

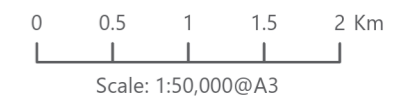
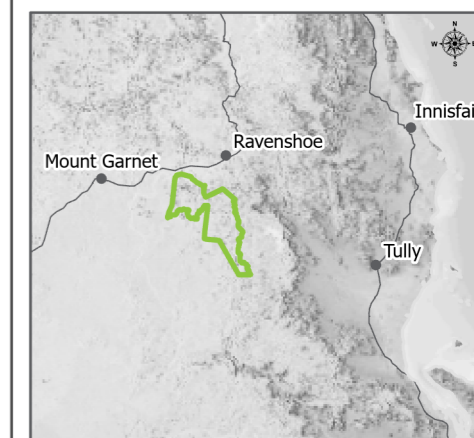
Chalumbin Wind Farm
Impacts to Greater glider habitat
Sheet 3 of 4

Figure 8.4

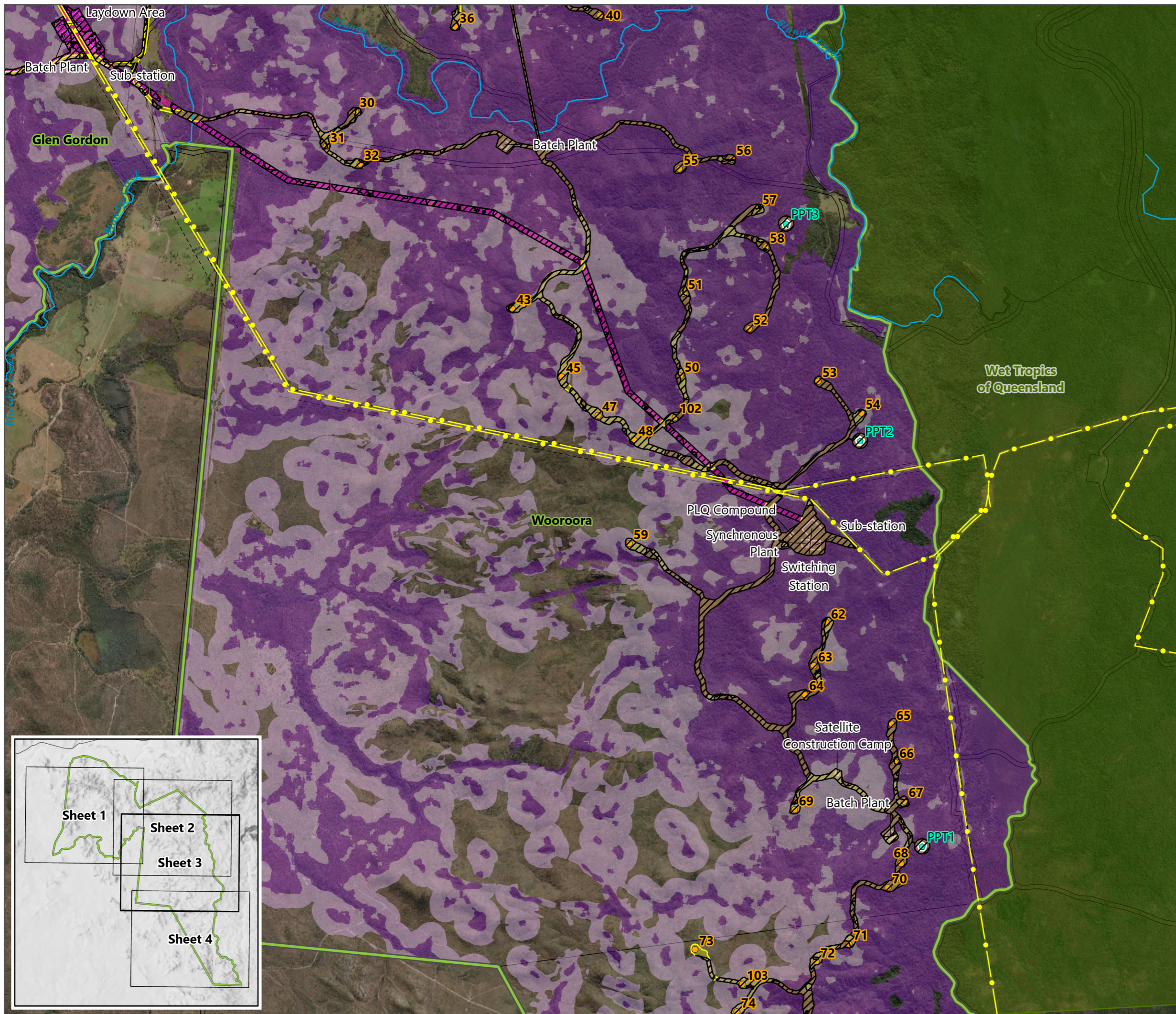
- Project Area Boundary
- Turbine
- Met-mast
- Facilities
- Clearance Envelope
 - Stage 1
 - Stage 2
- Significant Residual Impact
- Denning Habitat
- Foraging Habitat
- Existing HV Transmission Line
- Watercourse
- WTQ Boundary
- Lot Boundary
- Easement

