



## **APPENDIX D      BDAR - Part 1**



# Hills of Gold Wind Farm Biodiversity Development Assessment Report

FINAL REPORT Version 8

Prepared for Hills of Gold Wind Farm Pty Limited

06 January 2022

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<b>Biosis project no.:</b>	34963
<b>Arup job number:</b>	270335-00
<b>File name:</b>	34963.Hills.of.Gold.BDAR.Final.V8.FIN01.20220106
<b>Citation:</b>	Biosis 2021. Hills of Gold Wind Farm Biodiversity Development Assessment Report. Report for Someva Renewables. C, Wharfe, M, Palmer, M, Davis (Arup), M, Hyde. Biosis Pty Ltd., Sydney, NSW. Project no. 34963

## Acknowledgements

Biosis acknowledges the contribution of the following people and organisations in undertaking this study:

- Jamie Chivers and Liam Edgeworth of Someva as part of targeted agency and community responses and associated targeted project redesign.
- Meredith Anderson of ENGIE for confirmation of project mitigation commitments.
- Matt Davis and Chani Wheeler of Arup.
- Neville Reosengren of Environmental Geosurveys Pty Ltd.
- Department of the Environment and Energy for access to the Protected Matters Search Tool of the Australian Government.
- NSW Environment, Energy and Science Group for access to the BioNet Atlas of NSW Wildlife.
- BirdLife Australia for access to the New Atlas of Australian Birds 1998-2013.
- NSW Department of Primary Industries for access to indicative mapping of freshwater threatened species and fish populations.

Biosis staff involved in this project were:

- Mark Venosta and Ian Smales (technical bird and bat inputs)
- Lauren Harely (GIS and mapping)

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## Document verification

Document control			
<b>Revision</b>	<b>Draft 01 - Arup</b>		
<b>Filename</b>	270335-00-REP-001.docx		
<b>Date</b>	17 January 2020		
<b>Description</b>	First draft (work in progress).		
<b>Author and reviewer</b>	<b>Prepared by</b>	<b>Checked by</b>	<b>Approved by</b>
	Caroline Tan and Chani Wheeler	Andrea McPherson	Andrea McPherson
<b>Revision</b>	<b>Draft 02- Arup</b>		
<b>Filename</b>	270335-00-REP-001_Draft 2.docx		
<b>Date</b>	7 August 2020		
<b>Description</b>	Working draft update to incorporate summer field results and initial impact assessment.		
<b>Author and reviewer</b>	<b>Prepared by</b>	<b>Checked by</b>	<b>Approved by</b>
	Chani Wheeler and Biosis	Matt Davis	Matt Davis
<b>Revision</b>	<b>Draft 03- Arup</b>		
<b>Filename</b>	270335-00-REP-001_Draft 3.docx		
<b>Date</b>	23 September 2020		
<b>Description</b>	Draft for Someva and ERM review.		
<b>Author and reviewer</b>	<b>Prepared by</b>	<b>Checked by</b>	<b>Approved by</b>
	Chani Wheeler and Biosis	Matt Davis	Matt Davis
<b>Revision</b>	<b>Draft 04- Arup</b>		
<b>Filename</b>	270335-00-REP-001_Draft4_ISSUE.docx		
<b>Date</b>	9 October 2020		
<b>Description</b>	-		
<b>Author and reviewer</b>	<b>Prepared by</b>	<b>Checked by</b>	<b>Approved by</b>
	Chani Wheeler and Biosis	Matt Davis	Matt Davis
<b>Revision</b>	<b>Final 01- Arup</b>		
<b>Filename</b>	270335-00-REP-001_BDAR_FINAL.docx		
<b>Date</b>	28 October 2020		
<b>Description</b>	-		
<b>Author and reviewer</b>	<b>Prepared by</b>	<b>Checked by</b>	<b>Approved by</b>
	Chani Wheeler, Matt Davis and Biosis	Matt Davis	Matt Davis



Document control			
<b>Revision</b>	<b>Final 02- Arup</b>		
<b>Filename</b>	270335-00-REP-001_BDAR_FINAL_v2_clean.docx		
<b>Date</b>	6 November 2020		
<b>Description</b>	Minor updates for consistency with EIS.		
<b>Author and reviewer</b>	<b>Prepared by</b>	<b>Checked by</b>	<b>Approved by</b>
	Chani Wheeler, Matt Davis and Biosis	Matt Davis	Matt Davis
<b>Revision</b>	<b>Final 03- Arup</b>		
<b>Filename</b>	270335-00-REP-001_BDAR_FINAL_v3_clean.docx		
<b>Date</b>	10 Nov 2020		
<b>Description</b>	Minor updates to areas for consistency with EIS		
<b>Author and reviewer</b>	<b>Prepared by</b>	<b>Checked by</b>	<b>Approved by</b>
	Matt Davis	-	-
<b>Revision</b>	<b>Final 04- Arup</b>		
<b>Filename</b>	270335-00-REP-001_BDAR_FINAL_v5.docx		
<b>Date</b>	03 June 2021		
<b>Description</b>	Updates to respond to comments received during public exhibition and additional surveys work and analysis of data.		
<b>Author and reviewer</b>	<b>Prepared by</b>	<b>Checked by</b>	<b>Approved by</b>
	Matt Davis	-	-
<b>Revision</b>	<b>Final 05- Arup</b>		
<b>Filename</b>	270335-00-REP-001_BDAR_FINAL_v5.1.docx		
<b>Date</b>	24 June 2021		
<b>Description</b>	Update impact calculations and maps with design refinements.		
<b>Author and reviewer</b>	<b>Prepared by</b>	<b>Checked by</b>	<b>Approved by</b>
	Matt Davis	-	-
<b>Revision</b>	<b>Final 06 - Arup</b>		
<b>Filename</b>	270335-00-REP-001_BDAR_Final V6.docx		
<b>Date</b>	09 August 2021		
<b>Description</b>	Updates to address internal review and comment		
<b>Author and reviewer</b>	<b>Prepared by</b>	<b>Checked by</b>	<b>Approved by</b>
	Craig Chargulaf and Fiona Riley		

