduced to the Project area or spread from the Project area.</p> <p>Based on implementing the proposed mitigation measures it is not expected the Project will result in an increase of invasive species in the yellow-bellied glider habitat.</p>
<p>Introduce disease that may cause the species to decline</p>	<p>Unlikely</p> <p>No specific disease is applicable to the yellow-bellied glider. It is not expected that the Project will introduce disease that may cause the species to decline.</p>
<p>Interfere substantially with the recovery of the species</p>	<p>Unlikely</p> <p>The Project is not expected to interfere substantially with the recovery of the species. No clearing of critical habitat is proposed, and any yellow-bellied glider within the Project area will continue to have available foraging and breeding resources. Fire will also be managed on</p>



Significant Impact Criteria	Project Outcome
	site to ensure hot wildfires are minimised and hollow-bearing trees protected.

8.7 Listed Threatened Reptile Species

8.7.1 Atherton Delma

As discussed in **Section 4.8.1.4**, the Atherton delma has not been recorded within the Project area. Nonetheless, potential habitat has been mapped as wet sclerophyll forests.

8.7.1.1 Potential Construction Impacts from the Project and Relevant Mitigation

Approximately 3,380 ha of potential habitat for the Atherton delma has been mapped within the Project area, and approximately 16,451 ha within the broader Study area.

The Project will require clearing of approximately 117.5 ha of potential habitat for the Atherton delma during Stage 1 and zero during Stage 2. Potential construction impacts and proposed mitigation measures for the Atherton delma are discussed further in **Table 8-80**.

Table 8-80 Potential Construction Impacts and Proposed Mitigation – Atherton Delma

Potential Impact	Assessment	Mitigation
Vegetation and habitat clearance	The Project will result in clearing of 117.5 ha of potential habitat for the species.	<p>There is no mapped critical habitat within the Project area. Large areas of potential Atherton delma habitat throughout the Project area will be retained.</p> <p>Design has sought to avoid and minimise clearing within wet sclerophyll forests which are potential habitat for the species.</p> <p>Vegetation clearing will be minimised as much as practicable through micro-siting within the proposed Project footprint.</p> <p>Project infrastructure including laydown areas, construction compounds and substation have been sited in cleared areas where practicable to avoid clearing of potential Atherton delma habitat.</p> <p>Existing access tracks within the Project area are prioritised as part of the design to minimise any further clearing and fragmentation of vegetation communities.</p> <p>Clearing of Atherton delma habitat will occur sequentially and in accordance with an approved Species Management Program.</p>



Potential Impact	Assessment	Mitigation
Fragmentation (of populations and habitat)	<p>The Project could result in fragmentation through clearing of 117.5 ha of potential habitat for the species.</p>	<p>Retained vegetation will be maintained through implementation of a Vegetation Management Plan to reduce hazards from fire, pest species, degradation and other potential impacts. This will assist in maintaining the integrity of the vegetation as habitat and will reduce disturbance to surrounding habitat and conservation areas.</p> <p>Project design has sought to minimise the width of access tracks in areas of potential Atherton delma habitat.</p> <p>Construction personnel will be educated on the potential presence of Atherton delma. Off-track driving will not be permitted and reduced speed limits will be enforced in areas of potential habitat, with appropriate signage on site.</p> <p>Targeted revegetation of parts of the Project footprint not required for operation will occur using wet sclerophyll trees preferred by the species.</p>
Weed and pest incursion	<p>The Project has the potential to facilitate the spread of weeds and pest fauna through machinery, vehicles and materials brought to site from outside the Project area.</p>	<p>The Project area is currently subjected to existing weed and pest impacts. During construction of the Project, weed and pest control measures will be established to minimise the risk of the Project further exacerbating the issue.</p> <p>A preliminary Weed and Pest Management Plan has been prepared (see Appendix F) and includes management of weed spread (with specific advice for key identified species), management of pest infestations and monitoring effectiveness of control measures. This plan will be further developed by the Construction Contractor prior to works commencing on site.</p>
Species mortality (vehicle collision, vegetation clearance)	<p>During vegetation clearing, there is potential for direct mortality if Atherton delma are present. There is also a risk of vehicle strike during construction.</p>	<p>Clearing of habitat could potentially result in significant injury or death to individual Atherton delma, however clearing operations will be conducted in accordance with the provisions outlined in a sequential clearing procedure including the use of a fauna spotter catcher. The process will significantly mitigate any potential impacts associated with clearing operations ensuring Atherton delmas are detected, provided procedures are followed and spotters are allowed ample opportunity to</p>



Potential Impact	Assessment	Mitigation
		<p>check areas prior to construction. Capture and release those healthy individuals. Any injured delmas will be taken to a vet for treatment.</p> <p>Off-track driving will not be permitted and reduced speed limits will be enforced in areas of potential Atherton delma habitat, with appropriate signage on site.</p>
Erosion and sedimentation	Construction activities may alter surface water overland flow, leading to increased erosion of suitable habitat.	A preliminary Erosion and Sediment Control Plan (ESCP) (Appendix I) and a Sediment and Erosion Management Plan (Appendix J) have been prepared for the Project and will be further developed by the Construction Contractor prior to works commencing on site. Implementation of these plans will minimise soil loss from the disturbance areas.
Reduced air quality	Construction activities have the potential to degrade Atherton delma habitat through smothering by dust.	Generally, dust is not expected to pose a significant risk in this high-rainfall area. Dust generating activities will be minimised during dry, windy conditions and areas of exposed soils will be rehabilitated as soon as practicable, to minimise dust emissions. Dust suppression (water spraying) will be used during the dry season as necessary.
Noise and lighting	There is the potential for Atherton delmas it be disturbed by noise and lighting impacts during Project construction.	Standard construction work hours will generally be between 6.30am and 6.30pm, therefore site lighting will be kept to the minimum required for safety. Where necessary, construction lighting will be directed to the required areas and designed to minimise light spill to adjacent areas. Construction equipment will be fitted with noise reduction devices where practicable and switched off when not in use
Bushfire risk	Inappropriate fire regimes are a potential threat to this species. The Project is not expected to increase the risk of high intensity bushfires in the Project area.	A Bushfire Management Plan will be prepared prior to construction and will be implemented during all on-site activities. Fuel loads will be monitored and managed through activities such as controlled grazing, cool mosaic burns and weed management.

8.7.1.2 Potential Operational Impacts from the Project and Relevant Mitigation

Potential operational impacts and proposed mitigation measures for the Atherton delma are discussed in **Table 8-81**.



Table 8-81 Potential Operational Impacts and Proposed Mitigation – Atherton Delma

Potential Impact	Assessment	Mitigation
Species mortality (vehicle collision)	Increased traffic around the Project area has the potential to kill or injure fauna on impact although traffic levels will be greatly reduced during operations compared to the construction phase and more geared towards light or medium vehicles.	Mitigation measures outlined in Section 6.0 will reduce risks associated with increased vehicle presence on site.
Bushfire risk	During operational activities, there is potential for heightened fire risk due to the increased presence of maintenance and monitoring vehicles and personnel in the Project area. This is through the use of machinery that may generate sparks, use of flammable liquids and idling vehicles being present in areas of ground vegetation.	A Bushfire Management Plan will be prepared prior to construction and will be implemented during all on-site activities. Fuel loads will be monitored and managed through activities such as controlled grazing, cool mosaic burns and weed management.
Noise and lighting	There is limited scope for indirect impacts such as noise and lighting on this species resulting from Project operation.	Noise-generating activities during the operations phase will be negligible. Night lighting during the operations phase will be limited to that required for safety and security. Low luminance, directional lighting will be used in proximity to environmentally sensitive areas.
Weed and pest incursion	The Project has the potential to facilitate the spread of weeds and pest fauna through machinery, vehicles and materials brought to site from outside the Project area.	The Project area is currently subjected to existing weed and pest impacts. During operation of the Project, weed and pest control measures will be established to minimise the risk of the Project further exacerbating the issue.

8.7.1.3 Assessment of Significant Residual Impacts

The Project is not expected to have a significant residual impact on the Atherton delma (Vulnerable). A full significance assessment following the Significant Impact Guidelines (DoE 2013) is presented in **Table 8-82**.

Table 8-82 Significant Residual Impact Assessment – Atherton Delma

Significant Impact Criteria	Assessment
Lead to a long-term decrease in the size of an important population of a species	Unlikely Desktop assessment and field surveys have not confirmed the presence of Atherton delma within the Project area. Potential habitat has been mapped within the Project area on a precautionary basis. The Project



Significant Impact Criteria	Assessment
	<p>area is not considered to support an important population of Atherton delma.</p> <p>Aside from the sensitive design measures already employed for the Project, the measures proposed to manage vegetation clearing and fragmentation are expected to be effective in ensuring that the Project does not lead to a long-term decrease in the size of the Project area's Atherton delma's population, should it be present.</p>
Reduce the area of occupancy of an important population	<p>Unlikely</p> <p>The Project area is not considered to support an important population of Atherton delma. The proposed removal of potential habitat associated with the Project is not concentrated in a manner that will remove one or more 4km² grid squares from the Atherton delma's area of occupancy.</p>
Fragment an existing important population into two or more populations	<p>Unlikely</p> <p>The presence of Atherton delma has not been confirmed within the Project area. The Project area contains potential habitat for the species and the vast majority of this habitat will be retained within the Project area.</p> <p>Risks of fragmentation are likely to be highest where access roads cross areas of potential habitat. Aside from the sensitive design measures already employed for the Project, the measures proposed to manage vegetation clearing and fragmentation are expected to be effective in ensuring that the Project does not lead to fragmentation of an existing population into two or more populations.</p> <p>Large tracts of Atherton delma habitat will remain within the Project area post clearing which are connected to larger habitats in adjacent areas. These retained and adjacent habitats will support the species and provide connectivity. Rehabilitation activities will also aim to restore habitats that will provide Atherton delma habitat. The Project is not expected to fragment an existing important population into two or more populations.</p>
Adversely affect habitat critical to the survival of a species	<p>Unlikely</p> <p>The Project will not involve the removal of habitat critical to the survival of the species, the presence of which has not been confirmed within the Project area.</p>
Disrupt the breeding cycle of an important population	<p>Unlikely</p> <p>To avoid and minimise potential impacts on Atherton delma breeding habitat and young, fauna spotter catchers will be present prior to and during clearing to check for the presence of the species. The Project is not expected to disrupt the breeding cycle of an important population.</p>
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	<p>Unlikely</p> <p>The Atherton delma has not been confirmed present but the Project area does contain potential habitat for the species. The vast majority of this habitat will be retained within the Project area. Nevertheless, the</p>



Significant Impact Criteria	Assessment
	<p>Project will involve the removal of 117.5 ha of potential habitat for the Atherton delma.</p> <p>Large tracts of Atherton delma habitat will remain within the Project area post clearing which are connected to larger habitats in adjacent areas. These retained and adjacent habitats will support the species and provide connectivity. Rehabilitation activities will also aim to restore habitats that will provide Atherton delma habitat. Aside from the sensitive design measures already employed for the Project, the measures proposed to manage vegetation clearing and fragmentation are expected to be effective in ensuring that the Project does not lead to a decline in the species.</p>
<p>Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat</p>	<p>Unlikely</p> <p>A number of invasive species (such as feral cats and feral pigs) are prevalent within the Project area. Clearing activities associated with the Project have the potential to open up areas that may be subject to weed incursion and increased prevalence of pest fauna.</p> <p>Areas of retained vegetation will be managed, including weed and pest animal control to maintain the retained areas in good condition and reduce threats. Hygiene protocols in the operational areas will also be implemented to reduce any weeds or disease being introduced to the Project area or spread from the Project area.</p> <p>Based on implementing the proposed mitigation measures it is not expected the Project will result in an increase of invasive species in the Atherton delma habitat.</p>
<p>Introduce disease that may cause the species to decline</p>	<p>Unlikely</p> <p>It is not expected that the Project will introduce disease that may cause the species to decline.</p>
<p>Interfere substantially with the recovery of the species</p>	<p>Unlikely</p> <p>The Project is not expected to interfere substantially with the recovery of the species, the presence of which has not been confirmed. Clearing of habitat will be undertaken sequentially, and large areas of potential habitat will be retained across the Project area. This availability and connectivity of foraging and breeding habitat will ensure any Atherton delma within the Project area will have available foraging and breeding resources. Fire will also be managed on site to ensure hot wildfires are minimised.</p> <p>Large tracts of habitat will remain within the Project area which are connected to larger habitats in adjacent areas. These retained and adjacent habitats will support the species and provide connectivity and maintain gene flow for the species.</p>



8.8 Listed Threatened Migratory Species

8.8.1 Black-faced Monarch

As discussed in **Section 4.9.1**, a single black-faced monarch was recorded on site in January 2021. Important and potential habitat (sub-optimal) has been mapped within the Project area and Project infrastructure has been aligned to avoid all important habitat. Potential habitat has also been avoided to a large extent, and where this has not been possible, the mitigation measures described below will be implemented.

8.8.1.1 Potential Construction Impacts from the Project and Relevant Mitigation

Approximately 121 ha of important habitat and 2,728 ha of potential (sub-optimal) habitat for black-faced monarch occurs within the Project area; approximately 31,113 ha of important habitat and 14,653 ha of potential (sub-optimal) habitat for black-faced monarch occurs within the broader Study area, with the latter based on DoR's mapping of relevant rEs rather than the more detailed vegetation community mapping undertaken for the Project area.

No important habitat for black-faced monarch will be cleared for the Project. Approximately 83 ha of potential (sub-optimal) habitat will require clearing for construction.

Potential construction impacts and proposed mitigation measures for black-faced monarch are discussed further in **Table 8-83**.

Table 8-83 Potential Construction Impacts and Relevant Mitigation – Black-faced Monarch

Potential Impact	Assessment	Mitigation
Vegetation/habitat clearance	Only one individual has been recorded within the Project area in a full year's worth of seasonal surveys. There is minimal important habitat (i.e. rainforest vegetation) for the species within the Project area.	The Project design has avoided all important habitat for the black-faced monarch. Potential (sub-optimal) habitat has also been avoided as far as possible, with infrastructure such as construction compounds, batching plant and substations sited outside of this habitat. Clearing of potential (sub-optimal) habitat will be minimised as much as practicable through micro-siting within the proposed Project footprint. Clearing of potential (sub-optimal) black-faced monarch habitat will occur sequentially and in accordance with an approved Species Management Program.
Fragmentation	The Project may lead to the clearing of approximately 83 ha of potential (sub-optimal) habitat for the species.	Potential (sub-optimal) habitat is located in discrete patches along the eastern boundary of the Project area. The Project has been designed to minimise fragmentation of these habitats (from each other and from the much larger area of habitat to east, within the WTQWHA) with access tracks approaching from the west. Areas cleared for construction that are not required for the operational footprint will be



Potential Impact	Assessment	Mitigation
		sequentially rehabilitated as soon as practicable following construction.
Erosion and water quality	The black-faced monarch is unlikely to be directly impacted by impacts from erosion and reduced water quality resulting from Project construction.	A preliminary Erosion and Sediment Control Plan (ESCP) (Appendix I) and a Sediment and Erosion Management Plan (Appendix J) have been prepared for the Project and will be further developed by the Construction Contractor prior to works commencing on site. Implementation of these plans will minimise soil loss from the disturbance areas.
Bushfire risk	Inappropriate fire regimes may be a threat to this species. The Project is not expected to increase the risk of high intensity bushfires in the Project area.	A certified Bushfire Management Plan will be prepared prior to construction and will be implemented during all on-site activities. Fuel loads will be monitored and managed through activities such as controlled grazing, cool mosaic burns and weed management.
Noise and lighting	There is limited scope for indirect impacts such as noise and lighting on this species resulting from Project construction.	Standard construction work hours will generally be between 6.30am and 6.30pm, therefore site lighting will be kept to the minimum required for safety. Where necessary, construction lighting will be directed to the required areas and designed to minimise light spill to adjacent areas. Construction equipment will be fitted with noise reduction devices where practicable and switched off when not in use.
Dust emissions	There is limited scope for indirect impacts from dust emissions on this species resulting from Project construction.	Generally, dust is not expected to pose a significant risk in this high-rainfall area. Dust generating activities will be minimised during dry, windy conditions and areas of exposed soils will be rehabilitated as soon as practicable, to minimise dust emissions. Dust suppression (water spraying) will be used during the dry season as necessary.
Weeds and pests	Weeds and pest fauna (such as feral cats) are both known threats of the black-faced monarch. The Project area is currently subjected to existing weed and pest impacts, including an established feral cat population.	During construction of the Project, weed and pest control measures will be established to minimise the risk of the Project further exacerbating the issue. A preliminary Weed and Pest Management Plan has been prepared (see Appendix F) and includes management of weed spread (with specific advice for key identified species), management of pest infestations and monitoring effectiveness of control measures. Specifically, feral cat control will be undertaken in line with the <i>Threat abatement plan for predation by feral cats</i> (DoE 2015c),



Potential Impact	Assessment	Mitigation
		which will assist in reducing potential predation on black-faced monarch. This plan will be further developed by the Construction Contractor prior to works commencing on site.

8.8.1.2 Potential Operational Impacts from the Project and Relevant Mitigation

Potential impacts to black-faced monarch during the operations phase will be limited, as outlined in **Table 8-84**.

Table 8-84 Potential Operational Impacts and Relevant Mitigation – Black-faced Monarch

Potential Impact	Assessment	Mitigation
Collision risk	The black-faced monarch typically forages within 6 m of the ground (SPRAT 2021), well below RSA. The risk of collision with the wind turbines is therefore considered negligible.	A preliminary Bird and Bat Management Plan (BBMP) has been developed (see Appendix G) based on the three seasonal bird utilisation surveys (BUS) undertaken to take. This preliminary BBMP presents the results of a risk assessment, describes the operational monitoring for the site utilisation of birds and bats (compared to baseline data) and protocols for carcass searches to enable detection of any mortality. Triggers for adaptive management are also included. Additional seasonal BUS are planned and the BBMP will be updated as necessary prior to the wind farm being commissioned.
Bushfire risk	The increased presence of construction personnel, vehicles and machinery in the Project area during operational activities may lead to elevated bushfire risk unless adequately mitigated.	A certified Bushfire Management Plan will be prepared prior to construction and will be implemented during all on-site activities. Fuel loads will be monitored and managed through activities such as controlled grazing, cool mosaic burns and weed management.
Noise and lighting	There is limited scope for indirect impacts such as noise and lighting on this species resulting from Project operation. Lighting of turbines during operation may lead to increased insect numbers in the vicinity of turbine structures. This may attract insectivorous species such as the black-faced monarch to the area around structures, increasing collision risk. However, it is exclusively a diurnal species and primarily forages below the canopy, and therefore the	Noise-generating activities during the operations phase will be negligible. Night lighting during the operations phase will be limited to that required for safety and security. Low luminance, directional lighting will be used in proximity to environmentally sensitive areas.



Potential Impact	Assessment	Mitigation
	mechanism for increased impacts from lighting is negligible.	
Weeds and pests	Weeds and pest fauna (such as feral cats) are both known threats of the black-faced monarch. The Project area is currently subjected to existing weed and pest impacts, including an established feral cat population.	During operation of the Project, weed and pest control measures will be established and implemented to minimise the risk of the Project further exacerbating this issue.
Vehicle strike	The potential for species mortality during operation of the Project is very low (beyond that already assessed for collision with turbine structures).	Access roads within the Project area will be speed restricted, with signage placed at key locations. All operational traffic will be confined to designated access roads. Appropriate procedures for managing injured wildlife will be developed and implemented through the Operations EMP.

8.8.1.3 Assessment of Significant Residual Impacts

The Project is not expected to have a significant residual impact on the black-faced monarch. A full significance assessment following the Significant Impact Guidelines (DoE 2013) is presented in Table 8-85.