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

Author: TOD
Reviewed: NOD

















Data Source(s):
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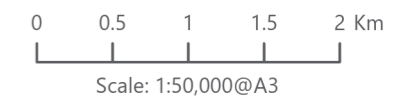
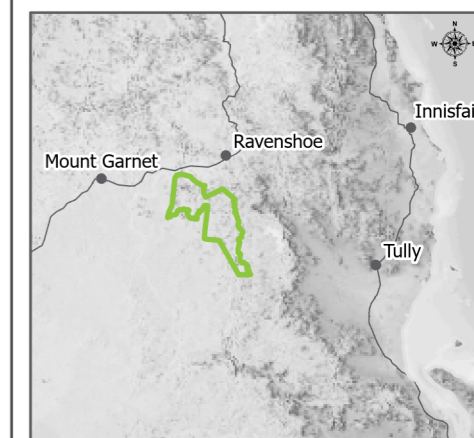
Chalumbin Wind Farm
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 Sheet 4 of 4

Figure 8.4

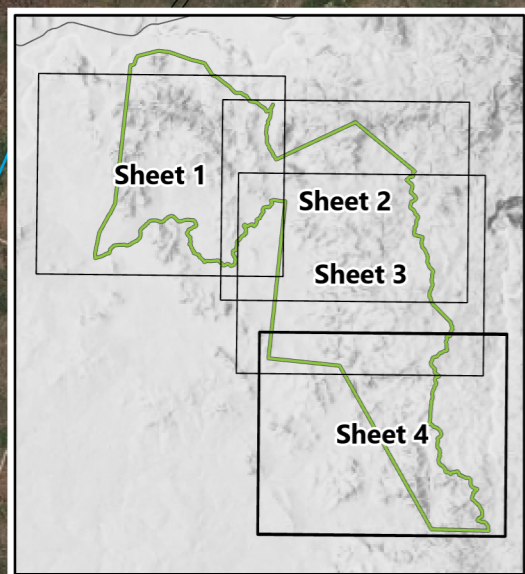
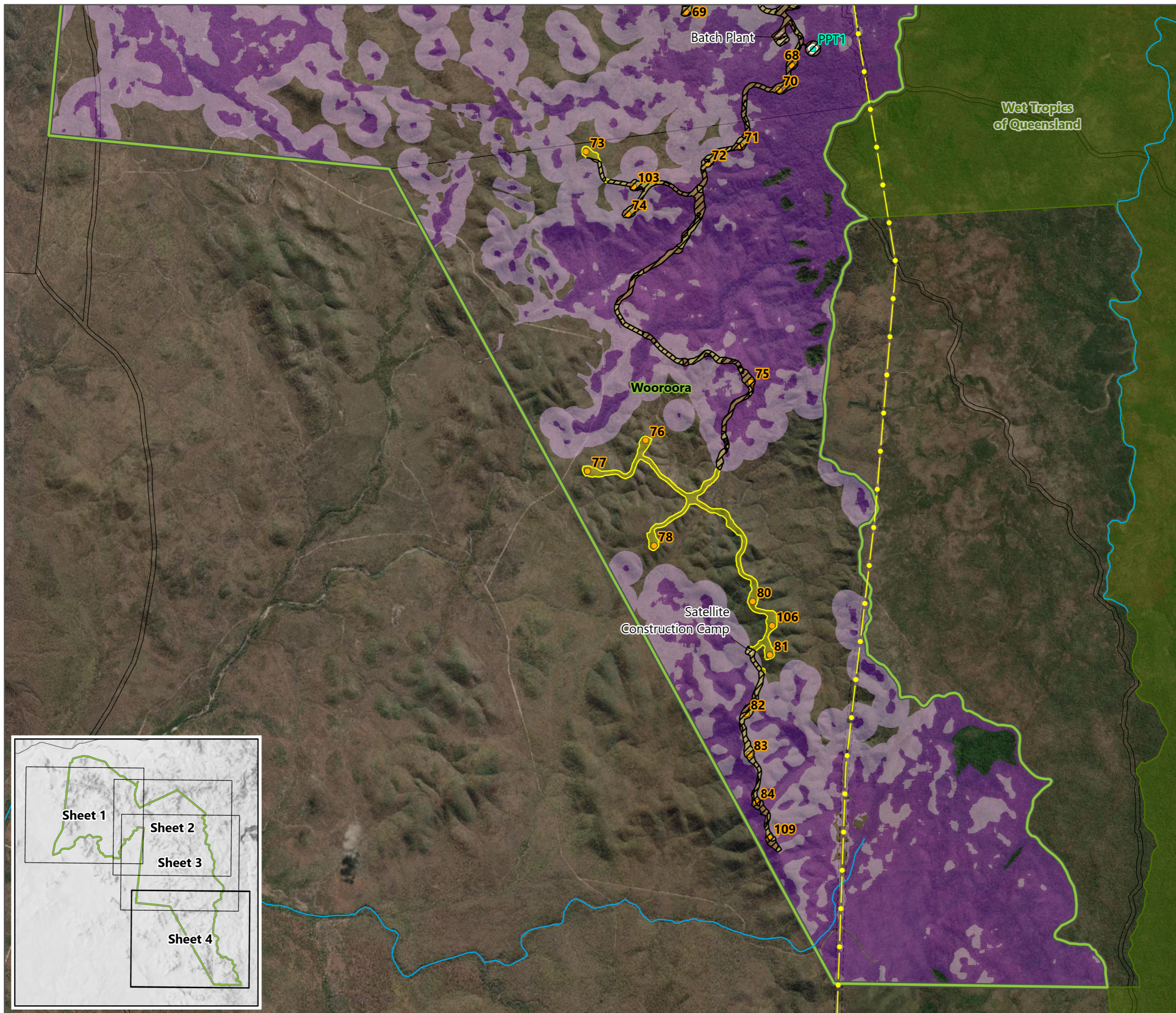
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8.6.7.2 Potential Operational Impacts from the Project and Relevant Mitigation

Potential operational impacts and proposed mitigation measures for the northern greater glider are discussed in **Table 8-63**.

Table 8-63 Potential Operational Impacts and Proposed Mitigation – Northern Greater 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 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.

8.6.7.3 Assessment of Significant Residual Impacts

The Project could potentially have a significant residual impact on the northern greater glider (Vulnerable). A full significance assessment following the Significant Impact Guidelines (DoE 2013) is presented in **Table 8-64**.



Table 8-64 Significant Residual Impact Assessment – Northern Greater Glider

Significant Impact Criteria	Assessment
<p>Lead to a long-term decrease in the size of an important population of a species</p>	<p>Unlikely</p> <p>The population within and around the Project area may be considered an important population as it is in an area containing habitat critical to the survival of the species.</p> <p>The Project will involve the clearing of up to 887.9 ha of northern greater glider habitat. It is likely that only a proportion of forest in potential habitat areas is suitable for the species, as the structural attributes of the forest overstorey and forage quality it relies on vary considerably across the landscape (DCCEW 2022). This is likely to be true for the Project area, where the population recorded during field surveys (< 1 per hour of spotlighting) is not considered 'large' per MacHunter et al. 2011.</p> <p>Vegetation clearing will be undertaken in accordance with an approved Species Management Plan and any unavoidable impacts on hollow-bearing trees will be mitigated through the retention and use of hollow-bearing stags, and the installation of nest boxes on a 1:1 basis. The majority of the cleared area (up to 80 %) will be progressively rehabilitated as soon as possible on completion of construction, incorporating glider poles where necessary to maintain connectivity until the revegetation has sufficiently established.</p> <p>Taking into account the avoidance, minimisation and mitigation measures proposed, and the fact that extensive areas of habitat will be retained throughout the Project area, it is considered unlikely that the Project will lead to a long-term decrease in the size of an important population of the northern greater glider.</p> <p>Furthermore, operational impacts on the species associated with the Project are not anticipated.</p>
<p>Reduce the area of occupancy of an important population</p>	<p>Unlikely</p> <p>The population within and around the Project area may be considered an important population as it is in an area containing habitat critical to the survival of the species.</p> <p>The Project will involve the clearing of up to 887.9 ha of northern greater glider habitat, which is approximately 3.9 % of the habitat available within the Project area and less than 1 % of the habitat available within the broader Study area.</p> <p>The Project is unlikely to cause a permanent disappearance of the species from a 4 km² area such that there would be a decrease in the area of occupancy of the species.</p>
<p>Fragment an existing important population into two or more populations</p>	<p>Unlikely</p> <p>The population within and around the Project area may be considered an important population as it is in an area containing habitat critical to the survival of the species.</p> <p>Vegetation clearing widths required to install the access roads for the Project will be determined by the topography and underlying geology,</p>



Significant Impact Criteria	Assessment
	<p>still to be determined through detailed geotechnical investigations. Conservatively, the maximum clearing distance proposed for the access roads is approximately 70 m to incorporate the required slopes and batters. This is greater than the likely maximum gliding distance of the species in this type of environment, estimated at 50 m. However, many of the access roads will require much less clearing than this. As soon as practicable after construction, access roads will be revegetated by up to 80 %, leaving only the width required for the permanent access road, approximately 5.5 m.</p> <p>The revegetation will include the use of glider habitat tree species appropriate to the bioregion and reflective of the pre-clearing vegetation community. Glider poles will also be installed, to facilitate movement of the species across access roads until the vegetation has re-established sufficiently that trees are large enough to glide from. The revegetation will also involve the retention of hollow-bearing trunks from cleared trees, installed at a similar height and aspect adjacent to the Project footprint.</p> <p>Taking into account the avoidance, minimisation and mitigation measures proposed, and the fact that extensive areas of critical and potential habitat will be retained throughout the Project area, it is considered unlikely that the Project will fragment an existing important population of the northern greater glider into two or more populations.</p>
Adversely affect habitat critical to the survival of a species	<p>Likely</p> <p>The Project will involve the removal of 887.9 ha of critical habitat for the northern greater glider. This clearing represents approximately 3.9% of the critical habitat for the species mapped within the Project area.</p>
Disrupt the breeding cycle of an important population	<p>Unlikely</p> <p>The population within and around the Project area may be considered an important population as it is in an area containing habitat critical to the survival of the species.</p> <p>Females give birth to a single young from March to June (TSSC 2016b). Their relatively low reproductive rate may render isolated populations in small remnants prone to extinction (TSSC 2016b). To avoid and minimise impacts on greater 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 greater 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 an important population.</p>



Significant Impact Criteria	Assessment
<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>	<p>Unlikely</p> <p>The Project will involve the clearing of up to 887.9 ha of northern greater glider habitat.</p> <p>Vegetation clearing will be undertaken in accordance with an approved Species Management Plan and any unavoidable impacts on hollow-bearing trees will be mitigated through replacement of hollows/nest boxes on a 1:1 basis.</p> <p>Taking into account the avoidance, minimisation and mitigation measures proposed, and the fact that extensive areas of habitat will be retained throughout the Project area, it is considered unlikely that the Project will modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the greater glider is likely to decline.</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>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 greater 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 northern greater 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. Clearing of habitat will be undertaken sequentially, and large areas of habitat will be retained across the Project area. This availability and connectivity of foraging and denning habitat will ensure any greater gliders within the Project area will have available foraging and denning resources. Fire will also be managed on site to ensure hot wildfires are minimised and hollow-bearing trees 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, particularly along riparian corridors, will support the species into the future.</p> <p>From an operational perspective, the Project poses minimal overall risk to the greater glider.</p>



8.6.8 Northern Quoll

As discussed in **Section 4.7.8**, the northern 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 northern quoll, no habitat critical to the survival of the species has been mapped within the Project area. Potential shelter habitat has been mapped as areas of rocky relief (as identified through the analysis of LiDAR data); potential foraging habitat has been mapped as eucalypt woodland within 1 km of potential shelter habitat.