Table 8-85 Significant Residual Impact Assessment – Black-faced Monarch

Significant Impact Criteria	Project Outcome
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	<p>Unlikely</p> <p>The <i>Referral guideline for 14 birds listed as migratory species</i> (DoE 2015a) identifies that an area of impact on important habitat that is likely to result in a significant impact is 2,600 ha (in relation to the global population) or 260 ha (in relation to the national population).</p> <p>The Project will not result in any direct or indirect impacts to important habitat for the black-faced monarch.</p>
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	<p>Unlikely</p> <p>The Project area is currently subjected to existing weed and pest impacts. During construction of the Project, weed and pest control measures will be established to minimise the risk of the Project further exacerbating the issue.</p> <p>A preliminary Weed and Pest Management Plan has been prepared (see Appendix F) and includes management of weed spread (with specific advice for key identified species), management of pest infestations and monitoring effectiveness of control measures. Specifically, feral cat control will be undertaken in line with the <i>Threat abatement plan for predation by feral cats</i> (DoE 2015c), which will assist in reducing potential</p>



Significant Impact Criteria	Project Outcome
	<p>predation on black-faced monarch. This plan will be further developed by the Construction Contractor prior to works commencing on site.</p> <p>The Project area contains minimal important habitat for the black-faced monarch and this has been avoided by all Project infrastructure (including the use of existing access tracks).</p>
<p>Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species</p>	<p>Unlikely</p> <p>The <i>Referral guideline for 14 birds listed as migratory species</i> (DoE 2015a) identifies an ecologically significant proportion of the population of black-faced monarch to be 4,600 birds in relation to the global population and 460 birds in relation to the national population.</p> <p>Given the very small amount of important habitat for black-faced monarch within the Project area, and the fact that only one individual has been recorded in a full year's worth of seasonal surveys, the Project area is not considered to support an ecologically significant proportion of the population of black-faced monarch. The Project is not anticipated to disrupt breeding, feeding, migration or resting behaviour of the black-faced monarch.</p>

8.8.2 Fork-tailed Swift

As discussed in **Section 4.9.2**, one individual fork-tailed swift was recorded during the diurnal bird counts in January 2021, flying at an approximate height of 40 m. No habitat mapping has been undertaken for fork-tailed swift as this species could occur in any airspace over the Project area.

8.8.2.1 Potential Construction Impacts from the Project and Relevant Mitigation

Potential construction impacts and proposed mitigation measures for the fork-tailed swift are discussed in **Table 8-86**.

Table 8-86 Potential Construction Impact and Relevant Mitigation – Fork-tailed Swift

Potential Impact	Assessment	Mitigation
Vegetation/habitat clearance	As swifts are almost exclusively aerial, direct impacts from clearance of their habitat are not expected to occur as a result of Project construction. Fork-tailed swift frequently forage over cleared or urban landscapes and the Project is unlikely to impact on their	Mitigation measures outlined in Section 6.0 are considered appropriate to manage this risk.



Potential Impact	Assessment	Mitigation
	foraging resources during construction.	
Fragmentation	As swifts are almost exclusively aerial, direct impacts from fragmentation of their habitat are not expected to occur as a result of Project construction.	Mitigation measures outlined in Section 6.0 are considered appropriate to manage this risk.
Erosion and water quality	Fork-tailed swift is unlikely to be directly impacted by impacts from erosion and reduced water quality resulting from Project construction.	Mitigation measures outlined in Section 6.0 are considered appropriate to manage this risk.
Bushfire risk	There is limited scope for indirect impacts such as increased bushfire risk on this species resulting from Project construction.	Mitigation measures outlined in Section 6.0 are considered appropriate to manage this risk.
Noise and lighting	There is limited scope for indirect impacts such as noise and lighting on this species resulting from Project construction.	Mitigation measures outlined in Section 6.0 are considered appropriate to manage this risk.
Dust emissions	There is limited scope for indirect impacts from reduced air quality on this species resulting from Project construction.	Mitigation measures outlined in Section 6.0 are considered appropriate to manage this risk.
Weeds and pests	There is limited scope for indirect impacts such as weed and pest interaction with this species resulting from Project construction. Although there is the possibility of roosting individuals being taken by cats, the frequency of such events is likely to be low. The potential for weeds to impact on the quality of foraging habitat is low.	Mitigation measures outlined in Section 6.0 are considered appropriate to manage this risk.

8.8.2.2 Potential Operational Impacts from the Project and Relevant Mitigation

Potential operational impacts and proposed mitigation measures for the fork-tailed swift are discussed in **Table 8-87**.



Table 8-87 Potential Operational Impacts and Relevant Mitigation – Fork-tailed Swift

Potential Impact	Assessment	Mitigation
Collision risk	<p>During Project operation there is potential for fork-tailed swift to collide with wind turbines during the summer months when the species may be present within the Project area. The impact is expected to be minor as this species uses a range of habitats and is widespread across Australia.</p> <p>Fork-tailed swift is not considered to be particularly prone to turbine strike, being a relatively mobile species and often flying at heights well above RSA.</p>	<p>A preliminary Bird and Bat Management Plan (BBMP) has been developed (see Appendix G) based on the three seasonal bird utilisation surveys (BUS) undertaken to take. This preliminary BBMP presents the results of a risk assessment, describes the operational monitoring for the site utilisation of birds and bats (compared to baseline data) and protocols for carcass searches to enable detection of any mortality. Triggers for adaptive management are also included.</p> <p>Additional seasonal BUS are planned and the BBMP will be updated as necessary prior to the wind farm being commissioned.</p>
Bushfire risk	<p>The increased presence of construction personnel, vehicles and machinery in the Project area during operational activities may lead to elevated bushfire risk unless adequately mitigated.</p>	<p>A certified Bushfire Management Plan will be prepared prior to construction and will be implemented during all on-site activities. Fuel loads will be monitored and managed through activities such as controlled grazing, cool mosaic burns and weed management.</p>
Noise and lighting	<p>There is limited scope for indirect impacts such as noise and lighting on this species resulting from Project operation. Lighting of turbines during operation may lead to increased insect numbers in the vicinity of turbine structures. This may attract insectivorous species such as fork-tailed swift to the area around structures, increasing collision risk. However, it is exclusively a diurnal species, and therefore the mechanism for increased impacts from lighting impacts is negligible.</p>	<p>Noise-generating activities during the operations phase will be negligible.</p> <p>Night lighting during the operations phase will be limited to that required for safety and security. Low luminance, directional lighting will be used in proximity to environmentally sensitive areas.</p>
Weeds and pests	<p>There is limited scope for indirect impacts such as weed and pest interaction with this species resulting from Project operation. Although there is the possibility of roosting individuals being taken by cats, the frequency of such events is likely to be low.</p>	<p>During operation of the Project, weed and pest control measures will be established and implemented to minimise the risk of the Project further exacerbating this issue.</p>



Potential Impact	Assessment	Mitigation
	The potential for weeds to impact on the quality of foraging habitat is low.	
Vehicle strike	The potential for species mortality during operation of the Project is low (beyond that already assessed for collision with turbine structures). Fork-tailed swift is a high-flying species and unlikely to interact with Project vehicles.	Access roads within the Project area will be speed restricted, with signage placed at key locations. All operational traffic will be confined to designated access roads. Appropriate procedures for managing injured wildlife will be developed and implemented through the Operations EMP.

8.8.2.3 Assessment of Significant Residual Impacts

The Project is unlikely to have a significant residual impact on the fork-tailed swift. A full significance assessment following the Significant Impact Guidelines (DoE 2013) is presented in **Table 8-88**.

Table 8-88 Significant Residual Impact Assessment – Fork-tailed Swift

Significant Impact Criteria	Project Outcome
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	Unlikely The fork-tailed swift is almost exclusively aerial. In a full year of seasonal bird surveys across the Project area, only one individual fork-tailed swift has been recorded. The Project area is not considered to provide important habitat for the fork-tailed swift, which has a vast range and very broad habitat preferences.
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	Unlikely The Project area is not considered to provide important habitat for the fork-tailed swift. The Project area is currently subjected to existing weed and pest impacts. During construction of the Project, weed and pest control measures will be established to minimise the risk of the Project further exacerbating the issue. A preliminary Weed and Pest Management Plan has been prepared (see Appendix F) and includes management of weed spread (with specific advice for key identified species), management of pest infestations and monitoring effectiveness of control measures. Specifically, feral cat control will be undertaken in line with the <i>Threat abatement plan for predation by feral cats</i> (DoE 2015c), which will assist in reducing potential predation on fork-tailed swift. This plan will be further



Significant Impact Criteria	Project Outcome
<p>Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species</p>	<p>developed by the Construction Contractor prior to works commencing on site.</p> <p>Unlikely</p> <p>The fork-tailed swift does not breed in Australia, therefore the Project will not disrupt the breeding cycle of the species.</p> <p>The <i>Referral guideline for 14 birds listed as migratory species</i> (DoE 2015a) identifies an ecologically significant proportion of the population of fork-tailed swift to be 1,000 birds in relation to the global population and 100 birds in relation to the national population.</p> <p>Given the fact that only one individual has been recorded in a full year's worth of seasonal surveys, the Project area is not considered to support an ecologically significant proportion of the population of fork-tailed swift. The Project is not anticipated to disrupt breeding, feeding, migration or resting behaviour of the fork-tailed swift.</p>

8.8.3 Latham's Snipe

As discussed in **Section 4.9.3**, Latham's snipe has not been recorded within the Project area either historically (data available in Wildnet and ALA) or during a full year of seasonal bird surveys undertaken by the Project consultants. Latham's snipe is a wetland species. There is minimal wetland habitat (approximately 365 ha) within the Project area, with approximately 1,196 ha of wetland habitat within the broader Study area. The Project has been designed to avoid all wetland habitat.

8.8.3.1 Potential Construction Impacts from the Project and Relevant Mitigation

The Project footprint avoids all wetland habitat, therefore no direct impacts on Latham's snipe are anticipated. Potential construction impacts and proposed mitigation measures for Latham's snipe are described further in **Table 8-89**.

Table 8-89 Potential Construction Impacts and Relevant Mitigation – Latham's Snipe

Potential Impact	Assessment	Mitigation
Vegetation/habitat clearance	The Project will not clear any potential Latham's snipe habitat.	The Project has been designed to avoid all wetland habitat. No mitigation measures required.
Fragmentation	The Project will not clear any potential Latham's snipe habitat. Project access tracks will not bisect any areas of potential Latham's snipe habitat, either within the Project area or between the Project area and the broader Study area.	The Project has been designed to avoid all wetland habitat. No mitigation measures required.



Potential Impact	Assessment	Mitigation
Erosion and water quality	Latham's snipe is unlikely to be affected by impacts from erosion and reduced water quality resulting from Project construction, due to the separation between potential habitat for the species and proposed Project infrastructure.	A preliminary Erosion and Sediment Control Plan (ESCP) (Appendix I) and a Sediment and Erosion Management Plan (Appendix J) have been prepared for the Project and will be further developed by the Construction Contractor prior to works commencing on site. Implementation of these plans will minimise soil loss from the disturbance areas.
Bushfire risk	Inappropriate fire regimes are not a recognised threat to this species. Nonetheless, the Project is not expected to increase the risk of high intensity bushfires in the Project area.	A Bushfire Management Plan will be prepared prior to construction and will be implemented during all on-site activities. Fuel loads will be monitored and managed through activities such as controlled grazing, cool mosaic burns and weed management.
Noise and lighting	There is limited scope for indirect impacts such as noise and lighting on this species resulting from Project construction.	Standard construction work hours will generally be between 6.30am and 6.30pm, therefore site lighting will be kept to the minimum required for safety. Where necessary, construction lighting will be directed to the required areas and designed to minimise light spill to adjacent areas. Construction equipment will be fitted with noise reduction devices where practicable and switched off when not in use.
Dust emissions	There is limited scope for indirect impacts from reduced air quality on this species resulting from Project construction.	Generally, dust is not expected to pose a significant risk in this high-rainfall area. Dust generating activities will be minimised during dry, windy conditions and areas of exposed soils will be rehabilitated as soon as practicable, to minimise dust emissions. Dust suppression (water spraying) will be used during the dry season as necessary.
Weeds and pests	Predation by the red fox is a known threat to Latham's snipe. The Project area is currently subjected to existing weed and pest impacts, although the red fox is not present. The potential for the Project to introduce weeds to wetland areas within the Project area is limited, due to the separation between these habitats and proposed Project infrastructure.	During construction of the Project, weed and pest control measures will be established to minimise the risk of the Project further exacerbating the issue. A preliminary Weed and Pest Management Plan has been prepared (see Appendix F) and includes management of weed spread (with specific advice for key identified species), management of pest infestations and monitoring effectiveness of control measures. This plan will be further developed by the Construction Contractor prior to works commencing on site.

8.8.3.2 Potential Operational Impacts from the Project and Relevant Mitigation

Potential operational impacts and proposed mitigation measures for Latham's snipe are described in **Table 8-90**.



Table 8-90 Potential Operational Impacts and Relevant Mitigation – Latham’s Snipe

Potential Impact	Assessment	Mitigation
Collision risk	There is a risk of collision with the wind turbines during migratory flight.	<p>A preliminary Bird and Bat Management Plan (BBMP) has been developed (see Appendix G) based on the three seasonal bird utilisation surveys (BUS) undertaken to take. This preliminary BBMP presents the results of a risk assessment, describes the operational monitoring for the site utilisation of birds and bats (compared to baseline data) and protocols for carcass searches to enable detection of any mortality. Triggers for adaptive management are also included.</p> <p>Additional seasonal BUS are planned and the BBMP will be updated as necessary prior to the wind farm being commissioned.</p>
Bushfire risk	The increased presence of construction personnel, vehicles and machinery in the Project area during operational activities may lead to elevated bushfire risk unless adequately mitigated.	A Bushfire538ncur538izednt Plan will be prepared prior to construction and will be implemented during all on-site activities. Fuel loads will be monitored and managed through activities such as controlled grazing, cool mosaic burns and weed management.
Noise and lighting	There is limited scope for indirect impacts such as noise and lighting on this species resulting from Project operation. Latham’s snipe habitat coincides with low-lying wetland areas rather than the turbine locations on ridgelines.	<p>Noise-generating activities during the operations phase will be negligible.</p> <p>Night lighting during the operations phase will be limited to that required for safety and security. Low luminance, directional lighting will be used in proximity to environmentally sensitive areas.</p>
Weeds and pests	<p>There is limited scope for indirect impacts such as weed and pest interaction with this species resulting from Project operation. Although there is the possibility of individuals being taken by cats, the frequency of such events is likely to be low.</p> <p>The potential for weeds to impact on the quality of foraging habitat is low.</p>	During operation of the Project, weed and pest control measures will be established and implemented to minimise the risk of the Project further exacerbating this issue.
Vehicle strike	The potential for species mortality during operation of the Project is low (beyond that already assessed for collision with turbine structures).	Access roads within the Project area will be speed restricted, with signage placed at key locations. All operational traffic will be confined to designated access roads. Appropriate procedures for managing injured wildlife will be developed and implemented through the Operations EMP.



8.8.3.3 Assessment of Significant Residual Impacts

The Project is not expected to have a significant residual impact on Latham’s snipe. A full significance assessment following the Significant Impact Guidelines (DoE 2013) is presented in **Table 8-91**.

Table 8-91 Significant Residual Impact Assessment – Latham’s Snipe

Significant Impact Criteria	Project Outcome
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	<p>Unlikely</p> <p>In a full year of seasonal bird surveys across the Project area, Latham’s snipe has not been recorded. The Project area is not considered to provide important habitat for Latham’s snipe. Mitigation measures outlined in Section 6.0 are considered appropriate to manage this risk.</p>
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	<p>Unlikely</p> <p>The Project area is not considered to provide important habitat for Latham’s snipe.</p> <p>The Project area is currently subjected to existing weed and pest impacts. During construction of the Project, weed and pest control measures will be established to minimise the risk of the Project further exacerbating the issue.</p> <p>A preliminary Weed and Pest Management Plan has been prepared (see Appendix F) and includes management of weed spread (with specific advice for key identified species), management of pest infestations and monitoring effectiveness of control measures. Specifically, feral cat control will be undertaken in line with the <i>Threat abatement plan for predation by feral cats</i> (DoE 2015c), which will assist in reducing potential predation on Latham’s snipe. This plan will be further developed by the Construction Contractor prior to works commencing on site.</p>
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	<p>Unlikely</p> <p>Given the very small amount of wetland habitat within the Project area, and the fact that the species has been recorded in a full year’s worth of seasonal surveys, the Project area is not considered to support an ecologically significant proportion of the population of Latham’s snipe. The Project is not anticipated to disrupt breeding, feeding, migration or resting behaviour of Latham’s snipe.</p>



8.8.4 Rufous fantail

As described in **Section 4.9.4**, a single rufous fantail was recorded on a remote camera in April 2021 from a rocky drainage line within a patch of Eucalypt woodland. Important habitat is defined as rainforest and wet sclerophyll forest but the species may also be found in more open habitats during the migration period.

8.8.4.1 Potential Construction Impacts from the Project and Relevant Mitigation

Approximately 3,582 ha of important habitat for rufous fantail occurs within the Project area and approximately 48,173 ha occurs within the broader Study area. Approximately 170 ha of important habitat for rufous fantail will require clearing for construction.

Potential construction impacts and proposed mitigation measures for rufous fantail are discussed in **Table 8-92**.

Table 8-92 Potential Construction Impacts and Relevant Mitigation – Rufous Fantail

Potential Impact	Assessment	Mitigation
Vegetation/habitat clearance	Only one individual has been recorded within the Project area in a full year's worth of seasonal surveys. Important habitat (rainforest and wet sclerophyll forest) is limited to the eastern side of the Project area that abuts the WTQWHA although the species could potentially use more open habitats across the Project area during migration.	The Project design has minimised clearing of important habitat for the rufous fantail as far as practicable, with infrastructure such as construction compounds, batching plant and substations sited outside of this habitat. Clearing of rufous fantail habitat will occur sequentially and in accordance with an approved Species Management Program.
Fragmentation	The Project may lead to the clearing of approximately 170 ha of important habitat for the species.	Wet sclerophyll forest and small patches of rainforest, which are defined as important habitat for the rufous fantail, are primarily located along the eastern boundary of the Project area. The Project has been designed to minimise fragmentation of these habitats (from each other and from the much larger area of habitat to the east, within the WTQWHA) with access tracks approaching from the west. Areas cleared for construction that are not required for the operational footprint will be sequentially rehabilitated as soon as practicable following construction.
Erosion and water quality	The rufous fantail is unlikely to be directly impacted by impacts from erosion and reduced water quality resulting from Project construction.	A preliminary Erosion and Sediment Control Plan (ESCP) (Appendix I) and a Sediment and Erosion Management Plan (Appendix J) have been prepared for the Project and will be further developed by the Construction Contractor prior to works commencing on site. Implementation of these plans will minimise soil loss from the disturbance areas.



Potential Impact	Assessment	Mitigation
Bushfire risk	Inappropriate fire regimes may be a threat to this species. The Project is not expected to increase the risk of high intensity bushfires in the Project area.	A Bushfire Management Plan will be prepared prior to construction and will be implemented during all on-site activities. Fuel loads will be monitored and managed through activities such as controlled grazing, cool mosaic burns and weed management.
Noise and lighting	There is limited scope for indirect impacts such as noise and lighting on this species resulting from Project construction.	Standard construction work hours will generally be between 6.30am and 6.30pm, therefore site lighting will be kept to the minimum required for safety. Where necessary, construction lighting will be directed to the required areas and designed to minimise light spill to adjacent areas. Construction equipment will be fitted with noise reduction devices where practicable and switched off when not in use.
Dust emissions	There is limited scope for indirect impacts from dust emissions on this species resulting from Project construction.	Generally, dust is not expected to pose a significant risk in this high-rainfall area. Dust generating activities will be minimised during dry, windy conditions and areas of exposed soils will be rehabilitated as soon as practicable, to minimise dust emissions. Dust suppression (water spraying) will be used during the dry season as necessary.
Weeds and pests	Weeds and pest fauna (such as feral cats) are potential threats to the rufous fantail. The Project area is currently subjected to existing weed and pest impacts, including an established feral cat population.	During construction of the Project, weed and pest control measures will be established to minimise the risk of the Project further exacerbating the issue. A preliminary Weed and Pest Management Plan has been prepared (see Appendix F) and includes management of weed spread (with specific advice for key identified species), management of pest infestations and monitoring effectiveness of control measures. Specifically, feral cat control will be undertaken in line with the <i>Threat abatement plan for predation by feral cats</i> (DoE 2015c), which will assist in reducing potential predation on rufous fantail. This plan will be further developed by the Construction Contractor prior to works commencing on site.

8.8.4.2 Potential Operational Impacts from the Project and Relevant Mitigation

Potential operational impacts and proposed mitigation measures for rufous fantail are discussed in **Table 8-93**.