8.6.8.1 Potential Construction Impacts from the Project and Relevant Mitigation

Approximately 424 ha of potential shelter habitat and approximately 8,582 ha of potential foraging habitat is present within the Project area. Potential roosting habitat within the broader Study area is likely to be extensive though not possible to quantify (nor considered necessary) without extending LiDAR coverage for the full extent. Assuming there would be dens present, there is approximately 21,421 ha of potential foraging habitat within the broader Study area.

The Project will require clearing of approximately 1 ha of potential shelter habitat and approximately 331 ha of potential foraging habitat for the northern quoll. Potential construction impacts and proposed mitigation measures for the northern quoll are discussed further in **Table 8-65**.

Table 8-65 Potential Construction Impacts and Proposed Mitigation – Northern Quoll

Potential Impact	Assessment	Mitigation
Vegetation and habitat clearance	The Project will result in the clearing of 1 ha of potential shelter habitat and 331 ha of potential foraging habitat for the species.	<p>Large areas of potential quoll habitat throughout the Project area will be retained.</p> <p>Design has sought to avoid and minimise clearing within mapped areas of rocky relief which are more likely to support dens in the preferred form of boulder piles as well as adjacent foraging and dispersal 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> <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 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 potential quoll habitat will occur sequentially and in accordance with an approved Species Management Program.</p> <p>Impacts to potential shelter habitat are generally restricted to the turbines and associated hardstands;</p>



Potential Impact	Assessment	Mitigation
		<p>the overhead transmission line and other support infrastructure are located where there is less suitable habitat for the species.</p> <p>Unavoidable impacts to potential den sites will be mitigated through relocation of the den sites 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 may lead to the clearing of 1 ha of potential shelter habitat and 331 ha of potential foraging habitat for the species.</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 micrositing 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>Project design has sought to minimise the width of access tracks in areas of potential northern quoll habitat.</p> <p>Construction personnel will be educated on the potential presence of northern 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> <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. Degradation of habitat by weeds, predation by feral cats and poisoning by cane toads are known threats to the northern quoll.</p>	<p>The Project area is currently subjected to existing weed and pest impacts, with weeds, cane toads and feral cats prevalent across the 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. This will include feral cat control to reduce predation on the northern quoll.</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</p>



Potential Impact	Assessment	Mitigation
		infestations and monitoring effectiveness of control measures. This plan will be further developed by the Construction Contractor prior to works commencing on site.
Species mortality (vehicle collision, vegetation clearance)	During vegetation clearing, there is potential for direct mortality if northern quolls are present (i.e. denning in the hollow-bearing trees to be cleared). There is also a risk of vehicle strike during construction.	<p>Clearing of habitat could potentially result in significant injury or death to individual northern 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 northern 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 northern quoll habitat when this nocturnal species is active. Construction personnel will be educated on the potential presence of northern 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>
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.
Dust emissions	Construction activities have the potential to degrade northern 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.



Potential Impact	Assessment	Mitigation
Noise and vibration	Vibration from construction activities has the potential to damage or destroy northern quoll den sites within boulder piles. Noise emissions may cause general disturbance to northern 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 northern 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 northern 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 northern 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 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.

8.6.8.2 Potential Operational Impacts from the Project and Relevant Mitigation

Potential operational impacts and proposed mitigation measures for the northern quoll are discussed in **Table 8-66**.

Table 8-66 Potential Operational Impacts and Proposed Mitigation – Northern 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	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



Potential Impact	Assessment	Mitigation
	is through the use of machinery that may generate sparks, use of flammable liquids and idling vehicles being present in areas of ground vegetation.	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 northern quolls.

8.6.8.3 Assessment of Significant Residual Impacts

The Project is not expected to have a potential significant residual impact on the northern quoll (Endangered). A full significance assessment following the Significant Impact Guidelines (DoE 2013) is presented in **Table 8-67**.

Table 8-67 Significant Residual Impact – Northern 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 northern quoll within the Project area. Potential habitat has been mapped within the Project area on a precautionary basis.</p> <p>The EPBC Act referral guideline for the endangered northern quoll (DoE 2016) defines three types of population that would be important for the long-term survival of the northern quoll, and the Project area does not meet the definition of any of these (high-density population, habitat free of cane toads, or population currently subject to research).</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 northern quoll population.</p>



Significant Impact Criteria	Project Outcome
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 northern quoll's area of occupancy.</p>
Fragment an existing population into two or more populations	<p>Unlikely</p> <p>The presence of northern 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 northern 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 northern 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> <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 a population	<p>Unlikely</p> <p>Northern quolls breed between May and November, and the majority of the adult males in a population die after the breeding season. Females typically only live for three years. This may render isolated populations prone to extinction.</p> <p>The species presence has not been confirmed within the Project area, To avoid and minimise potential impacts on northern 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>
Modify, destroy, remove, isolate or decrease the availability or quality of	<p>Unlikely</p>