Table 8-93 Potential Operational Impacts and Relevant Mitigation – Rufous Fantail

Potential Impact	Assessment	Mitigation
Collision risk	The rufous fantail forages mainly in the low to middle strata of forests, sometimes in or below the canopy or on the ground (SPRAT 2021), well below RSA height. The risk of collision with the wind turbines is therefore considered negligible.	A preliminary Bird and Bat Management Plan (BBMP) has been developed (see Appendix G) based on the three seasonal bird utilisation surveys (BUS) undertaken to date. This preliminary BBMP presents the results of a risk assessment, describes the operational monitoring for the site utilisation of birds and bats (compared to baseline data) and protocols for carcass searches to enable detection of any mortality. Triggers for adaptive management are also included. Additional seasonal BUS are planned and the BBMP will be updated as necessary prior to the wind farm being commissioned.
Bushfire risk	The increased presence of construction personnel, vehicles and machinery in the Project area during operational activities may lead to elevated bushfire risk unless adequately mitigated.	A Bushfire Management Plan will be prepared prior to construction and will be implemented during all on-site activities. Fuel loads will be monitored and managed through activities such as controlled grazing, cool mosaic burns and weed management.
Noise and lighting	There is limited scope for indirect impacts such as noise and lighting on this species resulting from Project operation. Lighting of turbines during operation may lead to increased insect numbers in the vicinity of turbine structures. This may attract insectivorous species such as the rufous fantail to the area around structures, increasing collision risk. However, it is a diurnal species and primarily forages below the canopy, and therefore the mechanism for increased impacts from lighting is negligible.	Noise-generating activities during the operations phase will be negligible. Night lighting during the operations phase will be limited to that required for safety and security. Low luminance, directional lighting will be used in proximity to environmentally sensitive areas.
Weeds and pests	Weeds and pest fauna (such as feral cats) are potential threats of the rufous fantail. The Project area is currently subjected to existing weed and pest impacts, including an established feral cat population.	During operation of the Project, weed and pest control measures will be established and implemented to minimise the risk of the Project further exacerbating this issue.
Vehicle strike	The potential for species mortality during operation of the Project is very low (beyond that already assessed for collision with turbine structures).	Access roads within the Project area will be speed restricted, with signage placed at key locations. All operational traffic will be confined to designated access roads. Appropriate procedures for managing



Potential Impact	Assessment	Mitigation
		injured wildlife will be developed and implemented through the Operations EMP.

8.8.4.3 Assessment of Significant Residual Impacts

The Project is not expected to have a significant residual impact on the rufous fantail. A full significance assessment following the Significant Impact Guidelines (DoE 2013) is presented in **Table 8-94**.

Table 8-94 Significant Residual Impact Assessment – Rufous Fantail

Significant Impact Criteria	Project Outcome
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	<p>Unlikely</p> <p>The <i>Referral guideline for 14 birds listed as migratory species</i> (DoE 2015a) identifies that an area of impact on important habitat for the north-eastern rufous fantail that is likely to result in a significant impact is 3,400 ha.</p> <p>The Project will require clearing of 170 ha of important habitat for the rufous fantail, which is less than the threshold for a significant impact. The Project will not result in the isolation of any important habitat, the majority of which is along the eastern boundary of the Project area and will retain connectivity to much larger expanses of important habitat within the WTQWHA to the east. The development and implementation of a Bushfire Management Plan will ensure that fire regimes are not altered. Hydrological and nutrient cycles are also not likely to be altered by the Project.</p>
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	<p>Unlikely</p> <p>The Project area is currently subjected to existing weed and pest impacts. During construction of the Project, weed and pest control measures will be established to minimise the risk of the Project further exacerbating the issue.</p> <p>A preliminary Weed and Pest Management Plan has been prepared (see Appendix F) and includes management of weed spread (with specific advice for key identified species), management of pest infestations and monitoring effectiveness of control measures. Specifically, feral cat control will be undertaken in line with the <i>Threat abatement plan for predation by feral cats</i> (DoE 2015c), which will assist in reducing potential predation on rufous fantail. This plan will be further developed by the Construction Contractor prior to works commencing on site.</p>



Significant Impact Criteria	Project Outcome
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	<p>Unlikely</p> <p>The <i>Referral guideline for 14 birds listed as migratory species</i> (DoE 2015a) identifies a project is likely to result in a significant impact if 1,500 north-eastern rufous fantails are affected in terms of direct mortality or serious disruption to the lifecycle.</p> <p>Given the small amount of important habitat for rufous fantail within the Project area (particularly within the context of the amount of important habitat within the broader Study area), and the fact that only one individual has been recorded in a full year's worth of seasonal surveys, the Project area is not considered to support an ecologically significant proportion of the population of north-eastern rufous fantail. The Project is not anticipated to disrupt breeding, feeding, migration or resting behaviour of the rufous fantail.</p>

8.8.5 Satin Flycatcher

As described in Section 4, two satin flycatchers were recorded during the bird utilisation surveys in October 2021. Important habitat is defined as eucalypt forest and woodlands at high elevations (excluding rainforest); the majority of the Project area is therefore classed as important habitat for the species.

8.8.5.1 Potential Construction Impacts from the Project and Relevant Mitigation

Approximately 26,965 ha of important habitat for satin flycatcher occurs within the Project area and approximately 111,897 ha occurs within the broader Study area. Approximately 1,009 ha of important habitat for satin flycatcher will require clearing for construction.

Potential construction impacts and proposed mitigation measures for satin flycatcher are discussed further in **Table 8-95**.

Table 8-95 Potential Construction Impacts and Relevant Mitigation – Satin Flycatcher

Potential Impact	Assessment	Mitigation
Vegetation/habitat clearance	Only two individuals have been recorded within the Project area in a full year's worth of seasonal surveys. Approximately 85 % of the Project area comprises important habitat for the species.	Clearing of satin flycatcher habitat will occur sequentially and in accordance with an approved Species Management Program.
Fragmentation	The Project may lead to the clearing of approximately 1,009 ha of important habitat for the species.	Areas cleared for construction that are not required for the operational footprint will be sequentially rehabilitated as soon as practicable following construction.



Potential Impact	Assessment	Mitigation
Erosion and water quality	The satin flycatcher is unlikely to be directly impacted by impacts from erosion and reduced water quality resulting from Project construction.	A preliminary Erosion and Sediment Control Plan (ESCP) (Appendix I) and a Sediment and Erosion Management Plan (Appendix J) have been prepared for the Project and will be further developed by the Construction Contractor prior to works commencing on site. Implementation of these plans will minimise soil loss from the disturbance areas.
Bushfire risk	Inappropriate fire regimes may be a threat to this species. The Project is not expected to increase the risk of high intensity bushfires in the Project area.	A Bushfire Management Plan will be prepared prior to construction and will be implemented during all on-site activities. Fuel loads will be monitored and managed through activities such as controlled grazing, cool mosaic burns and weed management.
Noise and lighting	There is limited scope for indirect impacts such as noise and lighting on this species resulting from Project construction.	Standard construction work hours will generally be between 6.30am and 6.30pm, therefore site lighting will be kept to the minimum required for safety. Where necessary, construction lighting will be directed to the required areas and designed to minimise light spill to adjacent areas. Construction equipment will be fitted with noise reduction devices where practicable and switched off when not in use.
Dust emissions	There is limited scope for indirect impacts from dust emissions on this species resulting from Project construction.	Generally, dust is not expected to pose a significant risk in this high-rainfall area. Dust generating activities will be minimised during dry, windy conditions and areas of exposed soils will be rehabilitated as soon as practicable, to minimise dust emissions. Dust suppression (water spraying) will be used during the dry season as necessary.
Weeds and pests	Weeds and pest fauna (such as feral cats) are potential threats to the satin flycatcher. The Project area is currently subjected to existing weed and pest impacts, including an established feral cat population.	During construction of the Project, weed and pest control measures will be established to minimise the risk of the Project further exacerbating the issue. A preliminary Weed and Pest Management Plan has been prepared (see Appendix F) and includes management of weed spread (with specific advice for key identified species), management of pest infestations and monitoring effectiveness of control measures. Specifically, feral cat control will be undertaken in line with the <i>Threat abatement plan for predation by feral cats</i> (DoE 2015c), which will assist in reducing potential predation on satin flycatcher. This plan will be



Potential Impact	Assessment	Mitigation
		further developed by the Construction Contractor prior to works commencing on site.

8.8.5.2 Potential Operational Impacts from the Project and Relevant Mitigation

Potential operational impacts and proposed mitigation measures for satin flycatcher are discussed in **Table 8-96**.

Table 8-96 Potential Operational Impacts and Relevant Mitigation – Satin Flycatcher

Potential Impact	Assessment	Mitigation
Collision risk	The satin flycatcher is insectivorous and forages high in the canopy and subcanopy (SPRAT 2021), well below RSA height. The risk of collision with the wind turbines is therefore considered negligible.	A preliminary Bird and Bat Management Plan (BBMP) has been developed (see Appendix G) based on the three seasonal bird utilisation surveys (BUS) undertaken to date. This preliminary BBMP presents the results of a risk assessment, describes the operational monitoring for the site utilisation of birds and bats (compared to baseline data) and protocols for carcass searches to enable detection of any mortality. Triggers for adaptive management are also included. Additional seasonal BUS are planned and the BBMP will be updated as necessary prior to the wind farm being commissioned.
Bushfire risk	The increased presence of construction personnel, vehicles and machinery in the Project area during operational activities may lead to elevated bushfire risk unless adequately mitigated.	A Bushfire Management Plan will be prepared prior to construction and will be implemented during all on-site activities. Fuel loads will be monitored and managed through activities such as controlled grazing, cool mosaic burns and weed management.
Noise and lighting	There is limited scope for indirect impacts such as noise and lighting on this species resulting from Project operation. Lighting of turbines during operation may lead to increased insect numbers in the vicinity of turbine structures. This may attract insectivorous species such as the satin flycatcher to the area around structures, increasing collision risk. However, it primarily forages within the canopy and subcanopy, and therefore the mechanism for increased impacts from lighting is negligible.	Noise-generating activities during the operations phase will be negligible. Night lighting during the operations phase will be limited to that required for safety and security. Low luminance, directional lighting will be used in proximity to environmentally sensitive areas.



Potential Impact	Assessment	Mitigation
Weeds and pests	Weeds and pest fauna (such as feral cats) are potential threats of the satin flycatcher. The Project area is currently subjected to existing weed and pest impacts, including an established feral cat population.	During operation of the Project, weed and pest control measures will be established and implemented to minimise the risk of the Project further exacerbating this issue.
Vehicle strike	The potential for species mortality during operation of the Project is very low (beyond that already assessed for collision with turbine structures).	Access roads within the Project area will be speed restricted, with signage placed at key locations. All operational traffic will be confined to designated access roads. Appropriate procedures for managing injured wildlife will be developed and implemented through the Operations EMP.

8.8.5.3 Assessment of Significant Residual Impacts

The Project is not expected to have a significant residual impact on the satin flycatcher. A full significance assessment following the Significant Impact Guidelines (DoE 2013) is presented in **Table 8-97**.

Table 8-97 Significant Residual Impact Assessment – Satin Flycatcher

Significant Impact Criteria	Project Outcome
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	<p>Unlikely</p> <p>The <i>Referral guideline for 14 birds listed as migratory species</i> (DoE 2015a) identifies that an area of impact on important habitat for the satin flycatcher that is likely to result in a significant impact is 4,400 ha.</p> <p>The Project will require clearing of 1,009 ha of important habitat for the satin flycatcher, which is less than the threshold for a significant impact. Clearing widths for access roads are not expected to provide a barrier to movement of this migratory species and road batters will be rehabilitated on completion of construction. The development and implementation of a Bushfire Management Plan will ensure that fire regimes are not altered. Hydrological and nutrient cycles are also not likely to be altered by the Project.</p>
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	<p>Unlikely</p> <p>The Project area is currently subjected to existing weed and pest impacts. During construction of the Project, weed and pest control measures will be established to minimise the risk of the Project further exacerbating the issue.</p> <p>A preliminary Weed and Pest Management Plan has been prepared (see Appendix F) and includes management of weed spread (with specific advice for key identified</p>



Significant Impact Criteria	Project Outcome
	species), management of pest infestations and monitoring effectiveness of control measures. Specifically, feral cat control will be undertaken in line with the <i>Threat abatement plan for predation by feral cats</i> (DoE 2015c), which will assist in reducing potential predation on rufous fantail. This plan will be further developed by the Construction Contractor prior to works commencing on site.
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	<p>Unlikely</p> <p>The <i>Referral guideline for 14 birds listed as migratory species</i> (DoE 2015a) identifies a project is likely to result in a significant impact if 1,700 satin flycatchers are affected in terms of direct mortality or serious disruption to the lifecycle.</p> <p>Given the fact that only two individuals have been recorded in a full year's worth of seasonal surveys, the Project area is not considered to support an ecologically significant proportion of the population of satin flycatcher. The Project is not anticipated to disrupt breeding, feeding, migration or resting behaviour of the satin flycatcher.</p>

8.8.6 Spectacled Monarch

As described in **Section 4.9.6**, a single spectacled monarch was recorded as an incidental observation during bird utilisation surveys in October 2021, within riparian vegetation associated with Blunder Creek. Important habitat is defined as rainforest and wet sclerophyll forest, including waterside vegetation.

8.8.6.1 Potential Construction Impacts from the Project and Relevant Mitigation

Approximately 4,029 ha of important habitat for spectacled monarch occurs within the Project area and approximately 48,620 ha of occurs within the broader Study area. Approximately 173 ha of important habitat for spectacled monarch will require clearing for construction.

Potential construction impacts and proposed mitigation measures for spectacled monarch are discussed in **Table 8-98**.

Table 8-98 Potential Construction Impacts and Relevant Mitigation – Spectacled Monarch

Potential Impact	Assessment	Mitigation
Vegetation/habitat clearance	Only one individual has been recorded within the Project area in a full year's worth of seasonal surveys. Important habitat (rainforest and wet sclerophyll forest, including waterside vegetation) is limited to the eastern side of the	The Project design has minimised clearing of important habitat for the spectacled monarch as far as practicable, with infrastructure such as construction compounds, batching plant and substations sited outside of this habitat.



Potential Impact	Assessment	Mitigation
	Project area that abuts the WTQWHA and alongside Blunder Creek.	Clearing of spectacled monarch habitat will occur sequentially and in accordance with an approved Species Management Program.
Fragmentation	The Project may lead to the clearing of approximately 173 ha of important habitat for the species.	Wet sclerophyll forest and small patches of rainforest, which are defined as important habitat for the spectacled monarch, are primarily located along the eastern boundary of the Project area. The Project has been designed to minimise fragmentation of these habitats (from each other and from the much larger area of habitat to the east, within the WTQWHA) with access tracks approaching from the west. Waterside vegetation alongside Blunder Creek is also considered to be important habitat for the species; this habitat has also been avoided by Project infrastructure as far as possible, with only one access road crossing of this watercourse proposed. Areas cleared for construction that are not required for the operational footprint will be sequentially rehabilitated as soon as practicable following construction.
Erosion and water quality	The spectacled monarch is unlikely to be directly impacted by impacts from erosion and reduced water quality resulting from Project construction.	A preliminary Erosion and Sediment Control Plan (ESCP) (Appendix I) and a Sediment and Erosion Management Plan (Appendix J) have been prepared for the Project and will be further developed by the Construction Contractor prior to works commencing on site. Implementation of these plans will minimise soil loss from the disturbance areas.
Bushfire risk	Inappropriate fire regimes may be a threat to this species. The Project is not expected to increase the risk of high intensity bushfires in the Project area.	A Bushfire Management Plan will be prepared prior to construction and will be implemented during all on-site activities. Fuel loads will be monitored and managed through activities such as controlled grazing, cool mosaic burns and weed management.
Noise and lighting	There is limited scope for indirect impacts such as noise and lighting on this species resulting from Project construction.	Standard construction work hours will generally be between 6.30am and 6.30pm, therefore site lighting will be kept to the minimum required for safety. Where necessary, construction lighting will be directed to the required areas and designed to minimise light spill to adjacent areas. Construction equipment will be fitted with noise reduction devices where practicable and switched off when not in use.



Potential Impact	Assessment	Mitigation
Dust emissions	There is limited scope for indirect impacts from dust emissions on this species resulting from Project construction.	Generally, dust is not expected to pose a significant risk in this high-rainfall area. Dust generating activities will be minimised during dry, windy conditions and areas of exposed soils will be rehabilitated as soon as practicable, to minimise dust emissions. Dust suppression (water spraying) will be used during the dry season as necessary.
Weeds and pests	Weeds and pest fauna (such as feral cats) are potential threats to the spectacled monarch. The Project area is currently subjected to existing weed and pest impacts, including an established feral cat population.	During construction of the Project, weed and pest control measures will be established to minimise the risk of the Project further exacerbating the issue. A preliminary Weed and Pest Management Plan has been prepared (see Appendix F) and includes management of weed spread (with specific advice for key identified species), management of pest infestations and monitoring effectiveness of control measures. Specifically, feral cat control will be undertaken in line with the <i>Threat abatement plan for predation by feral cats</i> (DoE 2015c), which will assist in reducing potential predation on spectacled monarch. This plan will be further developed by the Construction Contractor prior to works commencing on site.

8.8.6.2 Potential Operational Impacts from the Project and Relevant Mitigation

Potential operational impacts and proposed mitigation measures for spectacled monarch are discussed in **Table 8-99**.

Table 8-99 Potential Operational Impacts and Relevant Mitigation – Spectacled Monarch

Potential Impact	Assessment	Mitigation
Collision risk	The spectacled monarch forages mainly in the low to middle strata of forests, sometimes in or below the canopy or on the ground, well below RSA height. The risk of collision with the wind turbines is therefore considered negligible.	A preliminary Bird and Bat Management Plan (BBMP) has been developed (see Appendix G) based on the three seasonal bird utilisation surveys (BUS) undertaken to date. This preliminary BBMP presents the results of a risk assessment, describes the operational monitoring for the site utilisation of birds and bats (compared to baseline data) and protocols for carcass searches to enable detection of any



Potential Impact	Assessment	Mitigation
		<p>mortality. Triggers for adaptive management are also included.</p> <p>Additional seasonal BUS are planned and the BBMP will be updated as necessary prior to the wind farm being commissioned.</p>
Bushfire risk	The increased presence of construction personnel, vehicles and machinery in the Project area during operational activities may lead to elevated bushfire risk unless adequately mitigated.	A Bushfire Management Plan will be prepared prior to construction and will be implemented during all on-site activities. Fuel loads will be monitored and managed through activities such as controlled grazing, cool mosaic burns and weed management.
Noise and lighting	There is limited scope for indirect impacts such as noise and lighting on this species resulting from Project operation. Lighting of turbines during operation may lead to increased insect numbers in the vicinity of turbine structures. This may attract insectivorous species such as the spectacled monarch to the area around structures, increasing collision risk. However, it is a diurnal species and primarily forages below the canopy, and therefore the mechanism for increased impacts from lighting is negligible.	Noise-generating activities during the operations phase will be negligible. Night lighting during the operations phase will be limited to that required for safety and security. Low luminance, directional lighting will be used in proximity to environmentally sensitive areas.
Weeds and pests	Weeds and pest fauna (such as feral cats) are potential threats of the spectacled monarch. The Project area is currently subjected to existing weed and pest impacts, including an established feral cat population.	During operation of the Project, weed and pest control measures will be established and implemented to minimise the risk of the Project further exacerbating this issue.
Vehicle strike	The potential for species mortality during operation of the Project is very low (beyond that already assessed for collision with turbine structures).	Access roads within the Project area will be speed restricted, with signage placed at key locations. All operational traffic will be confined to designated access roads. Appropriate procedures for managing injured wildlife will be developed and implemented through the Operations EMP.

8.8.6.3 Assessment of Significant Residual Impacts

The Project is not expected to have a significant residual impact on the spectacled monarch. A full significance assessment following the Significant Impact Guidelines (DoE 2013) is presented in **Table 8-100**.