Significant Impact Criteria	Project Outcome
<p>habitat to the extent that the species is likely to decline</p>	<p>The northern 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 332 ha of potential habitat for the northern quoll.</p> <p>Large tracts of northern 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 northern 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 both 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 northern quoll 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>In Queensland, regional mitigation objectives for the northern quoll include:</p> <ul style="list-style-type: none"> • Protection of persisting populations and reduction of impacts on breeding habitats; and • Minimisation of risk of high intensity fire to these populations (DoE 2016). <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 northern quoll within the Project area will have available foraging and breeding</p>



Significant Impact Criteria	Project Outcome
	<p>resources. Fire will also be managed on site to ensure hot wildfires are minimised and potential den sites protected.</p> <p>Large tracts of potential 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>

8.6.9 Semon’s Leaf-nosed Bat

As discussed in **Section 4.7.9.4**, Semon’s leaf-nosed bat has not been recorded within the Project area. Based on the assessment work undertaken, the presence of Semon’s leaf-nosed bat within the Project area is considered highly unlikely. Nonetheless, small areas of potential habitat for the species have been mapped as rainforest, riparian forest and adjacent riparian forest.

8.6.9.1 Potential Construction Impacts from the Project and Relevant Mitigation

Approximately 5,034 ha of potential habitat is present within the Project area and approximately 47,247 ha within the broader Study area. In the absence of confirmed species presence, habitat critical to the survival of the species has not been identified within the Project area.

The Project will require clearing of approximately 143.5 ha of potential habitat for the Semon’s leaf-nosed bat during Stage 1 and approximately 10.5 ha during Stage 2 (154 ha in total across both Stages). Potential construction impacts and proposed mitigation measures for Semon’s leaf-nosed bat are discussed further in Table 8-68.

Table 8-68 Potential Construction Impacts and Proposed Mitigation – Semon’s Leaf-nosed Bat

Potential Impact	Assessment	Mitigation
Vegetation and habitat clearance	The Project may lead to the clearing of 154 ha of potential habitat for the species.	<p>Large areas of potential habitat for Semon’s leaf-nosed bat throughout the Project area will be retained.</p> <p>Design has sought to avoid and minimise clearing within these areas of potential habitat. 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 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 potential Semon’s leaf-nosed bat habitat will occur sequentially and in</p>



Potential Impact	Assessment	Mitigation
Fragmentation (of populations and habitat)	The Project may lead to the clearing of 154 ha of potential habitat for the species.	<p>accordance with an approved Species Management Program.</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. Project design has sought to minimise the width of access tracks in areas of potential habitat.</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>
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. Predation by feral cats is believed to be a threat to this species.	The Project area is currently subjected to existing weed and pest impacts, with established populations of feral cats recorded across the 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. This will include supporting feral cat control programs to reduce potential predation on Semon's leaf-nosed bat. 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.
Species mortality (vehicle collision, vegetation clearance)	During vegetation clearing, there is potential for direct mortality if Semon's leaf-nosed bats are present (i.e. roosting in the hollow-bearing trees to be cleared).	Clearing of habitat could potentially result in significant injury or death to individual Semon's leaf-nosed bats, 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 roosting



Potential Impact	Assessment	Mitigation
		<p>habitat overnight. The process will significantly mitigate any potential impacts associated with clearing operations ensuring Semon's leaf-nosed bats are detected, provided procedures are followed and spotters are allowed ample opportunity to check areas prior to construction. 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. Healthy individuals will be captured and released. Any injured bats 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 Semon's leaf-nosed bat habitat when this nocturnal species is active. Construction personnel will be educated on the potential presence of Semon's leaf-nosed bats. Off-track driving will not be permitted and reduced speed limits will be enforced in areas of potential bat habitat, with appropriate signage on site.</p>
Erosion and sedimentation	Semon's leaf-nosed bat is unlikely to be directly impacted by 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.
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.
Noise and lighting	As Semon's leaf-nosed bat is a nocturnal species, there is the potential for it to 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



Potential Impact	Assessment	Mitigation
		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	Modification of foraging habitat due to bushfire 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.

8.6.9.2 Potential Operational Impacts from the Project and Relevant Mitigation

Potential operational impacts and proposed mitigation measures for Semon's leaf-nosed bat are discussed in **Table 8-69**.

Table 8-69 Potential Operational Impacts and Proposed Mitigation – Semon's Leaf-nosed Bat

Potential Impact	Assessment	Mitigation
Collision risk	The risk of Semon's leaf-nosed bats colliding with wind turbines during Project operation is considered negligible as the species does not fly within the RSA height.	None required.
Barotrauma	As the Semon's leaf-nosed bat does not fly within RSA height, the risk of barotrauma is considered negligible.	None required.
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 potential 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.



Potential Impact	Assessment	Mitigation
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 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. The Project will support, where practical, feral cat control programs undertaken in the local area; this will assist to reduce predation on Semon's leaf-nosed bat.

8.6.9.3 Assessment of Significant Residual Impact

The Project is not expected to have a significant residual impact on Semon's leaf-nosed bat (Vulnerable). A full significance assessment following the Significant Impact Guidelines (DoE 2013) is presented in **Table 8-70**.