Table 8-100 Significant Residual Impact Assessment – Spectacled Monarch

Significant Impact Criteria	Project Outcome
<p>Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species</p>	<p>Unlikely</p> <p>The <i>Referral guideline for 14 birds listed as migratory species</i> (DoE 2015a) identifies that an area of impact on important habitat for the Wet Tropics spectacled monarch that is likely to result in a significant impact is 1,100 ha.</p> <p>The Project will require clearing of 173 ha of important habitat for the Wet Tropics spectacled monarch, which is less than the threshold for a significant impact. The Project will not result in the isolation of any important habitat, the majority of which is along the eastern boundary of the Project area and will retain connectivity to much larger expanses of important habitat within the WTQWHA to the east. The development and implementation of a Bushfire Management Plan will ensure that fire regimes are not altered. Hydrological and nutrient cycles are also not likely to be altered by the Project.</p>
<p>Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species</p>	<p>Unlikely</p> <p>The Project area is currently subjected to existing weed and pest impacts. During construction of the Project, weed and pest control measures will be established to minimise the risk of the Project further exacerbating the issue.</p> <p>A preliminary Weed and Pest Management Plan has been prepared (see Appendix F) and includes management of weed spread (with specific advice for key identified species), management of pest infestations and monitoring effectiveness of control measures. Specifically, feral cat control will be undertaken in line with the <i>Threat abatement plan for predation by feral cats</i> (DoE 2015c), which will assist in reducing potential predation on spectacled monarch. This plan will be further developed by the Construction Contractor prior to works commencing on site.</p>
<p>Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species</p>	<p>Unlikely</p> <p>The <i>Referral guideline for 14 birds listed as migratory species</i> (DoE 2015a) identifies a project is likely to result in a significant impact if 330 birds are affected in terms of direct mortality or serious disruption to the lifecycle.</p> <p>Given the small amount of important habitat for spectacled monarch within the Project area (particularly within the context of the amount of important habitat within the broader Study area), and the fact that only one individual has been recorded in a full year's worth of</p>



Significant Impact Criteria	Project Outcome
	seasonal surveys, the Project area is not considered to support an ecologically significant proportion of the population of Wet Tropics spectacled monarch. The Project is not anticipated to disrupt breeding, feeding, migration or resting behaviour of the spectacled monarch.

8.9 Listed Threatened Fish Species

8.9.1 Lake Eacham Rainbow Fish

As discussed in **Section 4.10.1**, the only reference to Lake Eacham rainbow fish being present within the Project area originates from Pusey et al 1997. On a precautionary basis, Blunder Creek and its tributary, Oaky Creek, have been mapped as potential habitat for the species.

8.9.1.1 Potential Construction Impacts from the Project and Relevant Mitigation

The Project will require the clearing of minimal amounts of in-stream and edge-of-stream habitat for the Lake Eacham rainbow fish associated with the construction of a new bridge over Blunder Creek (110 m of a total creek length within the Project area of 41.5 km) and potential upgrades to the existing bridge over Oaky Creek (77 m of a total creek length within the Project area of 15.3 km) during Stage 1. There will no further disturbance to potential Lake Eacham rainbow fish habitat during Stage 2.

The range of potential construction impacts and proposed mitigation measures for Lake Eacham rainbow fish are discussed further in **Table 8-101**.

Table 8-101 Potential Construction Impacts and Relevant Mitigation – Lake Eacham Rainbow fish

Potential Impact	Assessment	Proposed Mitigation
Vegetation and habitat clearance	The Project may lead to the clearing of 187 m linear creek length of potential Lake Eacham rainbowfish habitat. Section 4.10.1 summarises the current state of knowledge on the species, its population dynamics and its habitat requirements. There are existing bridges over Oaky Creek, Blunder Creek and the Herbert River downstream, of a similar size and design to the new bridge proposed; this suggests that the species is somewhat resilient to anthropogenic disturbances of this nature.	The majority of potential habitat for Lake Eacham rainbowfish throughout the Project area will be retained. Design has sought to avoid and minimise clearing of riparian habitat by using existing bridge crossings as far as practical. Project infrastructure including laydown areas, construction compounds and substation have been sited away from creeks.



Potential Impact	Assessment	Proposed Mitigation
Fragmentation (of populations and habitat)	The Project may lead to the clearing of 187 m linear creek length of potential Lake Eacham rainbowfish habitat.	Retained vegetation will be maintained through implementation of a Vegetation Management Plan to reduce hazards from fire, pest species, degradation and other potential impacts. This will assist in maintaining the integrity of the bankside vegetation as habitat. Where the Project requires a new bridge over Blunder Creek, the crossing will be appropriately designed so as to maintain the flow of water and connectivity across the disturbance footprint. Areas of riparian habitat required for construction but not operation will be revegetated on completion of construction.
Indirect impacts such as smothering of vegetation by dust and accidental release of hazardous materials such as fuel	Construction activities have the potential to result in indirect impacts on potential Lake Eacham rainbowfish habitat if not undertaken in accordance with the Construction EMP and associated sub-plans.	Smothering of vegetation by dust is not expected to pose a significant risk in this high-rainfall area. Dust generating activities will be minimised during dry, windy conditions and areas of exposed soils will be rehabilitated as soon as practicable, to minimise dust emissions. Dust suppression (water spraying) will be used during the dry season as necessary, including in areas of sensitive vegetation adjacent to the construction footprint if visible dust is observed. Accidental releases of hazardous materials in proximity to potential Lake Eacham rainbowfish habitat is highly unlikely as these materials would be securely stored in dedicated areas within the construction compound, away from sensitive sites. Spills would be limited to small drips from machinery hoses and similar, and would be cleaned up immediately, with the waste disposed of in accordance with the Construction EMP.
Weed and pest incursion	The Project has the potential to facilitate the spread of weeds and pest fauna through machinery, vehicles and materials brought to site from outside the Project area. In particular, the Lake Eacham rainbowfish is highly susceptible to introduced native (and likely alien) predatory fish.	During construction of the Project, weed and pest control measures will be established to minimise the risk of the Project introducing new weeds and pests or further spreading existing ones. A preliminary Weed and Pest Management Plan has been prepared (see Appendix F) and will be further developed by the Construction Contractor prior to works commencing on site.
Species mortality (vehicle collision, vegetation clearance)	During in-stream works in Blunder Creek and Oaky Creek, there is potential for direct mortality if Lake Eacham rainbowfish are present,	Clearing of riparian habitat could potentially result in significant injury or death to individual rainbowfish, however, clearing operations will be conducted in accordance with the provisions outlined in a sequential clearing procedure



Potential Impact	Assessment	Proposed Mitigation
	however the risk is considered negligible.	including the use of a fauna spotter catcher. The process will significantly mitigate any potential impacts associated with clearing operations ensuring rainbowfish are detected, caught and re-released after in-stream works have been completed.
Erosion and sedimentation	Construction activities may alter surface water overland flow, leading to increased erosion and subsequent sedimentation of potential habitat for the Lake Eacham rainbowfish. Sediment loss from within the Project footprint during construction and operation has been modelled as generally on par with, or better than, the existing conditions within the Project area (Appendix J).	A preliminary Erosion and Sediment Control Plan (ESCP) (Appendix I) and a Sediment and Erosion Management Plan (Appendix J) have been prepared for the Project and will be further developed by the Construction Contractor prior to works commencing on site. Implementation of these plans will minimise soil loss from the disturbance areas and subsequent sedimentation of nearby potential habitat for the Lake Eacham rainbowfish.
Noise and lighting	These potential impacts are considered to be negligible risks for the Lake Eacham rainbowfish.	Mitigation measures outlined in Section 6.0 are considered appropriate to manage these negligible risks.
Reduced air quality	These potential impacts are considered to be negligible risks for the Lake Eacham rainbowfish.	Mitigation measures outlined in Section 6.0 are considered appropriate to manage these negligible risks.
Bushfire risk	These potential impacts are considered to be negligible risks for the Lake Eacham rainbowfish.	Mitigation measures outlined in Section 6.0 are considered appropriate to manage these negligible risks.

8.9.1.2 Potential Operational Impacts from the Project and Relevant Mitigation

Potential impacts to the Lake Eacham rainbow fish during the operations phase will be limited, as outlined in **Table 8-102**.

Table 8-102 Potential Operational Impacts and Relevant Mitigation – Lake Eacham Rainbow fish

Potential Impact	Assessment	Mitigation
Indirect impacts such as smothering of vegetation by dust and accidental release of hazardous materials such as fuel	There is a very low risk of vehicles associated with Project operation causing indirect impacts on Lake Eacham rainbowfish habitat due to the release of dust or hazardous materials.	Standard mitigation measures, implemented by way of an Operations EMP, are considered appropriate to manage this risk.
Weed and pest incursion	The Project has the potential to facilitate the spread of weeds and	The Project area is currently subjected to existing weed and pest impacts.



Potential Impact	Assessment	Mitigation
	pest fauna through machinery, vehicles and materials brought to site from outside the Project area.	During operation of the Project, weed and pest control measures will be established to minimise the risk of the Project further exacerbating the issue.

8.9.1.3 Assessment of Significant Residual Impacts

The Project is unlikely to have a significant residual impact on the Lake Eacham rainbow fish (Endangered). A full significance assessment following the Significant Impact Guidelines (DoE 2013) is presented in **Table 8-103**.

Table 8-103 Significant Residual Impact Assessment – Lake Eacham Rainbow fish

Significant Impact Criteria	Project Outcome
Lead to a long-term decrease in the size of a population	<p>Unlikely</p> <p>There is only record of the Project area supporting a population of Lake Eacham rainbowfish, from 1997.</p> <p>The Project will require clearing of a minimal amount of potential bankside habitat for this species (187 m linear creek length of the total 56.8 km creek length within the Project area).</p> <p>Aside from the sensitive design measures already employed for the Project, the measures proposed to manage vegetation clearing and fragmentation are expected to be effective in ensuring that the Project does not lead to a long-term decrease in the size of the Project area’s Lake Eacham rainbowfish, should it be present.</p>
Reduce the area of occupancy of the species	<p>Unlikely</p> <p>The Project will require clearing of a minimal amount of potential bankside habitat for this species.</p>
Fragment an existing population into two or more populations	<p>Unlikely</p> <p>Section 4.10.1 summarises the current state of knowledge on the species, its population dynamics and its habitat requirements. There are existing bridges over Oaky Creek, Blunder Creek and the Herbert River downstream, of a similar size and design to the new bridge proposed; this suggests that the species is somewhat resilient to anthropogenic disturbances of this nature.</p> <p>Aside from the sensitive design measures already employed for the Project, the measures proposed to manage vegetation clearing and fragmentation are expected to be effective in ensuring that the Project does not lead to fragmentation of an existing important population into two or more populations.</p>
Adversely affect habitat critical to the survival of a species	<p>Unlikely</p> <p>Habitat critical to the survival of the Lake Eacham rainbowfish has not been identified within the Project area.</p> <p>The Project will require clearing of a minimal amount of potential bankside habitat for this species.</p>



Significant Impact Criteria	Project Outcome
Disrupt the breeding cycle of a population	<p>Unlikely</p> <p>The Project will require clearing of a minimal amount of potential bankside habitat for this species and the majority of potential habitat for Lake Eacham rainbowfish throughout the Project area will be retained. Consideration will be given to avoiding construction of the new bridge over Blunder Creek during the breeding season (April to August).</p>
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	<p>Unlikely</p> <p>The Project will require clearing of a minimal amount of potential bankside habitat for this species and the majority of potential habitat for Lake Eacham rainbowfish throughout the Project area will be retained. There are existing bridges over Oaky Creek, Blunder Creek and the Herbert River downstream, of a similar size and design to the new bridge proposed; this suggests that the species is somewhat resilient to anthropogenic disturbances of this nature.</p>
Result in invasive species that are harmful to the critically endangered or endangered species becoming established in the critically endangered or endangered species' habitat	<p>Unlikely</p> <p>The greatest known threat to the Lake Eacham rainbowfish is predation by illegally translocated carnivorous native fish, with predation by introduced species also a potential threat. Hybridisation with the eastern rainbowfish is also an ongoing threat and may already be occurring within the Project area (Pusey et al 1997).</p> <p>Construction personnel will be prohibited from translocating any species of fish into or out of the Project area.</p> <p>A preliminary Weed and Pest Management Plan has been prepared (see Appendix F) and includes management of weed spread, management of pest infestations and monitoring effectiveness of control measures. This plan will be further developed by the Construction Contractor prior to works commencing on site.</p>
Introduce disease that may cause the species to decline	<p>Unlikely</p> <p>There is currently no known disease to which the Lake Eacham rainbowfish is particularly susceptible.</p>
Interfere with the recovery of the species	<p>Unlikely</p> <p>The Project is not expected to interfere substantially with the recovery of the species. The Project will require clearing of a minimal amount of potential bankside habitat for this species and the majority of potential habitat for Lake Eacham rainbowfish throughout the Project area will be retained. There are existing bridges over Oaky Creek, Blunder Creek and the Herbert River downstream, of a similar size and design to the new bridge proposed; this suggests that the species is somewhat resilient to anthropogenic disturbances of this nature.</p> <p>Predation by native carnivorous fish is the greatest threat to this species; construction personnel will be prohibited from translocating any species of fish into or out of the Project area.</p>



8.10 Wet Tropics of Queensland World Heritage Area

Approval under the EPBC Act is required for any action occurring within or outside a declared World Heritage property that has, will have, or is likely to have a significant impact on the World Heritage values of a World Heritage property.

An action is likely to have a significant impact on the World Heritage values of a declared World Heritage property if there is a real chance or possibility that it will cause:

- One or more of the World Heritage values to be lost;
- One or more of the World Heritage values to be degraded or damaged; or
- One or more of the World Heritage values to be notably altered, modified, obscured or diminished.

The values of the WTQWHA are described in **Section 4.10**, both broadly and in relation to those areas of the property that may potentially be indirectly impacted by the Project. All Project infrastructure is a minimum of 600 m outside the boundary of the WTQWHA and direct impacts are therefore not envisaged.

8.10.1 Adherence with WTQ Planning and Management Principles

8.10.1.1 Wet Tropics Management Plan 2020

The purpose of the Wet Tropics Management Plan 2020 is to protect the WTQ with a zoning and permit scheme, managing activities within the WHA in a manner consistent with the Wet Tropics Management Plan 2020 and the World Heritage values of the WHA. The Management Plan is a regulation under the *Wet Tropics World Heritage Protection and Management Act 1993*.

The zoning scheme comprises three zones:

Zone A

Zone A accounts for 92.5 % of the mapped WTQWHA. The following management objectives apply in Zone A:

- protect and conserve the WH values and integrity of land in the zone
 - if land is disturbed, restore and enhance the WH values and integrity of the land
 - enable visitors to access parts of the land in the zone to appreciate and enjoy the area

Zone B

Zone B is a buffer around existing community services infrastructure. Generally, Zone B areas lie between 50 m and 500 m on either side of the centreline of linear infrastructure such as roads, power lines and railways. The following management objectives apply in Zone B:

- protect and conserve the WH values and integrity of land in the zone
 - if land is disturbed, restore and enhance the WH values and integrity of the land
 - enable visitors to access parts of the land in the zone to appreciate and enjoy the area
 - provide a buffer between Zone A and Zone C

Zone C



Zone C is located within 50 m of the centreline of linear structures (such as roads, powerlines and railways), within 50 m from the edge of dams or within 50 m of major infrastructure sites. These are sites that have been cleared and pre-determined as being associated with particular existing use rights. The following management objectives apply in Zone C:

- to protect and enhance WH values and integrity of the land in the zone subject to the points below:
- accommodate
 - community service infrastructure and visitor infrastructure
 - particular existing uses of parts of the zone shown on the zoning map
- minimise any adverse impact of any activities allowed to be carried out in the zone on the WH values and integrity of the land in the zone
- ensure, so far as is reasonably practicable, that any visitor infrastructure on land in the zone is built and maintained in a way that –
 - is ecologically sustainable
 - is sensitively integrated into the surrounding landscape
 - enhances visitors' understanding and appreciation of the natural and cultural heritage of the area.

The Plan authorises procedures for rezoning for infrastructure purposes for the community, activities that are allowed (e.g. vegetation clearing for road maintenance or firebreaks, maintenance for community or visitor infrastructure, an activity for conservation) or prohibited (e.g. disposing of waste or undesirable plant or animals, operate a motorised vehicle/boat/aircraft) within these zones, activities that require permits (e.g. reconfiguration of lots, MCU); requirements of obtaining permits; and penalties for breaching permits, and conditions of entering into coordinated management agreements with an emphasis on collaboration and consultation with Rainforest Aboriginal Peoples.

For part of the boundary between the Project area and the WTQWHA (including where Project infrastructure is proposed to be closest to the WTQWHA), land zoned as Zone B defined around the 275 kV Ross to Chalumbin powerline acts as an existing buffer between the Project area and the property. Elsewhere the Project area abuts land zoned as Zone A.

The Project has incorporated extensive mitigation measures to ensure that it will not be inconsistent with the management objectives of Zones A and B, as listed above. Furthermore, the Project is not inconsistent with the zoning regime as no Project infrastructure is proposed to be located within the WTQWHA boundaries.

8.10.1.2 Wet Tropics Strategic Plan 2020-2030

The purpose of the Wet Tropics Strategic Plan 2020-2030 is to enable the Wet Tropics Management Authority (WTMA) to identify, protect, conserve and, if possible, rehabilitate the World Heritage values of the WTQWHA in accordance with Australia's obligation under the World Heritage Convention.

There are 10 strategies proposed in the Plan, each with identified issues to be addressed as actions to be undertaken. The Plan outlines four overall outcomes to be achieved through the implementation of the 10 strategies, and key performance indicators (KPIs) to track the progress of achieving these outcomes.

The strategies and identified issues to be addressed are as follows:

1. Respond to impacts of climate change and cross-tenure conflicts. Actions to address this:



- a. Develop a climate change adaptation plan for the WTQWHA and coordinate delivery of priority actions
 - b. Establish a biosecurity taskforce to coordinate strategies and responses to major biosecurity threats (myrtle rust, feral pigs, Phytophthora)
 - c. Eradicate yellow crazy ants from within and adjacent to WTQWHA
 - d. Support the recovery of threatened species
 - e. Rehabilitate degraded areas to improve integrity
 - f. Support WT land managers to implement appropriate fire regimes in response to a variable and changing climate
2. Promote and incorporate the rights, interests and aspirations of Rainforest Aboriginal Peoples in the management of WTQWHA
- a. Implement a rights-based approach to World Heritage management in the WT
 - b. Support and coordinate implementation of a refreshed Regional Agreement
 - c. Empower Rainforest Aboriginal Peoples' wellbeing and livelihoods
 - d. Support Rainforest Aboriginal Peoples to uphold and strengthen their primary substantive rights and their custodial relationships between their peoples and customary landscapes
3. Optimise community participation and connection with the WTQWHA
- a. Empower volunteers and support community contributions to WH management
 - b. Support non/statutory committees to participate in decision making
 - c. Deliver high profile (at least 5) campaigns to influence behaviour and attitude
 - d. Revitalise the Wet Tropics Youth Engagement Program
 - e. Increase social inclusion with 'Healthy Parks, Healthy People' initiative
4. Enhance World Heritage presentation and support opportunities for natural and cultural tourism and recreation
- a. Promote WTQWHA as world class tourist destination
 - b. Improve visitor experience
 - c. Support tour guides, hosts, ambassadors
 - d. Support tourism opportunities
5. Appropriately manage activities that may have an impact on the WTQWHA
- a. Support appropriate community service infrastructure and activities
 - b. Undertake a renewed program of prioritised and strategic compliance
 - c. Support negotiations of cooperative management agreements
 - d. Ensure WT legislative context is contemporary and best practice



The identified outcomes and key performance indicators to be achieved are:

1. World Heritage values and integrity of the Area are maintained and/or enhanced.
 - a. KPI: Trends for the condition of World Heritage values will remain stable, and may improve in some degraded areas of zones B and C. Measures may include:
 - i. state of conservation of natural assets
 - ii. management effectiveness
 - iii. invasive species
 - iv. quality of life for local communities.
2. Rainforest Aboriginal Peoples' rights, interests, traditions and cultures are embedded in World Heritage management, with aspirations for Traditional Owner-led management
 - a. KPI: Rainforest Aboriginal Peoples involved in management of the Area in partnership with the Australian and Queensland governments through the WTWHA Regional Agreement. Measures may include:
 - i. increased number of formalised land management partnerships (e.g. cooperative management agreements, joint management of national parks, Indigenous Protected Areas)
 - ii. culturally-appropriate governance mechanisms that ensure free, prior and informed consent of Rainforest Aboriginal Peoples on matters relating to the Area
 - iii. employment of Rainforest Aboriginal Peoples in World Heritage management
 - iv. increased number of Indigenous ranger groups or Rainforest Aboriginal businesses.
3. Management of the Area is a shared responsibility of an engaged and informed Wet Tropics community
 - a. net increase in active community involvement in the management of the Area (e.g. a net gain of capacity in volunteer groups who are actively engaged in management). Measures include:
 - i. improved trend in volunteer numbers (groups and number of people participating)
 - ii. increased education and engagement initiatives
 - iii. increased levels of research, and adoption of this in management
 - iv. increased participation rates of young people (under 35) in volunteering.
4. The Area is recognised as a world-class sustainable natural and cultural tourism destination
 - a. the Area will be recognised nationally and globally as a must-see natural and cultural tourism destination and an example of best practice World Heritage presentation. Measures include:
 - i. number of tourism opportunities that embrace and protect the natural and cultural values of the Area
 - ii. number of Rainforest Aboriginal owned and operated business enterprises that embrace and protect the natural and cultural values of the Area



- iii. quality of visitor experience (as measured by surveys and other qualitative approaches) and number of accredited Wet Tropics Tour Guides.