Table 8-70 Significant Residual Impact Assessment – Semon's Leaf-nosed Bat

Significant Impact Criteria	Project Outcome
Lead to a long-term decrease in the size of an important population of a species	Unlikely The presence of Semon's leaf-nosed bat has not been confirmed within the Project area, and the Project area is unlikely to support an important population of the species. Nonetheless, potential roosting and foraging habitat has been mapped within the Project area on a precautionary basis. 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 Semon's leaf-nosed bat population, should it be present.
Reduce the area of occupancy of an important population	Unlikely The presence of Semon's leaf-nosed bat has not been confirmed within the Project area, and the Project area is unlikely to support an important population of the species. The proposed removal of potential Semon's leaf-nosed bat habitat associated with the Project is not concentrated in a manner that will remove one or more 4km ² grid squares from the Semon's leaf-nosed bat's area of occupancy.
Fragment an existing important population into two or more populations	Unlikely The presence of Semon's leaf-nosed bat has not been confirmed within the Project area, and the Project area is unlikely to support an important population of the species. The Project area contains a mixture of potential roosting and foraging habitat for the species. The vast majority of this habitat will be retained within the Project area.



Significant Impact Criteria	Project Outcome
	<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 population into two or more populations.</p> <p>Large tracts of Semon’s leaf-nosed bat 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 vegetation communities that will provide Semon’s leaf-nosed bat foraging habitat over the short to medium term.</p>
Adversely affect habitat critical to the survival of a species	<p>Unlikely</p> <p>In the absence of confirmed species presence, habitat critical to the survival of Semon’s leaf-nosed bat has not been identified within the Project area. Given the extent of potential habitat remaining in the locality, coupled with the implementation of the proposed mitigation measures, the Project is not considered likely to adversely affect habitat critical to the survival of the species.</p>
Disrupt the breeding cycle of an important population	<p>Unlikely</p> <p>The species has not been confirmed present within the Project area. 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 Project area contains a mixture of potential roosting and foraging 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 154 ha of potential habitat for Semon’s leaf-nosed bat.</p> <p>Large tracts of 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 vegetation communities that will provide Semon’s leaf-nosed bat foraging habitat over the short to medium 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>
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species’ habitat	<p>Unlikely</p> <p>Feral cats 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</p>



Significant Impact Criteria	Project Outcome
	<p>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 Project area.</p>
Introduce disease that may cause the species to decline	<p>Unlikely</p> <p>It is not expected that the Project will introduce disease that may cause the species to decline.</p>
Interfere substantially 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 presence of which has not been confirmed within the Project area. Clearing of habitat will be undertaken sequentially, and large areas of potential roosting and foraging habitat will be retained across the Project area. This availability and connectivity of foraging and breeding habitat will ensure any Semon’s leaf-nosed bats within the Project area will have available foraging resources. Fire will also be managed on site to ensure hot wildfires are minimised and potential roost 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>

8.6.10 Spectacled Flying-fox

As discussed in **Section 4.7.9**, the spectacled flying-fox has not been observed within the Project area and was last recorded in the Study area in 1999. There is limited rainforest vegetation within the Project area that could support a camp but the majority of the Project area does provide potential foraging habitat for the species in the form of open eucalypt forest.

8.6.10.1 Potential Construction Impacts from the Project and Relevant Mitigation

Approximately 28,890 ha of potential foraging habitat for the spectacled flying-fox occurs within the Project area, and 121,112 ha occurs within the broader Study area.

The Project will require clearing of 553.3 ha of potential foraging habitat for the spectacled flying-fox during Stage 1 and approximately 422.8 ha during Stage 2 (976.1 ha in total across the two Stages), as illustrated in **Figure 8-5** Figure 8-5. Potential construction impacts and proposed mitigation measures for spectacled flying-fox are discussed in **Table 8-71**.



Table 8-71 Potential Construction Impacts and Relevant Mitigation – Spectacled Flying-fox

Potential Impact	Assessment	Mitigation
Vegetation and habitat clearance	The Project will result in the clearing of 976.1 ha of potential foraging habitat for the species.	<p>Large areas of spectacled flying-fox foraging habitat throughout the Project area will be retained.</p> <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 spectacled flying-fox foraging 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 spectacled flying-fox foraging habitat will occur sequentially and in accordance with an approved Species Management Program.</p> <p>Up to 70 % of cleared foraging habitat will be progressively rehabilitated following construction and therefore the loss will only be temporary. It is anticipated that revegetated areas would provide suitable forage habitat for the species within approximately 5-10 years post-construction.</p>
Fragmentation (of populations and habitat)	The spectacled flying-fox has a foraging range of up to 50 km and is unlikely to be affected by the maximum clearing widths required for the Project access roads.	<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>Project design has sought to minimise the width of access tracks in areas of potential spectacled flying-fox foraging habitat.</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, ensuring spectacled flying-fox forage species are included in the seed mix.</p>



Potential Impact	Assessment	Mitigation
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 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.
Species mortality (vehicle collision, vegetation clearance)	The risk of species mortality during construction is negligible, as there are no known camps within the Project area and the species is unlikely to be struck by construction vehicles.	Standard construction hours (6.30am to 6.30pm) will reduce the likelihood of construction vehicles driving within spectacled flying-fox foraging habitat when this nocturnal species is active.
Erosion and sedimentation	The spectacled flying-fox is unlikely to be directly impacted by 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.
Dust emissions	Construction activities have the potential to degrade foraging habitat for spectacled flying-fox 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	Noise emissions may cause general disturbance to spectacled flying-fox.	Standard construction hours (6.30am to 6.30pm) will reduce the likelihood of construction activities disturbing this nocturnal species whilst it is potentially foraging within the Project area. Construction equipment will be fitted with noise reduction devices where practicable and switched off when not in use.
Light emissions	The spectacled flying-fox 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; night works will be limited and therefore site lighting will be kept to the minimum required for safety. Where necessary, construction lighting will be directed to the
















Potential Impact	Assessment	Mitigation
		required areas and designed to minimise light spill to adjacent 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.

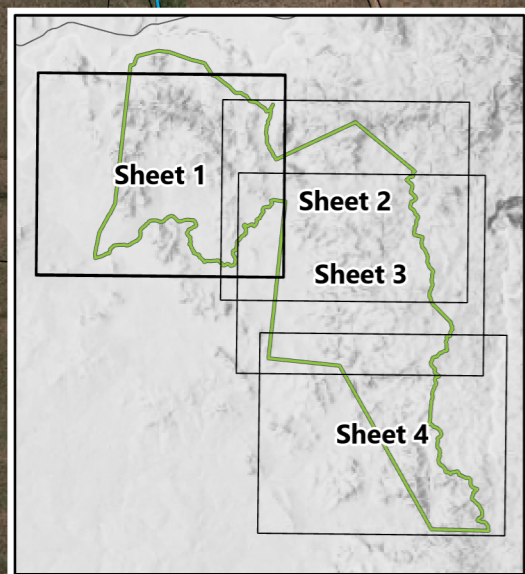
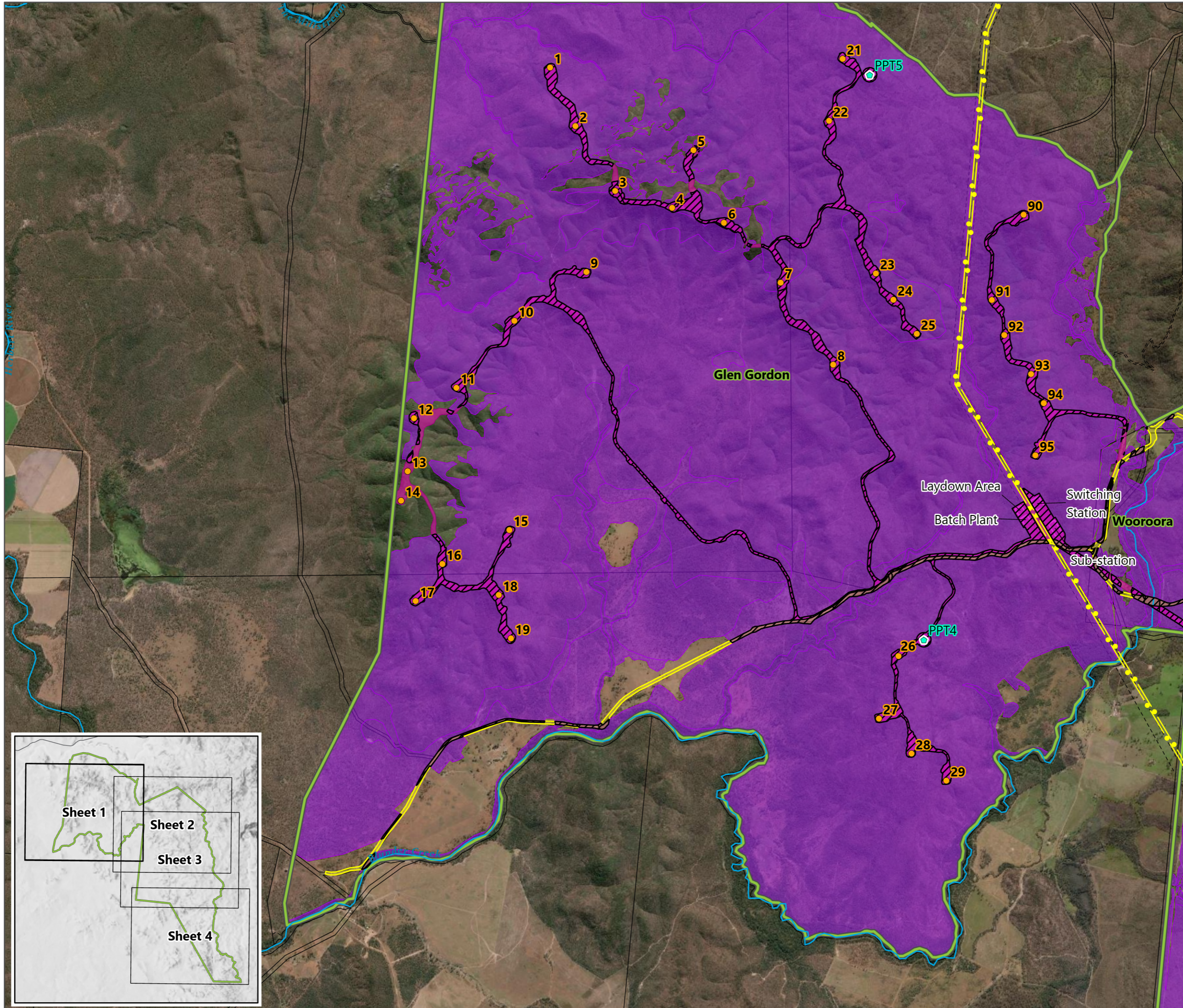
Chalumbin Wind Farm