8.10.1.3 World Heritage Management Principles

Part 10 of the *Environment Protection and Biodiversity Conservation Regulations 2000* sets out the following management principles for the WTQ:

- The primary purpose of management of natural heritage and cultural heritage of a declared World Heritage property must be, in accordance with Australia's obligations under the World Heritage Convention, to identify, protect, conserve, present, transmit to future generations and, if appropriate, rehabilitate the World Heritage values of the property.
- The management should provide for public consultation on decisions and actions that may have a significant impact on the property.
- The management should make special provision, if appropriate, for the involvement in managing the property of people who:
 - have a particular interest in the property; and
 - may be affected by the management of the property.
- The management should provide for continuing community and technical input in managing the property.

8.10.2 Assessment of Impacts and Relevant Mitigation

Section 5.0 of the PER provides detailed descriptions of the impacts relevant to the Project. The following sections have been tailored to respond specifically to Section 6.5.1 of the Final PER Guidelines (see **Appendix A**).

8.10.2.1 Criterion vii

Section 6.5.1 of the PER Guidelines require an assessment of the Project's potential impacts to sweeping forest vistas as well as to biological attributes of the WTQWHA that form part of the superlative natural phenomena of the region, including ancient Gondwanan forests, iconic species such as the southern cassowary and distinctive rainforest marsupial fauna.

A Landscape and Visual Impact Assessment has been undertaken (see **Appendix M**) and considers that the Project will result in a significant direct impact on the landscape character of the immediate Project area and limited areas of the adjacent landscape. Views from five identified viewpoints are also considered to be significantly impacted by the Project, including accessible lookouts on Majors Mountain (within the WTQWHA) and Bally Knob, views from the Kennedy Highway as well as views from residential properties in Millstream and the few non-participating rural properties west of the Project area on Herbert River Road.

It is anticipated that there would be no significant direct impact on the landscape character of WTQWHA from the Project and there would be no direct impacts on the superlative scenic features comprising mountains, gorges and waterfalls, which are the key Outstanding Universal Values (OUV) of the WTQWHA. However, the view from Majors Mountain lookout, which is located within this internationally recognised and protected landscape, would be significantly impacted by the introduction of turbines into a natural landscape, including localised impacts on sweeping forest vistas. The Major Mountains lookout is accessed by the Misty Mountains hiking trail, however the trail to the lookout is enclosed by dense vegetation that curtails views. Therefore, the visual impact on the WTQWHA



is on a very limited area accessed by a relatively small number of hikers and does not affect the major tourist vantage points for which this part of the WTQWHA is renowned, such as Tully Gorge Lookout.

Through the selective, generally orderly siting of the turbines along ridges, avoidance of key landscape features on the site (including Arthur's Seat) and through minimising impacts on the adjacent WTQWHA, it is considered that the Project minimises and mitigates adverse impacts on landscape character and scenic amenity to the greatest extent practicable.

Whilst there will be some significant impacts for individual views obtained from selected locations within the WTQWHA, these locations are infrequent and typically difficult to reach, being located on tracks that are understood to be less popular with visitors and that require high levels of fitness (i.e. grade 4 or 5). The dense foliage of the rainforest vegetation that is typical of the WTQWHA contributes to the fact that there are few publicly accessible vantage points providing views towards the Project from the WTQWHA. When considering the potential for the Project to impact the OUV of the WTQWHA, it is important to consider these values as they apply to the WTQWHA in its entirety. The WTQWHA is approximately 8,940 km² in size. A conservative estimate would suggest that less than 1 % of the WTQWHA property may have views of the Project; with the visual effect of the Project typically diminishing with distance from the site. Moreover, temporally, the Project has an operational life of 30 years and upon decommissioning no notable visual impact will be evident from anywhere within the WTQWHA. In this context, the Project will have a negligible effect on the OUV of the WTQWHA and it is considered that the OUV that makes the WTQWHA so unique will not be significantly impacted by the Project.

From a contextual perspective, it is important to note that the WTQWHA has a patchwork of land uses within 5 km and 10 km of its boundary, as demonstrated in **Figure 8-9**. This includes a mixture of bushland, areas of agriculture and plantations (both irrigated and non-irrigated) and intensive urban uses.

8.10.2.2 Criterion viii

Section 6.5.1 of the PER Guidelines require an assessment of the Project's potential impacts in relation to the following:

- A) 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)

All Project infrastructure is located a minimum of 600 m from the boundary of the WTQWHA. There will therefore be no direct loss or fragmentation of marsupial habitat within the WTQWHA. The Project will not create any barriers between different components of the WTQWHA. All construction vehicles and equipment will access the Project area from the west in order to minimise potential disturbance to habitat within the WTQWHA to the east.

There will be some fragmentation of marsupial habitat within the Project area associated with construction of the access roads. The following mitigation measures will be implemented to minimise habitat fragmentation:

- Minimisation of clearing widths to the extent practicable. Undertake staged clearing of native vegetation, and retain habitat trees where practicable, to minimise impacts to native fauna species.
- All fencing on site, including security fencing, will incorporate design measures to allow for the movement of fauna. Fencing design must consider allowing fauna to move through or over it and will not use barbed wire.
- Installation of rope crossings and poles for arboreal marsupials in areas with a clearance width of 50 m or greater to maintain habitat connectivity. Other measures to assist fauna move safely across Project access roads may include fauna-sensitive design of watercourse crossings and directional fencing to support their use.



- Nest box installation to be undertaken where active dens are identified within the Project footprint to compensate for loss of denning resources.
- Implement weed and pest control across the Project area to reduce degradation of habitats and edge effects as a result of the Project.
- Rehabilitation of the temporary construction footprint (see Preliminary Rehabilitation Plan in **Appendix K**).

The Project has the potential to degrade marsupial habitat through noise and vibration, and light pollution. Noise may adversely affect fauna by interfering with communication (e.g. territorial bird song), masking the sound of predators and prey, causing avoidance reactions and displacement from habitat. The risk of these impacts is greatest during the construction phase, which is temporary. Construction noise will be generated by the Project through the use of machinery, plant and vehicles, and will vary from short intermittent noise from plant and equipment to more persistent noise from generators. Individual fauna that occur within the Project area may leave the area of impact. The following mitigation measures will be implemented:

- Standard construction work hours for noise-generating activities will generally be between 6.30am and 6.30pm, reducing the risk of disturbance to nocturnal and crepuscular fauna.
- Equipment is to be fitted with noise reduction devices where practicable and switched off when not in use.
- Blasting will be minimised as far as practicable, based on the underlying geology. Prior to construction, likely locations for blasting will be searched by a fauna spotter-catcher to identify and relocate arboreal marsupials outside the likely impact area.

Artificial lighting from infrastructure and machinery may impact fauna within the Project area during the construction and commissioning phase. Artificial lighting can have a range of impacts which vary between species. Most marsupial species are likely to avoid brightly lit areas, potentially due to the increased risk of predation. Other potential adverse impacts include disruption of breeding and migratory patterns and disorientation. The following mitigation measures will be implemented:

- Standard construction work hours (generally 6.30am to 6.30pm) predominantly coincide with daylight hours, minimising the need for lighting to facilitate night works.
- Site lighting will be kept to the minimum required for safety.
- Where necessary, construction lighting will be directed to the required areas and designed to minimise light spill to surrounding areas through the use of shields or similar.

B) 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)

Once the Project is operational, the wind turbines have the potential to influence the behaviour of some birds. There may be localised displacement in the area around each turbine individually (due to loss of habitat in that location) or avoidance around groups of turbines, as a barrier effect. This may prevent movements of songbirds between nesting and foraging resources if the barrier is of a sufficient size.

The significance of barrier effects depends on the size of the wind farm, the spacing of the turbines and the degree of displacement of flying birds. Wind farms where the turbines are located close together without sufficient corridors between groups of turbines are more likely to result in barrier effects. Passerines (which form the majority of the bird assemblage within the Project area) seem to be relatively unaffected by displacement (Hotker 2017, Zwart et al 2016) and breeding songbirds have been shown to be less affected by larger turbines (Zwart et al 2016). The Project design



incorporates sufficient undisturbed areas between turbines to allow for movement of birds between breeding, foraging and roosting habitats. This will be monitored throughout the operational lifetime of the Project.

There is limited information currently published on the impacts of wind turbine noise on birds; it is not known whether documented effects of wind turbine noise on territorial behaviour in European robins can be generalised to other species (Zwart et al 2016). Mitigation measures to reduce the risk of songbird habitat degradation due to noise, vibration and light pollution are as described above in relation to marsupial habitat.

C) Potential damage to nesting behaviours of songbirds

For the majority of songbirds, nesting behaviour commences with the male securing a territory and then courting for females until a pair bond is established and a nest constructed. During courtship, males may sing and make elaborate displays to attract female attention, as well as chase other males out of their territory. Courtship may also involve males feeding females. Once mating occurs and eggs have been laid within the nest, the pair generally stay relatively close to the nest until the chicks have fully fledged, only leaving to find food or chase away competitors and predators. Nesting behaviour generally commences in spring and early summer, and therefore will coincide with Project construction activities. The loss of potential nesting habitat (representing approximately 3.4 % of the Project area) is not considered significant within the context of the amount of potential nesting habitat that will remain. This loss will be mostly temporary, with the majority of the Project footprint (approximately 70 %) intended to be fully rehabilitated on completion of construction, with the aim of re-establishing pre-existing vegetation communities. Construction-related noise, vibration, light pollution and general disturbance due to the movement of people and machinery has the potential to disturb songbirds attempting to nest to the point that they abandon the nest. Disturbance behaviour appears to be species-specific and it is unclear why some species are affected while others are not. No disturbance effects have been found for most passerine species (Zwart et al 2016). Mitigation measures to reduce the risk of songbird habitat degradation due to noise, vibration and light pollution are as described above in relation to marsupial habitat.

8.10.2.3 Criterion ix

Section 6.5.1 of the PER Guidelines require an assessment of the Project's potential impacts in relation to the following:

A) Impacts of turbine operation on the flight paths and habitat connectivity of WTQWHA endemic birds and flying mammals

The risk of collision with wind turbines is relevant to the following species, which have a low to moderate risk of flying within the Rotor Swept Area (RSA) of the Project, in addition to traversing the WTQWA:

- Raptors – this group take advantage of updrafts associated with ridgelines to move around. Raptor species were reasonably well represented in the diurnal bird surveys, with observations of collared sparrowhawk, brown goshawk, grey goshawk, wedge-tailed eagle, Pacific baza, whistling kite, brown falcon and peregrine falcon.
- Migratory swifts – both white-throated needletail and fork-tailed swift were recorded in low numbers during the field surveys and will routinely fly at RSA height.
- Waterfowl (ducks, cormorants, terns, herons, etc.) – these species are generally prone to collision due to their often-direct nature of flight, flight height and lower manoeuvrability than other species. No significant wetlands are present within the Project area and this group was not well represented in the diurnal bird surveys, with a few observations of Australian wood duck, Pacific black duck, white-necked heron and white-faced heron.
- Migrating passerines and other species – migratory passerines routinely fly at RSA height. The Project area is not considered to be located in a significant corridor for passerine movement.



- High-flying or migratory/nomadic microbats – many species forage at or below canopy height, but some species forage well above canopy height (e.g. some of the freetail and sheathail species).
- High-flying megabats such as the spectacled flying-fox – this species has not been recorded within the Project area during two years of ecological assessment work. Nevertheless, there is a known camp approximately 25 km to the northeast, at Malan, and individuals from this camp may forage within open eucalypt forest and small patches of rainforest within the Project area. Potential impacts on this species have been assessed in detail in **Section 8.6.10**.

Mitigation measures for collision risk are described in **Section 6.3.2**. A Preliminary Bird and Bat Management Plan has been developed and is included as **Appendix G**. This is intended to be used as an adaptive management tool throughout the operational lifetime of the Project.

- B) Indirect impacts to WTQWHA endemic flora and fauna include sound and light pollution spill from increased human and mechanical activity nearby

Indirect impacts to WTQWHA endemic flora due to sound and light pollution from increased human and mechanical activity nearby are not relevant. In relation to WTQWHA endemic fauna, Artificial lighting on infrastructure and machinery may disturb fauna behaviour by eliciting displacement or attraction responses. The risk of this is considered low, given the separation distance between the Project footprint and the WTQWHA, and the low likelihood of encountering many WTQWHA endemic fauna within the Project area due to the lack of rainforest habitat which the majority of these species inhabit (see **Appendix T**). For those the Standard construction work hours will generally be between 6.30am and 6.30pm, therefore site lighting will be kept to the minimum required for safety. Where necessary, construction lighting will be directed to the required areas and designed to minimise light spill to adjacent areas.

- C) Impacts of construction activities and vegetation clearing on WTQWHA endemic amphibian species

Of the 14 amphibian species identified as endemic to the WTQWHA (**Appendix T**), 12 are not restricted to rainforest habitat. There are only small, isolated patches of rainforest habitat within the Project area and these will not be disturbed by construction or operation. These rainforest patches are also fragmented from larger areas of rainforest within the WTQWHA and the Project will not exacerbate this fragmentation. These endemic amphibian species are therefore not anticipated to be affected by the Project.

The magnificent brood frog is not a rainforest specialist and has been assessed in more detail in **Section 8.4.2**.

The montane toadlet is also not a rainforest specialist, being found in open eucalypt forest and wet sclerophyll forest. It has been recorded in a number of locations across the Project area. The following measures will be employed during the construction phase of the Project to avoid and minimise impacts on this species:

- Vegetation clearing will be limited to those areas required for earthworks and construction of the Project. Those areas which are not required for the ongoing operation of the Project will be rehabilitated to pre-disturbance vegetation state as soon as practicable following construction.
- The approved disturbance area will be clearly demarcated on-ground, with site-specific construction management plans, and on GIS software for the construction team. This will be undertaken prior to clearing to avoid unnecessary clearing of vegetation and to ensure personnel and vehicles stay within the approved footprint.
- Sequential clearing will occur to minimise impacts on native fauna.
- Measures to ensure clearing limits are adhered to will be documented in the CEMP and addressed in site inductions.
- Access will be limited to approved access routes and tracks.



- Turbine locations will be microsituated within the Project corridor, where conditions and wind resource allow, to take advantage of areas of lower ecological significance.
- Access roads will be aligned along existing tracks wherever practicable to minimise vegetation removal.
- Develop a Species Management Program (SMP) to identify specific measures to be implemented that will mitigate impacts to threatened fauna species and breeding places during construction as well as the operation of the Project.
- Pre-clearance surveys will be undertaken by a suitably qualified ecologist to:
 - identify and mark any active breeding places such as soaks, ponds, etc.;
 - identify suitable release sites; and
 - identify presence of weed species.
- A suitably qualified fauna spotter-catcher will be present during all clearing activities, working under an approved SMP. The fauna spotter-catcher will be responsible to check an area immediately prior to any clearing for; presence of any native fauna including searches of all potential habitats such as terrestrial microhabitats. Any captured species will be relocated to an agreed release site. The fauna spotter-catcher will then advise the ground staff as to measures that need to be taken to avoid impacts on breeding places and fauna species.
- Sequential clearing will occur.
- All vehicles associated with construction activities will travel at slow speeds (e.g. 40 km/h) to minimise the chance of any fauna strikes occurring, with the majority of vehicle movements being during the daylight hours. Speed limit signage will be placed at the entrance to the site and other key access tracks.
- All contractors will be educated on the presence of native fauna including threatened species and need to travel slowly and look out for fauna when driving. This training will form part of mandatory inductions.
- Vehicle traffic will be confined to designated roads and access tracks.
- All fauna encountered (e.g. vehicle strike or during clearing activities) will be recorded in a central register by the Project Environment Manager. Any injured fauna will be reported as required in the Species Management Program that will be in place for the Project.
- Appropriate procedures for managing injured wildlife will be developed and included in the CEMP.
- During trenching activities, open trenches will be monitored daily. If species are trapped in the trench they will be released by a fauna spotter-catcher. The amount of open trench will be minimised and trenches will preferably be backfilled prior to nightfall.
- Escape ramps or planks and/or shelter (e.g. sawdust filled bags) for trapped fauna will be installed in open trenches.
- Erosion in active construction areas cannot be eliminated but can be controlled. As part of the construction planning a certified Erosion and Sediment Control Plan (ESCP) will be prepared prior to construction and implemented during on-site activities. Sediment and erosion control measures to prevent soil loss will be developed consistent with the International Erosion Control Association (IECA) Best Practice Erosion and Sediment Control (BPESC) document. The ESCP will form part of the overall CEMP. Particular focus will be given to managing runoff in the vicinity of watercourses. A Preliminary Erosion and Sediment Control Plan (**Appendix I**) and the Sediment and Erosion Management Plan (**Appendix J**) have been prepared and will be further developed by the Construction Contractor.



D) Impacts to the rainforest-sclerophyll forest transition zone on the western margin of the WTQWHA

The Project will not clear wet sclerophyll forest within the WTQWHA and there is a 600 m buffer between the WTQWHA and disturbance associated with the Project. There will be no direct impacts on wet sclerophyll forest within the WTQWHA. Approximately 117 ha of wet sclerophyll forest outside the WTQWHA will be cleared for the Project. Recognising the ecological sensitivity of this particular habitat type, five turbines and a met mast originally proposed to be located in a large patch of intact wet sclerophyll forest contiguous with similar forests within the WTQWHA have been removed from the Project design. This southern patch of wet sclerophyll forest is now proposed as an offset management area for the Project as described in the Preliminary Offsets Strategy (**Appendix O**).

There are approximately 13,600 ha of wet sclerophyll forests mapped by the Queensland DoR within the broader Study area (comprising a 10 km buffer around the Project area). Vegetation surveys have ground-truthed approximately 3,582 ha of wet sclerophyll forests within the Project area, of which 1,853 ha are contiguous with similar vegetation communities within the WTQWHA and 1,728 ha are currently fragmented by existing areas of disturbance. The Project clearing of 117 ha of wet sclerophyll forest (reduced from 170 ha) represents:

- 0.17% of the wet sclerophyll forest in the Wet Tropics bioregion (see **Figure 8-8**);
- 0.86% of the wet sclerophyll forest within the Study area; and
- 3.3% of the wet sclerophyll forest within the Project area.

The amount of suitable habitat remaining in a landscape has a large influence on the survival of wildlife. Small patch size and large distances between patches will have stronger negative impacts on birds and mammals if more than 70% of the landscape has been cleared of suitable habitat (Peeters and Butler 2014), which is not the case in this instance.

As demonstrated in **Section 5.5.2**, there will not be a cumulative impact on wet sclerophyll forest from other wind farms (operational, under construction, or proposed) in the region, based on available data.

The Project has the potential to impact retained areas of wet sclerophyll forests through fragmentation, clearing, fire and weed incursion. Ecologically significant changes to the rainforest / sclerophyll forest boundary have taken place over the last 50 years. Large areas of wet sclerophyll forest are being progressively converted to simple rainforest as a result of fire exclusion or reduced fire frequency. Wet sclerophyll forests are particularly important as an ecotonal community between the rainforests and savanna ecosystems (WTMA 2022). In addition to the effects of rainforest invasion, wet sclerophyll forests have suffered from impacts due to intensive logging and collection of firewood (EPA 2001).

Wet sclerophyll forest is intimately associated with rainforest, and in many areas it is largely the effects of fire that allow wet sclerophyll forest to occupy sites that would otherwise be suitable for rainforest. Other factors such as topography, drainage and substrate fertility also influence the distribution of wet sclerophyll forest but fire plays a major role (Peeters and Butler 2014). In the absence of fire, rainforest plants will often invade the understorey of a wet sclerophyll forest, and as they mature may eventually prevent the recruitment of eucalypt species, resulting in the transformation of wet sclerophyll forest to rainforest.

Fires of the intensity required to generate and maintain larger stands of wet sclerophyll forest seldom occur in the Wet Tropics, and low-moderate intensity fires are rapidly extinguished once they encounter rainforest (Peeters and Butler 2014). There is a history of regular fires (e.g. 2016 to 2021) in the wet sclerophyll forests within the Project area to the west of the WTQWHA which often burn up to the rainforest as shown in **Figure 8-6** (with rainforests shown in green and wet sclerophyll forests shown in blue). In recent years these fires do not appear to have damaged the adjacent rainforests. Similarly, the uncontrolled, high intensity 2019 wildfire did not burn into or damage the rainforests adjacent to the Project area, but rather self-extinguished at the rainforest edge. This is in direct contrast to rocky pavement shrub complex habitat, which was severely burnt in the 2019 wildfire without seedling recruitment of the Vulnerable shrub *Homoranthus porteri*.

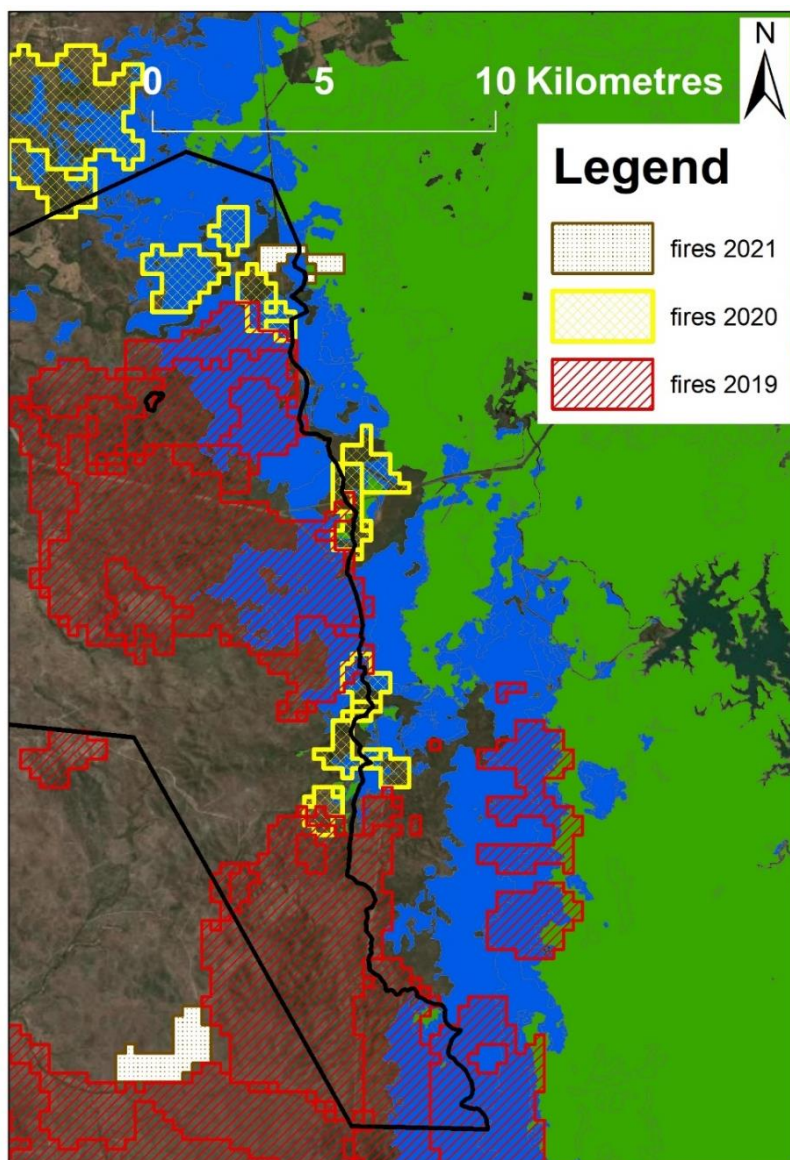


Figure 8-6 Recent Fire History within the Project area

Source: <https://firenorth.org.au/nafi2/>

Wet rainforests appear to be fire-excluding and self-protecting because of their humidity, less combustible plants and lack of grass fuel (Dr Paul Williams, pers. comm.). State fire guidelines for wet tropics rainforest are not particularly concerned about adjacent fires. For example, the state fire guidelines for rainforest RE 7.12.16 says "Do not burn deliberately. Mosaic burning in surrounding fire-adapted ecosystems will minimise spread and severity of wildfire during severe weather events. Occasional hot fires in adjoining communities may be required to prevent expansion of rainforest elements. Edges are generally self-protecting but back burning from rainforest edges may be desirable." (DES 2022). In Queensland, regeneration of wet sclerophyll canopy trees can be encouraged with low to moderate levels of fire or mechanical disturbance, to reduce the density of shrubs or small trees in the understorey if they become so dense as to preclude eucalypt establishment (Peeters and Butler 2014). With a changing climate, the risk of increased prevalence of very hot fires increases; this is understood to be viewed as a risk to the WTQWHA rainforest areas by WTMA despite the specifics of the fire history within the Project area. Through improvements to access throughout much of the Project area, creation and implementation of construction and operational bushfire management plans, and preparation of a bespoke fire regime for the Project area (including land-based offset sites), the Project is anticipated to improve the prospects of managing the risk of bushfires within the Project area that may



detrimentally impact the WTQWHA. CWF is committed to preparing and implementing a fire regime for the Project that is based on key input from industry experts and the Queensland Fire and Emergency Service (QFES) that also accords with the development permit requirements for the Project under the Planning Act. For these reasons, the high-level concerns around the perception that the Project will detrimentally impact the WTQWHA through clearing of wet sclerophyll forest and increasing the fire risk is not expected to manifest in an actual increased risk.

Edge effects include increased exposure to weed invasion, predation, wind, sun and temperature. Woodland patches that are rounded in shape suffer fewer edge effects than patches of a similar size that are long and thin. It has been demonstrated that canopy cover is significantly reduced up to 150 m from the forest edge and is noticeably reduced a further 300 m into the forest interior (Laurance 1991). It is thought that sudden changes in microclimate can result in environmental conditions outside the physiological tolerances of some species; these changes are reduced over time as the exposed edge is sealed by the dense growth of pioneer species (Laurance 1991). Disturbance-adapted species showed increased abundance up to 500 m into the forest interior, thought to be due to altered microclimate (i.e. suitable germination conditions for successional species) (Laurance 1991). Additional studies have identified increased photosynthetically available radiation up to 40 m from forest margins (Kapos 1989), elevated temperatures up to 30 m from forest margins (Turton and Freinurger 1997), increased humidity up to 40 m from forest margins (Kapos 1989) and decreased soil water up to 20 m from forest margins (Raven et al 1992). On this basis, a minimum separation distance of 600 m between Project infrastructure and the WTQWHA should be sufficient to ensure that edge effects do not extend into the WTQWHA.

- E) Impacts on refugial processes including biogeographic interactions allowing shifts of refugial locations along altitudinal gradients

The WTQWHA is one of the most effectively regulated and managed protected areas in the world; this includes the scientific evidence on which that regulation and management is based. However, there is growing evidence that climate change impacts are a threat to the OUV upon which the listing is based (Weber et al 2021). Indeed, climate change due to greenhouse gas emissions is now regarded as the single biggest threat to the future of the OUV of the WTQWHA. Garden et al concluded that the observed nature of distributional change indicates that long-term regional species conservation will depend more on identifying, protecting and restoring habitat refugia than on actions to facilitate larger-scale movements.

Climate change is leading to changes in the distribution of species, with cool-adapted species moving to higher altitudes. Many Wet Tropics endemic species are only found in the cooler, higher altitude parts of the region and hence are most vulnerable to climate change impacts (Weber et al 2021). Based on two years of ecological assessment work, very few of these Wet Tropics endemics are currently supported by habitat within the Project area (see **Appendix T**) and under most climate change scenarios would be even less so in the future. Climatically buffered microhabitats within pristine rainforests will likely serve as a line of defence against extreme weather events as they remain cool and wet during hot conditions (Weber et al 2021). It is highly unlikely that the small, isolated patches of rainforest within the Project area are examples of these microhabitat refuge areas.

The proposed turbines on the western edge of the wet sclerophyll forests within Wooroora Station form a north-south line along the top of a ridgeline, at an elevation between 700 m and 800 m. To the west, elevation drops towards the Herbert River and the vegetation changes markedly in response to a decrease in rainfall associated with the rain shadow behind the Great Dividing Range, becoming drier and more open in structure. To the east and northeast, elevation increases to 900 m and higher. These areas are dominated by the wetter, more closed wet sclerophyll and rainforest habitats that are likely to become climate refugia. Species seeking refuge in higher altitude habitats would be shifting distribution eastwards and northwards, further into the WTQWHA rather than out into the Project area. For this reason, it is highly unlikely that the Project would impact on refugial processes along altitudinal gradients.

- A) Impacts on processes leading to the evolution and maintenance of biological diversity in a range of habitat along gradients of substrate, elevation and climate



Figure 8-7 illustrates the location of Project infrastructure in relation to two large patches of wet sclerophyll forest outside the WTQWHA. The northern patch is contiguous with wet sclerophyll forests within the WTQWHA and the construction of two turbines on the very western edge of this habitat will not fragment this forest. Connectivity between the WTQWHA and habitats within the Project area will be maintained.

Within the central part of Wooroora Station, Project infrastructure is located along the eastern boundary of a large patch of wet sclerophyll forest that is already fragmented from similar forests within the WTQWHA by an existing powerline easement. This easement is approximately 60 m wide, a similar width to the widest clearing proposed for some of the Project access roads. This powerline easement was completely cleared of vegetation in the past and maintenance clearing continues to restrict the height of vegetation within the easement. In contrast, the majority of the area cleared for the Project access roads will be rehabilitated, leaving only the operational road at approximately 5.5 m wide. Rehabilitation activities will aim to restore the pre-clearing vegetation communities and there will be no restrictions on vegetation heights in the long-term. As such, the Project access roads are expected to pose less of an impediment to east-west fauna movement in and out of the WTQWHA than the existing powerline easement.

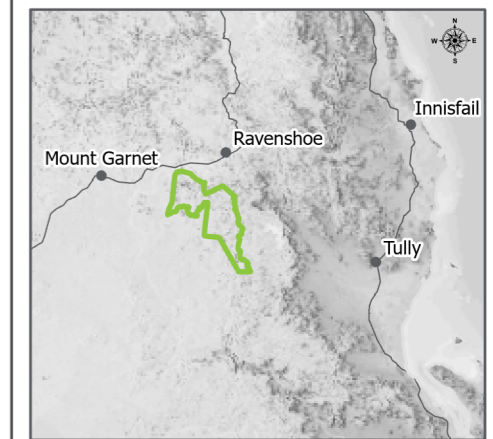
Figure 8-7 illustrates potential opportunities for connectivity between the Project area and the WTQWHA, many of which are associated with watercourse crossings. Riparian vegetation provides important shelter for fauna species moving across a landscape and particular care will be taken when rehabilitating these corridors, to ensure opportunities for population dispersal and gene flow.

Chalumbin Wind Farm
Outstanding Universal Values in Proximity to the Project Area

Figure 8.7

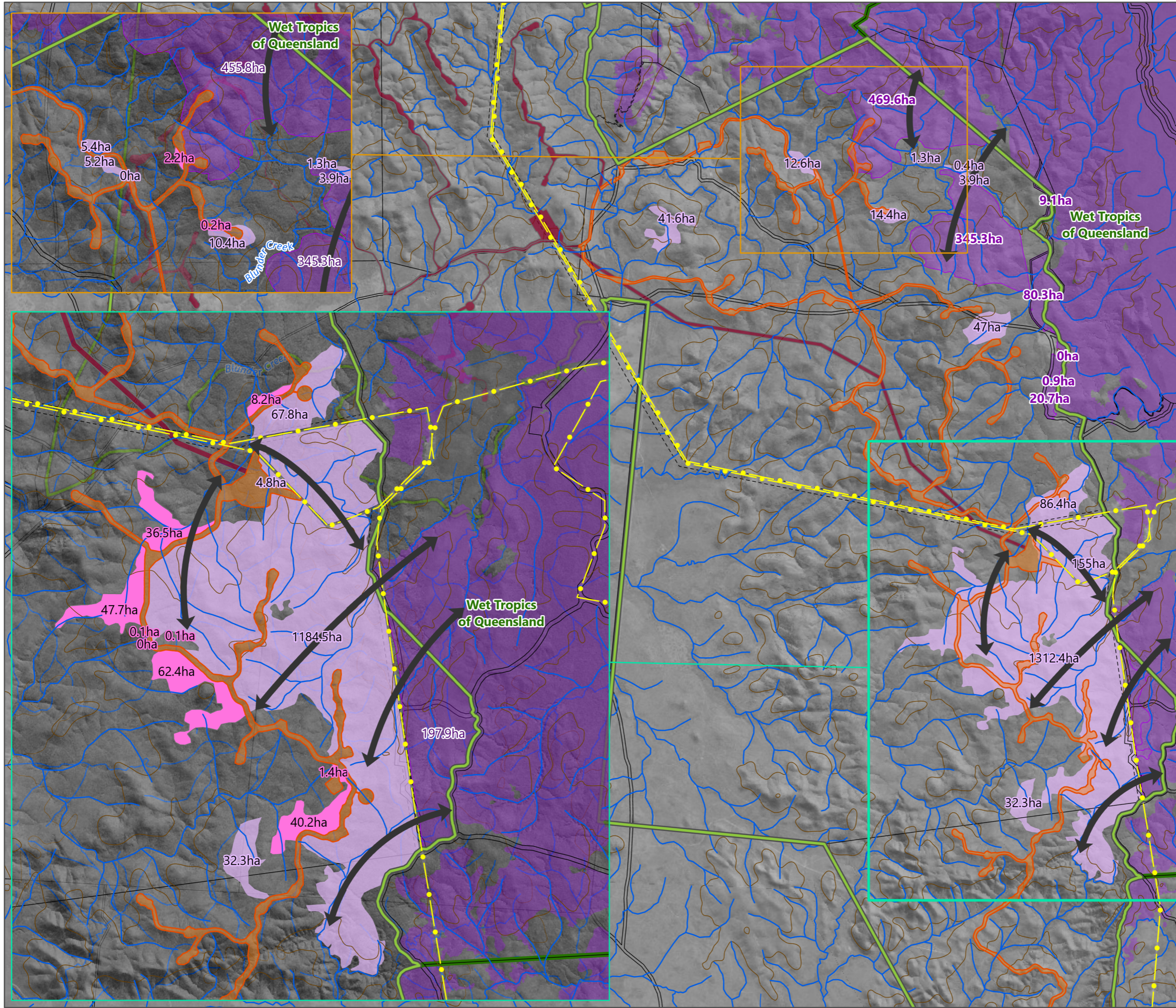
- Project Area Boundary
- Stage 1
- Stage 2
- Existing HV Transmission Line
- World Heritage Area Boundary
- Wet Sclerophyll Forest/Rainforest**
 - Contiguous (No change)
 - Fragmented (No change)
 - Additional Fragmentation
- Connectivity Route
- Watercourse
- Lot Boundary
- Easement

Date: 17/10/2022 Author: TOD
Project: EPU-004 Reviewed: NOD



0 1 2 km
Scale: 1:75,000@A3

Data Source(s):
Digital Cadastral Database - Department of Resources (2022);
Regional Ecosystem Mapping, WildNet - Department of Environment and Science (2022); Atlas of Living Australia (2020)
Earthstar Geographics, © State of Queensland (Department of Resources) 2022, Maxar



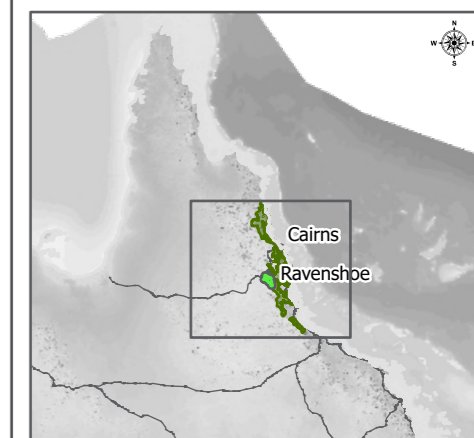
Chalumbin Wind Farm
 Wet Sclerophyll Forests within
 the Wet Tropics Bioregion

Figure 8-8

- Project Boundary
- Wet Sclerophyll Forest (BVG:8)
- WTQ Boundary
- Biogeographic region
- Locality
- Highway

Date: 1/03/2023
 Project: EPU-004

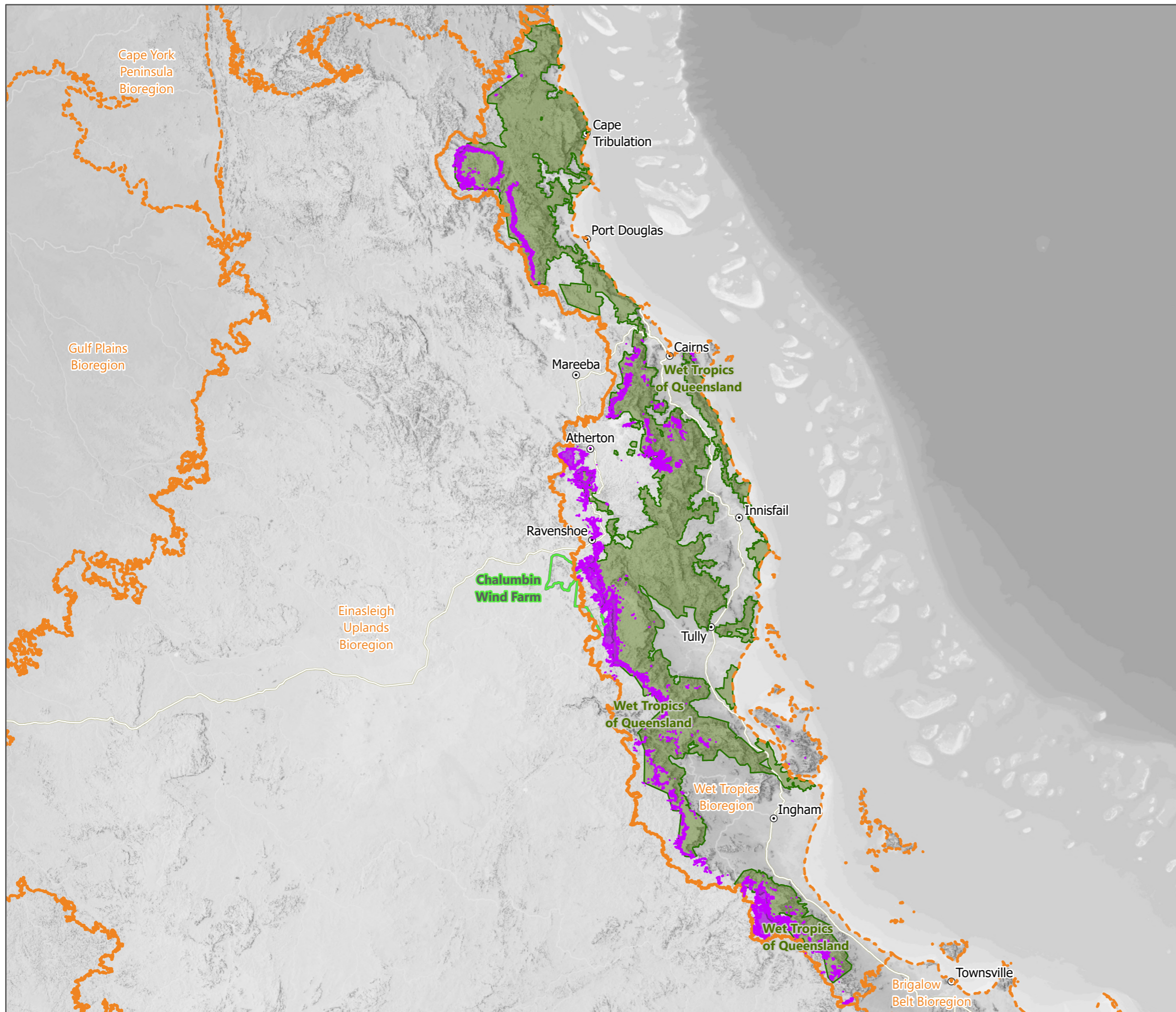
Author: TOD
 Reviewed: NOD



0 25 50 Km















Scale: 1:1,500,000@A3

Data Source(s):
 Digital Cadastral Database - Department of Resources (2023)
 © State of Queensland (Department of Resources) 2022