Impacts to Spectacled flying-fox habitat

Sheet 1 of 4

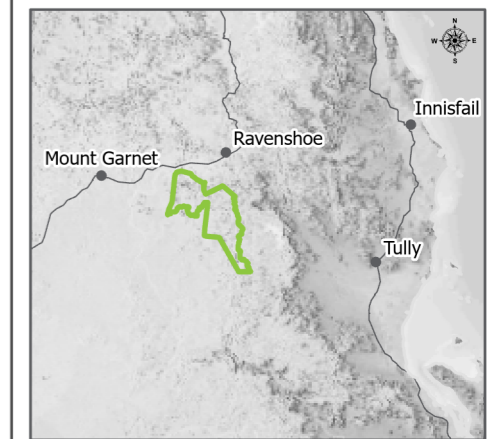
Figure 8.5

-  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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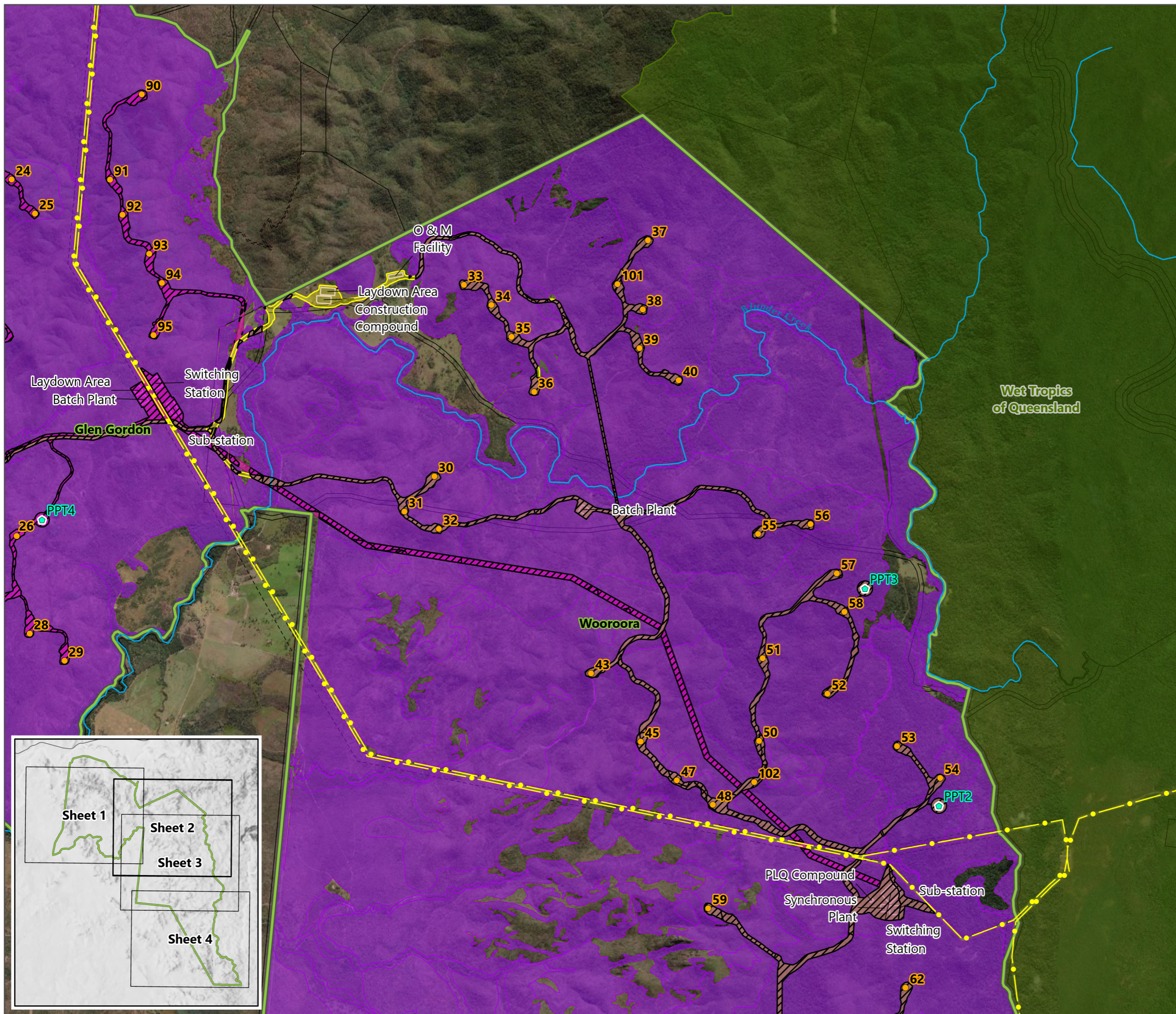
Chalumbin Wind Farm

Impacts to Spectacled flying-fox habitat

Sheet 2 of 4

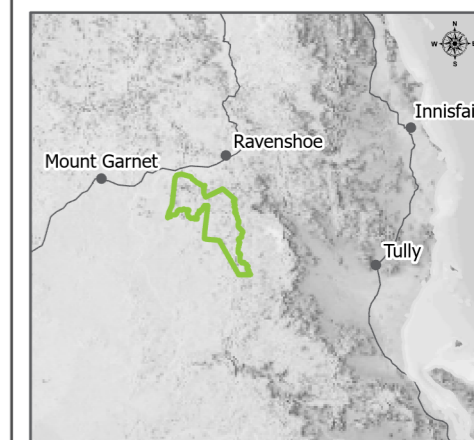
Figure 8.5

- Project Area Boundary
- Turbine
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- Stage 1
- Stage 2
- Facilities
- Significant Residual Impact
- Potential habitat
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