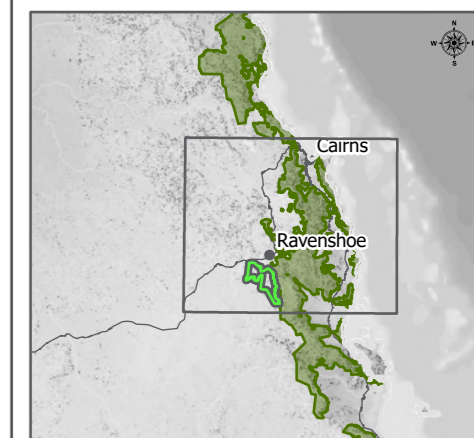
Chalumbin Wind Farm
 Land Uses within Proximity to
 the Wet Tropics Bioregion

Figure 8-9

-  Project Area Boundary
-  Existing/Proposed Wind Farm
-  WTQ Boundary
- Distance to WTQ
 -  <5km
 -  5-10km
- Primary Landuse (ALUMC, 2016)
 -  Conservation and natural environments
 -  Production from relatively natural environments
 -  Production from dryland agriculture and plantations
 -  Production from irrigated agriculture and plantations
 -  Intensive uses
 -  Water
-  Locality
-  Existing HV Transmission Line
-  Highway

Date: 1/03/2023
 Project: EPU-004

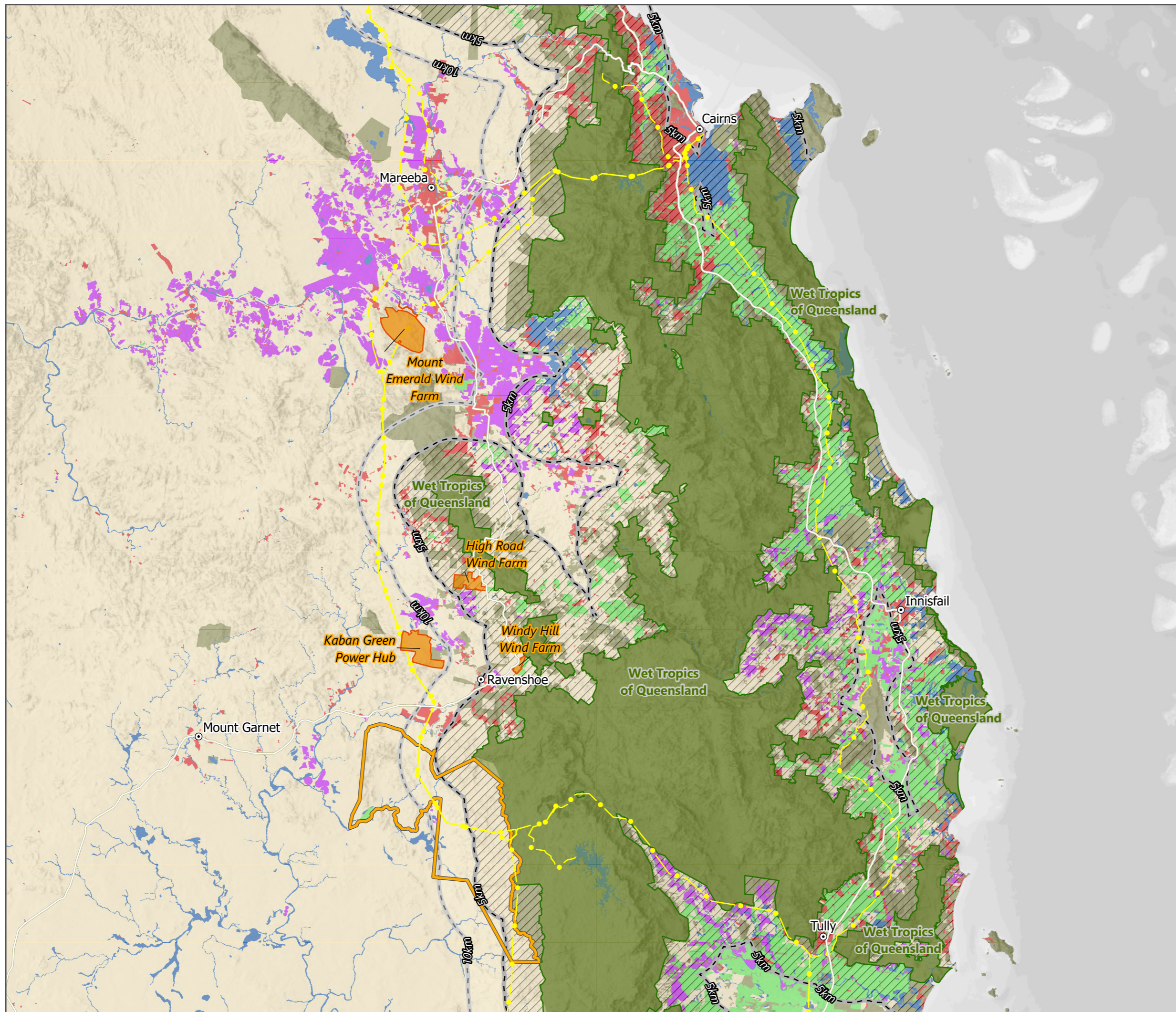
Author: TOD
 Reviewed: NOD



0 5 10 15 20 Km

Scale: 1:500,000@A3

Data Source(s):
 Digital Cadastral Database - Department of Resources (2023)
 © State of Queensland (Department of Resources) 2022





8.10.2.4 Criterion x

Section 6.5.1 of the PER Guidelines require an assessment of the Project's potential impacts in relation to the disruption to behaviour and habitat of threatened species and WTQWHA endemic species that may utilise the Project site.

An individual assessment of potential Project impacts on all listed threatened species for which the Project area provides known or potential habitat has been undertaken and is presented in **Sections 8.3 to 8.8**. These sections include species-specific mitigation measures to reduce the risk of Project impacts.

In addition, an extensive literature review has led to the development of a comprehensive list of WTQWHA endemic species that may be present within the Project area, as presented in **Appendix T**. Of the 60 species assessed, 37 are restricted to rainforest habitats and are therefore unlikely to be found in large numbers within the Project area where there are only a few small, isolated patches of rainforest. Of the rainforest specialists, only a small number of individuals of the following species have been recorded during two years of ecological assessment work: Bower's shrike-thrush, chowchilla, grey-headed robin, chameleon gecko and northern leaf-tail gecko. Fifteen of the endemic species inhabit wet sclerophyll forest and hence may be found within Stage One of the Project area (i.e. the eastern side) and were recorded in low numbers during field surveys: montane toadlet, bridled honeyeater, Victoria's riflebird, Wet Tropics bassian thrush, Lumholtz's tree-kangaroo and Boyd's forest dragon. Three species (Macleay's honeyeater, the dwarf-crowned snake and the red-throated rainbow-skink) may be found in any forest habitat across the Project area but have not been recorded during two years of ecological assessment work. One species, the Mareeba rock wallaby, inhabits open eucalypt woodland and grassland on rocky habitats and could be found anywhere within the Project area except rainforest and wet sclerophyll forest; this species was recorded by camera trap in a number of locations within the western part of the Project area (i.e. Stage Two), in rocky pavement habitats.

The Project has prioritised avoidance of vegetation clearing impacts through design as outlined in **Section 6.0**. Other Project-wide measures include management of vegetation clearing activities in accordance with a Preliminary Fauna Management Plan and a Preliminary Vegetation Management Plan (see **Appendix D** and **E** respectively) and rehabilitation of the temporary construction footprint (see Preliminary Rehabilitation Plan in **Appendix K**).

Increased traffic around the Project area throughout the construction phase has the potential to kill or injure fauna on impact. Some ground-dwelling or slow-moving species may be particularly susceptible to these impacts. Standard construction mitigation measures, as described in **Section 6.2.3** and implemented through an Environmental Management Plan, will reduce these potential impacts to an acceptable level.

Movement of vehicles, equipment and personnel throughout the Project area has the potential to facilitate the spread of weeds, pest fauna and/or pathogens. The Project area is currently subjected to existing weed and pest impacts, including established populations of feral cats, cane toads, wild dogs and feral pigs. During construction of the Project, weed and pest control measures will be established to minimise the risk of the Project further exacerbating the issue. A preliminary Weed and Pest Management Plan has been prepared (see **Appendix F**) and includes management of weed spread (with specific advice for key identified species), management of pest infestations and monitoring effectiveness of control measures. This plan will be further developed by the Construction Contractor prior to works commencing on site.

The increased presence of construction vehicles and personnel in the Project area may increase fire risk through use of machinery that may generate sparks, use of flammable liquids and idling vehicles being present in areas of ground vegetation. Changes in the natural fire regime may result in changes in species composition and/or structure of the vegetation. A Bushfire Management Plan will be prepared prior to construction and will be implemented during all on-site activities. Fuel loads will be monitored and managed through activities such as controlled grazing, cool mosaic burns and weed management. Naturally fire-resistant native plant species will be included in rehabilitation areas between Project infrastructure and the WTQ.



Noise from construction activities may adversely affect fauna by interfering with communication, masking the sound of predators and prey, causing avoidance reactions and displacement from habitat. In the case of cave-roosting fauna, vibration from certain construction activities such as blasting has the potential to damage shelter sites. Construction equipment will be fitted with noise reduction devices where practicable and switched off when not in use. In areas where blasting may be required (to be confirmed on the basis of future geotechnical investigations), pre-construction surveys will be undertaken for potential cave shelters and roosts within the modelled blast pressure and specific mitigation responses will be developed as necessary.

Artificial lighting on infrastructure and machinery may disturb fauna behaviour by eliciting displacement or attraction responses. Standard construction work hours will generally be between 6.30am and 6.30pm, therefore site lighting will be kept to the minimum required for safety. Where necessary, construction lighting will be directed to the required areas and designed to minimise light spill to adjacent areas.

8.10.3 Assessment of Significant Residual Impacts

The Project is not expected to have a significant residual impact on the natural heritage values of the WTQWHA. A full significance assessment following the Significant Impact Guidelines (DoE 2013) is presented in **Table 8-104**.

Table 8-104 Significant Residual Impacts on the Wet Tropics World Heritage Area

Significant Impact Criteria	Project Outcome
<i>Values associated with geology or landscape</i>	
Damage, modify, alter or obscure important geological formations in a World Heritage property	Unlikely The Project is located outside the WTQWHA and is not expected to damage, modify, alter or obscure geological formations within the WHA. Excavations to install wind turbine towers and other Project infrastructure will be at least 600 m from the boundary of the WTQWHA (and in most cases, significantly further than this).
Damage, modify, alter or obscure landforms or landscape features, for example, by excavation or infilling of the land surface in a World Heritage property	Unlikely The Project is located outside the Wet Tropics WHA and will not involve any excavation or infilling within the WHA. The Project has undertaken a Landscape and Visual Impact Assessment (see Appendix M) which concludes that the landscape OUV that makes the WTQWHA so unique will not be significantly impacted by the Project. The majority of visitors to the WTQWHA travel from the east via Cairns. The proposed action is located on the western side of the WTQWHA.
Modify, alter or inhibit landscape processes, for example, by accelerating or increasing susceptibility to erosion, or stabilising mobile landforms such as sand dunes, in a World Heritage property	Unlikely No Project infrastructure (and hence no ground disturbance activities) will be located within the WHA. The Project area is not considered to support mobile landforms, with the majority of the geology comprising granite and rhyolite formations. The Project has the potential to cause erosion due to ground disturbance works; this risk will be managed through the



Significant Impact Criteria	Project Outcome
	implementation of a Preliminary Erosion and Sediment Control Plan (Appendix I) and a Sediment and Erosion Control Plan (see Appendix J).
Divert, impound or channelise a river, wetland or other water body in a World Heritage property	<p>Unlikely</p> <p>The Project will not involve the diversion, impoundment or channelising of any rivers, wetlands or water bodies. One crossing of Blunder Creek is proposed, through the use of a box culvert. This waterway drains west into the Herbert River. The detailed design of this proposed crossing is yet to be finalised, and will take into consideration the need to accommodate a 1 in100 year flood event. There are three small wetland areas within the Project area and proposed infrastructure does not intersect any of these.</p>
Substantially increase concentrations of suspended sediment, nutrients, heavy metals, hydrocarbons, or other pollutants or substances in a river, wetland or water body in a World Heritage property	<p>Unlikely</p> <p>The Project is located on the western side of the WTQWHA with the majority of runoff away from the WTQWHA. Notwithstanding, all hazardous materials (such as hydrocarbons) will be stored within dedicated, bunded areas (or self-bunded containers), away from watercourses and other sensitive receptors. Refuelling and equipment maintenance will be undertaken over handstand in dedicated areas. Accidental releases will be cleaned up promptly and reported within internal incident reporting systems. The risk of sedimentation and release of nutrients into waterways will be controlled through the implementation of a Preliminary Erosion and Sediment Control Plan (Appendix I) and a Sediment and Erosion Control Plan (see Appendix J).</p>
<i>Biological and ecological values</i>	
Reduce the diversity or modify the composition of plant and animal species in all or part of a World Heritage property	<p>Unlikely</p> <p>The Project is located outside the Wet Tropics WHA and there is a minimum separation distance of 600 m between the boundary of the WHA and the nearest Project infrastructure. The Project has been designed such that access for the turbines nearest the WHA will come from west, avoiding the need for Project vehicles to utilise existing roads within the WHA. Significant residual impact assessments have been undertaken for all flora and fauna species known or considered likely to occur within the Project area (Section 8.2 to Section 8.7), some of which also occur within the WHA, and the Project is not considered likely to reduce the diversity of change the composition of these species.</p>



Significant Impact Criteria	Project Outcome
Fragment, isolate or substantially damage habitat important for the conservation of biological diversity in a World Heritage property	<p>Unlikely</p> <p>The Project is located outside the Wet Tropics WHA and there is a minimum separation distance of 600 m between the boundary of the WHA and the nearest Project infrastructure. The project has been designed such that access for the turbines nearest the WHA will come from west, avoiding the need for Project vehicles to utilise existing roads within the WHA. Habitats within the Project area are generally quite different in composition to those within the WHA; there are very few patches of rainforest vegetation within the Project area and the Project has avoided all direct impacts to these.</p>
Cause a long-term reduction in rare, endemic or unique plant or animal populations or species in a World Heritage property	<p>Unlikely</p> <p>The Project is located outside the Wet Tropics WHA and there is a minimum separation distance of 600 m between the boundary of the WHA and the nearest Project infrastructure. The project has been designed such that access for the turbines nearest the WHA will come from west, avoiding the need for Project vehicles to utilise existing roads within the WHA. Significant residual impact assessments have been undertaken for all flora and fauna species known or considered likely to occur within the Project area (Section 8.2 to Section 8.7), some of which also occur within the WHA, and the Project is not considered likely to reduce the diversity of change the composition of these species.</p>
Fragment, isolate or substantially damage habitat for rare, endemic or unique animal populations or species in a World Heritage property	<p>Unlikely</p> <p>The Project is located outside the Wet Tropics WHA and there is a minimum separation distance of 600 m between the boundary of the WHA and the nearest Project infrastructure. The project has been designed such that access for the turbines nearest the WHA will come from west, avoiding the need for Project vehicles to utilise existing roads within the WHA. Habitats within the Project area are generally quite different in composition to those within the WHA; there are very few patches of rainforest vegetation within the Project area and the Project has avoided all direct impacts to these.</p>
<i>Wilderness, natural beauty or rare or unique environmental values</i>	
Involve construction of buildings, roads, or other structures, vegetation clearance, or other actions with substantial, long-term or permanent impacts on relevant values	<p>Unlikely</p> <p>The Project is located outside the Wet Tropics WHA. The Project has undertaken a landscape and visual impact assessment which indicates that the Project is likely to be visible from the Misty Mountain hiking trail on Mount Major on a clear day. This location is infrequently</p>



Significant Impact Criteria	Project Outcome
	<p>accessed and typically difficult to reach, being located on a track that is understood to be less popular with visitors and that require high levels of fitness (i.e. grade 4 or 5). The dense foliage of the rainforest vegetation that is typical of the WTQWHA contributes to the fact that there are few publicly accessible vantage points providing views towards the Project from the WTQWHA. When considering the potential for the Project to impact the OUV of the WTQWHA, it is important to consider these values as they apply to the WTQWHA in its entirety. The WTQWHA is approximately 8,940 km² in size. A conservative estimate would suggest that less than 1 % of the WTQWHA property may have views of the Project; with the visual effect of the Project typically diminishing with distance from the site. Moreover, temporally, the Project has an operational life of 30 years and upon decommissioning no notable visual impact will be evident from anywhere within the WTQWHA. In this context, the Project will have a negligible effect on the OUV of the WTQWHA and it is considered that the OUV that makes the WTQWHA so unique will not be significantly impacted by the Project.</p>
Introduce noise, odours, pollutants or other intrusive elements with substantial, long-term or permanent impacts on relevant values	<p>Unlikely</p> <p>The Project is located outside the Wet Tropics WHA and there is a minimum separation distance of 600 m between the boundary of the WHA and the nearest Project infrastructure. The project has been designed such that access for the turbines nearest the WHA will come from west, avoiding the need for Project vehicles to utilise existing roads within the WHA. The Project is not anticipated to introduce noise, odours, pollutants or other intrusive elements with substantial, long-term or permanent impacts on relevant values.</p>

8.11 Wet Tropics of Queensland National Heritage Place

Approval under the EPBC Act is required for any action occurring within, or outside, a National Heritage place that has, will have, or is likely to have a significant impact on the National Heritage values of the National Heritage place. An action is likely to have a significant impact on the National Heritage values of a National Heritage place if there is a real chance or possibility that it will cause:

- One or more of the National Heritage values to be lost;
- One or more of the National Heritage values to be degraded or damaged; or
- One or more of the National Heritage values to be notably altered, modified, obscured or diminished.



8.11.1 Adherence with WTQ Planning and Management Principles

The Principles of the WTMA Wet Tropics Management Plan and the Wet Tropics Strategic Plan 2020-2030 are discussed in **Section 8.10.1**. These are also valid for the WTQ National Heritage Place.

8.11.1.1 National Heritage Management Principles

Part 10 of the *Environment Protection and Biodiversity Conservation Regulations 2000* set out the following management principles for the WTQ National Heritage place:

- The objective in managing National Heritage places is to identify, protect, conserve, present and transmit, to all generations, their National Heritage values.
- The management of National Heritage places should use the best available knowledge, skills and standards for those places, and include ongoing technical and community input to decisions and actions that may have a significant impact on their National Heritage values.
- The management of National Heritage places should respect all heritage values of the place and seek to integrate, where appropriate, any Commonwealth, State, Territory and local government responsibilities for those places.
- The management of National Heritage places should ensure that their use and presentation is consistent with the conservation of their National Heritage values.
- The management of National Heritage places should make timely and appropriate provision for community involvement, especially by people who:
 - have a particular interest in, or association with, the place; and
 - may be affected by the management of the place.
- Indigenous people are the primary source of information on the value of their heritage and the active participation of indigenous people in identification, assessment and management is integral to the effective protection of indigenous heritage values.
- The management of National Heritage places should provide for regular monitoring, review and reporting on the conservation of National Heritage values.

8.11.2 Natural Heritage Values

The natural heritage values of the WTQ National Heritage Place are the same as the natural heritage values of the WTQ World Heritage Area and are therefore addressed in Section 8.7.2.

8.11.3 Indigenous Heritage Values

8.11.3.1 Engagement with Jirrbal People

Engagement with Jirrbal people with respect to the cultural landscape of the Project area was directed by Wabubadda Aboriginal Corporation (WAC) and the Native Title party (the registered native title claimants for Jirrbal #4 claim). Two key rounds of engagement have taken place, the first between November 2020 and February 2021, which resulted in a Scoping Study report and the second in January and February of 2022.



The methodology for all site inspections was developed by WAC, the Native Title Party and the Technical Advisors.

Engagement was conducted both on site and through private interviews with individuals. Particular knowledge holders were nominated by the Board of directors, WAC and interviewed in person or by phone; site inspections took place in November and December 2020 (Round 1) and during January and early February 2022 (Round 2) and is detailed in **Table 8-105**.

The Board of Directors of WAC nominated 20 senior Jirrbal people to be consulted by the Technical Advisors. Consultation took place individually and in small groups, both on site and in private residences, between November and December 2020 and January - February 2022.

A community workshop was held on 3 February 2021 with the aim of providing the Jirrbal community with information on both the Project and the results of the Scoping Study. Forty Jirrbal people attended the workshop, which was held in Ravenshoe. Attendees travelled from Innisfail, Cairns, Mount Garnet and Atherton. Details on the attendees are held by WAC.

Information on the historical use of the stations and surrounding areas provide important historical context and information on past land use practices. Accordingly, some information about certain aspects of post-contact histories of the Wooroora, Glen Gordon and Kara Outstations were collected from consultation with selected non-Indigenous people.

Engagement and consultation with Jirrbal people via the WAC and Native Title Parties is ongoing. The arrival of COVID-19 on the Atherton Tablelands in January 2022 limited the ability to fully complete Round 2 engagement, which was to include consultation with knowledge holders, site visits and additional historical research. A workshop to present results of the Round 2 engagement was also planned and will be rescheduled.

Round 2 engagement is proposed to be completed between April and May 2023 and will include:

- Interviews with an additional 12 senior Jirrbal knowledge holders. Jirrbal knowledge holders that talk for the Project Area are all descendants of Polly Robinson. Polly was born at Wooroora and had seven sons, including Kara. Descendants that should be part of the engagement process reside in Ravenshoe, Tully, Innisfail, Palm Island and Yarrabah, Mt Garnet and Innot Hot Springs, as well as Herberton and Wondecla.
- Site visits to Kara outstation, Wooroora Homestead, Murubun Rockshelter and other places identified by Jirrbal.
- Further consultation with previous non-Indigenous land owners.
- Preparation of additional photo view-points including: Arthur's Seat and Black Mountains, Innot Hot Springs Community Centre, Tully Falls Lookout, Archer's Creek campsite (on Kennedy Highway), Mandalee Crossing on Wild River and Woodleigh Station campsite.
- Additional historical research.

8.11.3.2 Surveys Completed to Date

Engagement on cultural heritage matters with Jirrbal people was directed by Wabubadda Aboriginal Corporation (WAC) and the Native Title party (the registered native title claimants for Jirrbal #4 claim). Two key rounds of engagement took place, the first between November 2020 and February 2021, which resulted in a Scoping Study report and the second in January and February of 2022.

The 2020 site inspections aimed to cover as much of the Project Area as possible by vehicle and to provide clearance for the installation of one meteorological mast. The 2022 site inspection was conducted by helicopter and aimed to identify areas of high cultural value (e.g. Kara Outstation), conduct a high level assessment of the southern section



and observe landscape change from the wet season. Of particular interest was to identify if the southern part of the Project Area held major water sources in the wet season that could have been important campsites.

Five cultural heritage surveys of the Project area have been completed by Jirrbal people and their Technical Advisors with a total of 8 days on site (see **Table 8-105**).

Table 8-105 List of Site Inspections Completed (to end of 2022)

Date	Aim / Purpose	Jirrbal People Present	Number of Days
27 Nov 2020	Met mast 1	J1, J2, J3, J4	1
8-10 Dec 2020	Scoping study and Met mast audit	J1, J2, J3, J4, J6, J7	3
11 Dec 2020	Engagement at Booboo Rock	J1, J4, J7, J8, J17	1
18-19 May 2021	Met mast 2 & 3	J1, J3, J6, J10, J11, J12	2
1 Feb 2022	Aerial survey (helicopter)	J6, J12	1

A further scoping survey was commenced in January 2023, but was not fully completed as the wet weather prevented safe access on site. It is intended that this survey is completed towards mid-2023 when conditions are more amenable to traversing the site.

The following reports were produced by the Technical Advisors after surveys with Jirrbal people. Each draft report was submitted to WAC, the Native Title party and the proponent for review:

- 'Meteorological Mast Cultural Heritage Clearance, Chalumbin Windfarm, Ravenshoe', Nov 2020;
- 'Jirrbal audit of alternate access track and met mast clearance, Chalumbin Wind Farm', Dec 2020;
- 'Booboo Rock Jirrbal rock art recording', Dec 2020;
- 'Preliminary Scoping Study report, Chalumbin Wind Farm, Ravenshoe', Feb 2021; and
- 'Glen Gordon and Wooroora Meteorological Mast Cultural Heritage Inspection', May 2021.

8.11.3.3 Additional Surveys Planned

In accordance with the CHMA, the Project will undertake surveys of all areas of the Project footprint which are to be disturbed by project works. These will be ongoing as the Project progresses.

Additionally, the Project recognizes that the Project area contains some highly culturally significant areas for Jirrbal people and is committed to assisting Jirrbal people to limited access to areas of interest which are not going to be subject to project development activities but which have been identified as important and sensitive places in the Scoping Study.

The Wooroora Homestead environs, Blunder Creek and Kara Outstation are particularly sensitive significant components of the Jirrbal cultural landscape because of the past events that took place there, some of which are outside of the proposed Project footprint. The exact location of campsites, ceremonial sites, birthplaces and burials of Jirrbal ancestors are not known but the CHMA cultural surveys process will assist in identification and protection should such sites be located.



Further preliminary surveys are planned for Kara Outstation, Wooroora Homestead environs, Black Mountains, Murubun Rockshelter, and low-lying areas within the wet sclerophyll zone which intersect with planned wind farm infrastructure and development.

Surveys planned include:

- Kara Outstation with a walking visit to Murubun rockshelter in the adjoining Tully Falls National Park;
- Limestone Creek area in the southern area of Wooroora Station;
- The area of Blunder Creek where the Project development footprint intersects (road and powerline crossing); and
- Wooroora Homestead – Jirrbal historical camp on Blunder Creek.

8.11.3.4 Impacts on Indigenous Heritage Values

The Scoping Study and subsequent investigations identified eight high value cultural areas (red zones) and minimal areas with low cultural heritage values (green zones, these are the existing tracks and infrastructure). The wet sclerophyll zone on Wooroora Station was added to the high-risk areas through a second round of engagement). Most of the Project Area, particularly the southern section, is orange, undetermined.

The additional studies will be used to identify whether the Project is likely to impact on tangible and intangible Indigenous heritage values.

8.11.3.5 Mitigation and Management of Potential Indigenous Heritage Impacts

Avoidance

Avoidance of significant Jirrbal areas and objects is the preferred option agreed in the CHMA between Wabubadda Aboriginal Corporation, the Native Title Party and the proponent.

A Scoping Study was conducted with the aim of identifying significant Jirrbal areas and objects. The Scoping Study was conducted through a combination of interviews with knowledge holders and site inspections. The Scoping Study produced a list of areas of known high potential for cultural heritage (red zones), areas of low potential for cultural heritage (green zones) and areas of unknown heritage potential (orange zones).

Monitoring and Management

The CHMA provides for pre-construction surveys and monitoring of ground works within the red and orange zones identified in the Scoping Study. Prior to construction, the CWF Project must provide a Survey Notice to WAC in respect of the area to be impacted, with at least 20 business days' notice for the survey to be completed. The survey team consists of up to four Jirrbal cultural heritage officers, one Elder, a Technical Advisor and a Field Supervisor. If any significant objects or items are located in the works area, the Proponent may agree to move the works if reasonable and practicable, or the survey team may decide to relocate the object/item. A Cultural Heritage Clearance Form is to be completed by the Elder or Technical Advisor. A report may be required for complex cultural heritage objects and items. The Parties have 20 days to agree on the contents and recommendations contained in the report.

All ground disturbance in potential high risk cultural areas requires monitoring by one Cultural Heritage Elder and one Cultural Heritage Officer. According to the CHMA they will monitor the removal of the initial clear and grade and topsoil only. A Daily Work Report and Cultural Heritage Clearance Form will be completed daily and provided to the proponent.



If cultural heritage is located during monitoring the Parties (WAC, J#4, CWF) must decide whether it is reasonable and practical to avoid the cultural heritage or whether salvage is required. If salvaged, the ownership and management is the sole responsibility of WAC.

As per the Queensland duty of care guidelines, if any cultural items or human remains are located during work, the Queensland duty of care requirement will be enacted.

The Scoping Study (Buhrich and Ferrier 2021) recommend more consideration is given to the salvage process and monitoring ground disturbance, particularly in areas of high cultural values such as near the rivers and creeks. The CHMA states that any salvaged material is the sole responsibility of WAC, as the Aboriginal party corporation. Before ground disturbance works occur it is important to clarify how salvaged items will be collated and managed, who will hold the information and how WAC will be resourced to manage long-term storage, if that is the goal of salvage.

The process for monitoring is straightforward and follows standard procedures for most development. The CHMA provides for two Jirrbal monitors, the use of standard Cultural Heritage Clearance Forms and finds trigger a process that includes maintaining a 50 m buffer around any finds until management can be agreed.

8.11.4 Assessment of Significant Residual Impacts

The Project is not expected to have a significant residual impact on the natural heritage values of the WTQNHP. A full significance assessment following the Significant Impact Guidelines (DoE 2013) is presented in **Table 8-106**.

Table 8-106 Significant Residual Impacts on the Natural Heritage Values of a Wet Tropics National Heritage Place

Significant Impact Criteria	Project Outcome
<i>Values associated with geology or landscapes</i>	
Damage, modify, alter or obscure important geological formations in a National Heritage place	Unlikely The Project is located outside the WTQNHP and is not expected to damage, modify, alter or obscure geological formations within the NHP. Excavations to install wind turbine towers and other Project infrastructure will be at least 600 m from the boundary of the WTQ NHP (and in most cases, significantly further than this).
Damage, modify, alter or obscure landforms or landscape features, for example, by clearing, excavating or infilling the land surface in a National Heritage place	Unlikely The Project is located outside the Wet Tropics NHP and will not involve any excavation or infilling within the NHP. The Project has undertaken a Landscape and Visual Impact Assessment (see Appendix M) which concludes that the landscape OUV that makes the WTQ NHP so unique will not be significantly impacted by the Project.
Modify, alter or inhibit landscape processes, for example, by accelerating or increasing susceptibility to erosion, or stabilizing mobile landforms such as sand dunes in a National Heritage place	Unlikely No Project infrastructure (and hence no ground disturbance activities) will be located within the NHP. The Project area is not considered to support mobile landforms, with the majority of the geology comprising granite and rhyolite formations. The Project has the potential to cause erosion due to ground disturbance



Significant Impact Criteria	Project Outcome
	works; this risk will be managed through the implementation of a Preliminary Erosion and Sediment Control Plan (Appendix I) and a Sediment and Erosion Control Plan (see Appendix J).
Divert, impound or channelize a river, wetland or other water body in a National Heritage place	<p>Unlikely</p> <p>The Project will not involve the diversion, impoundment or channelising of any rivers, wetlands or water bodies. One crossing of Blunder Creek is proposed, through the use of a box culvert. This waterway drains west into the Herbert River. The detailed design of this proposed crossing is yet to be finalised, and will take into consideration the need to accommodate a 1 in100 year flood event. There are three small wetland areas within the Project area and proposed infrastructure does not intersect any of these.</p>
Substantially increase concentrations of suspended sediment, nutrients, heavy metals, hydrocarbons or other pollutants or substances in a river, wetland or water body in a National Heritage place	<p>Unlikely</p> <p>The Project is located on the western side of the WTQWHA with the majority of runoff away from the WTQWHA. Notwithstanding, all hazardous materials (such as hydrocarbons) will be stored within dedicated, bunded areas (or self-bunded containers), away from watercourses and other sensitive receptors. Refuelling and equipment maintenance will be undertaken over handstand in dedicated areas. Accidental releases will be cleaned up promptly and reported within internal incident reporting systems. The risk of sedimentation and release of nutrients into waterways will be controlled through the implementation of a Preliminary Erosion and Sediment Control Plan (Appendix I) and a Sediment and Erosion Control Plan (see Appendix J).</p>
<i>Biological and ecological values</i>	
Modify or inhibit ecological processes in a National Heritage place	<p>Unlikely</p> <p>The Project is located outside the Wet Tropics NHP and there is a minimum separation distance of 600 m between the boundary of the NHP and the nearest Project infrastructure. With the implementation of mitigation measures (including significant rehabilitation of areas cleared for construction), it is not anticipated that the Project would modify or inhibit ecological processes.</p>
Reduce the diversity or modify the composition of plant and animal species in a National Heritage place	<p>Unlikely</p> <p>The Project is located outside the Wet Tropics NHP and there is a minimum separation distance of 600 m between the boundary of the NHP and the nearest Project infrastructure. The project has been designed such that access for the turbines nearest the WHA will</p>



Significant Impact Criteria	Project Outcome
	<p>come from west, avoiding the need for Project vehicles to utilise existing roads within the NHP. Significant residual impact assessments have been undertaken for all flora and fauna species known or considered likely to occur within the Project area (Section 8.2 to Section 8.7), some of which also occur within the NHP, and the Project is not considered likely to reduce the diversity of change the composition of these species.</p>
<p>Fragment or damage habitat important for the conservation of biological diversity in a National Heritage place</p>	<p>Unlikely</p> <p>The Project is located outside the Wet Tropics NHP and there is a minimum separation distance of 600 m between the boundary of the NHP and the nearest Project infrastructure. The project has been designed such that access for the turbines nearest the NHP will come from west, avoiding the need for Project vehicles to utilise existing roads within the NHP. Habitats within the Project area are generally quite different in composition to those within the NHP; there are very few patches of rainforest vegetation within the Project area and the Project has avoided all direct impacts to these.</p>
<p>Cause a long-term reduction in rare, endemic or unique plant or animal populations or species in a National Heritage place</p>	<p>Unlikely</p> <p>The Project is located outside the Wet Tropics NHP and there is a minimum separation distance of 600 m between the boundary of the NHP and the nearest Project infrastructure. The project has been designed such that access for the turbines nearest the WHA will come from west, avoiding the need for Project vehicles to utilise existing roads within the NHP. Significant residual impact assessments have been undertaken for all flora and fauna species known or considered likely to occur within the Project area (Section 8.2 to Section 8.7), some of which also occur within the NHP, and the Project is not considered likely to reduce the diversity of change the composition of these species.</p>
<p>Fragment, isolate or substantially damage habitat for rare, endemic or unique animal populations or species in a National Heritage place</p>	<p>Unlikely</p> <p>The Project is located outside the Wet Tropics NHP and there is a minimum separation distance of 600 m between the boundary of the NHP and the nearest Project infrastructure. The project has been designed such that access for the turbines nearest the WHA will come from west, avoiding the need for Project vehicles to utilise existing roads within the NHP. Habitats within the Project area are generally quite different in composition to those within the NHP; there are very few patches of rainforest vegetation within the Project area and the Project has avoided all direct impacts to these.</p>



Significant Impact Criteria	Project Outcome
<i>Wilderness, aesthetic or other rare or unique environment values</i>	
<p>Involve construction of buildings, roads or other structures, vegetation clearance or other actions with substantial and/or long-term impacts on relevant values</p>	<p>Unlikely</p> <p>The Project is located outside the Wet Tropics WHA. The Project has undertaken a landscape and visual impact assessment which indicates that the Project is likely to be visible from the Misty Mountain hiking trail on Mount Major on a clear day. This location is infrequent accessed and typically difficult to reach, being located on a track that is understood to be less popular with visitors and that require high levels of fitness (i.e. grade 4 or 5). The dense foliage of the rainforest vegetation that is typical of the WTQWHA contributes to the fact that there are few publicly accessible vantage points providing views towards the Project from the WTQWHA. When considering the potential for the Project to impact the OUV of the WTQWHA, it is important to consider these values as they apply to the WTQWHA in its entirety. The WTQWHA is approximately 8,940 km² in size. A conservative estimate would suggest that less than 1 % of the WTQWHA property may have views of the Project; with the visual effect of the Project typically diminishing with distance from the site. Moreover, temporally, the Project has an operational life of 30 years and upon decommissioning no notable visual impact will be evident from anywhere within the WTQWHA. In this context, the Project will have a negligible effect on the OUV of the WTQWHA and it is considered that the OUV that makes the WTQWHA so unique will not be significantly impacted by the Project.</p>
<p>Introduce noise, odours, pollutants or other intrusive elements with substantial and/or long-term impacts on relevant values</p>	<p>Unlikely</p> <p>The Project is located outside the Wet Tropics NHP and there is a minimum separation distance of 600 m between the boundary of the NHP and the nearest Project infrastructure. The project has been designed such that access for the turbines nearest the WHA will come from west, avoiding the need for Project vehicles to utilise existing roads within the NHP. The Project is not anticipated to introduce noise, odours, pollutants or other intrusive elements with substantial, long-term or permanent impacts on relevant values.</p>

The Project is not expected to have a significant residual impact on the Indigenous heritage values of the WTQNHP. A full significance assessment following the Significant Impact Guidelines (DoE 2013) is presented in **Table 8-107**.



Table 8-107 Significant Residual Impacts on the Indigenous Heritage Values of a Wet Tropics National Heritage Place

Significant Impact Criteria	Project Outcome
Restrict or inhibit the continuing use of a National Heritage place as a cultural or ceremonial site, causing its values to notably diminish over time	<p>Unlikely</p> <p>The Project will not restrict the use of a National Heritage place as a cultural or ceremonial site. The Project is not located within the NHP. Project design has been altered to avoid key sites of significance as identified by the Jirrbal. Additional surveys will be undertaken to further identify specific tangible and intangible Indigenous values within the Project area, and the process outlined in the CHMA will be followed in determining the most appropriate course of action on a case-by-case basis. Access into the Project area by the Jirrbal has been restricted in modern times and the Project has facilitated site visits in order that the Jirrbal can reconnect with their cultural landscape.</p>
Permanently diminish the cultural value of a National Heritage place for an Indigenous group to which its National Heritage values relate	<p>Unlikely</p> <p>The Project will not permanently diminish the cultural value of the WTQ as no infrastructure is proposed within the NHP.</p>
Alter the setting of a National Heritage place in a manner which is inconsistent with relevant values	<p>Unlikely</p> <p>The Project has undertaken a Landscape and Visual Impact Assessment (Appendix M) that incorporates viewpoints that are important to the Jirrbal, from within and outside the NHP. The results of this LVIA have been discussed with the Jirrbal and the setting of key sites of importance (such as Wooroorra Homestead) are not likely to be affected by the Project.</p>
Remove, destroy, damage or substantially disturb archaeological deposits or cultural artefacts in a National Heritage place	<p>Unlikely</p> <p>A CHMA has been agreed with the Jirrbal that describes the process to be followed in the event that cultural artefacts are identified outside the NHP during future field surveys.</p>
Destroy, damage or permanently obscure rock art of other cultural or ceremonial, artefacts, features or objects in a National Heritage place	<p>Unlikely</p> <p>A CHMA has been agreed with the Jirrbal that describes the process to be followed in the event that rock art of other cultural or ceremonial, artefacts, features are identified within the Project area (outside the NHP) during future field surveys.</p>
Notably diminish the value of a National Heritage place in demonstrating creative or technical achievement	<p>Unlikely</p> <p>The Project is not located within the NHP and is not considered likely to diminish the value of the NHP in demonstrating creative or technical achievements, such as tools used to make toxic plants palatable. Should</p>



Significant Impact Criteria	Project Outcome
	evidence of such achievements be discovered during planned future surveys, the process outlined in the CHMA will be followed in determining the most appropriate course of action on a case-by-case basis.
Permanently remove, destroy, damage or substantially alter Indigenous built structures in a National Heritage place	Unlikely The Project is not located within the NHP and will not require the removal, destruction, damage or alteration of Indigenous built structures within the NHP.
Involve activities in a National Heritage place with substantial and/or long-term impacts on the values of the place	Unlikely The Project is not located within the NHP and will not have substantial, long-term impacts on the Indigenous heritage values of the NHP.