Document control			
Revision	Final 07 – Biosis (Draft)		
Filename	34963.Hills.of.Gold.BDAR.Final_V7_DFT01.20210909		
Date	09 September 2021		
Description	Conversion into Biosis template. Updates to BDAR based on final design revisions		
Author and reviewer	Prepared by	Checked by	Approved by
	Callan Wharfe, Matt Hyde, Mitch Palmer	Mitch Palmer	Mitch Palmer
Revision	Final 07 – Biosis (Final)		
Filename	34963.Hills.of.Gold.BDAR.Final_V7_FIN01.20210916		
Date	16 September 2021		
Description	Minor updates to BDAR following internal comments		
Author and reviewer	Prepared by	Checked by	Approved by
	Callan Wharfe, Matt Hyde, Mitch Palmer	Mitch Palmer	Mitch Palmer
Revision	Final 08 – Biosis (Draft)		
Filename	34963.Hills.of.Gold.BDAR.Final_V8_DFT01.20211105		
Date	05 November 2021		
Description	Update BDAR from BAM 2017 to BAM 2020		
Author and reviewer	Prepared by	Checked by	Approved by
	Callan Wharfe, Matt Hyde, Mitch Palmer	Mitch Palmer	Mitch Palmer
Revision	Final 08 – Biosis (Final)		
Filename	34963.Hills.of.Gold.BDAR.Final.V8.FIN01.20220106		
Date	06 January 2022		
Description	Update following minor internal comments		
Author and reviewer	Prepared by	Checked by	Approved by
	Callan Wharfe, Matt Hyde	Mitch Palmer	Mitch Palmer

## Forward, certification and declarations

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Biosis commenced control of this document and assessment in September 2021. Prior to Biosis taking custodianship, earlier drafts of this updated Biodiversity Development Assessment Report (updated BDAR) were prepared by Arup.

Prior to submission of the original Biodiversity Development Assessment Report (original BDAR) with the Project Environmental Impact Statement (EIS), Arup acted as lead biodiversity consultant and Accredited BAM Assessor (Matt Davis BAAS18090) for the project. Biosis undertook the fauna component of the field surveys, provided field support for flora surveys and vegetation mapping of the transmission line corridor, haul route and other ancillary investigation areas, and provided input into the fauna components of the BDAR only at this point.

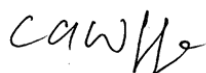
Following Matt Davis' departure from Arup, Biosis assumed the role of finalising this updated BDAR. As such the role of Accredited BAM Assessor has been split between Matt Davis (BAAS18090) for development of the original BDAR, and Callan Wharfe (BAAS18138) and Mitch Palmer (BAAS17051) for updates undertaken in developing this updated BDAR, including aligning the BDAR with BAM 2020 requirements as part of the Response to Submission and Amendment Report process.

We certify that this report has been prepared on the basis of the requirements of, and information provided under, the Biodiversity Assessment Method ([DPIE 2020](#)) and s6.15 of the *Biodiversity Conservation Act 2016*.

In preparing this assessment we have acted in accordance with the Accredited BAM Assessor Code of Conduct.

We declare that we have considered the circumstances and there is no actual, perceived or potential conflict of interest.

**Signature:** Callan Wharfe



**Date:** 06 January 2022

**BAM Assessor Accreditation Number:** BAAS181338

**Signature:** Mitch Palmer



**Date:** 06 January 2022

**BAM Assessor Accreditation Number:** BAAS17051

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## Glossary

<b>AGL</b>	Above ground level
<b>Amendment Report</b>	The Amendment Report prepared for the Project following exhibition of the EIS.
<b>Assessment Area</b>	Is the Assessment area for the proposal and includes the development footprint plus a 1500m landscape assessment buffer
<b>BAM</b>	Biodiversity Assessment Method 2020
<b>BBAMP</b>	Bird and Bat Adaptive Management Plan
<b>BC Act</b>	<i>Biodiversity Conservation Act 2016</i>
<b>BCD</b>	Biodiversity Conservation Division
<b>BDAR</b>	Biodiversity Development Assessment Report
<b>BoM</b>	Bureau of Meteorology
<b>BOS</b>	Biodiversity Offsets Scheme
<b>BVM</b>	Biodiversity Values Map
<b>Development Corridor</b>	The development corridor is the broader investigation area used to inform the design layout and impact mitigation. The development corridor has the same meaning as ‘subject land’ as defined by the BAM, and has undergone ground-validated assessment as described in this BDAR. Figure 2 provides an overview of this area.
<b>Development footprint</b>	Is the area in which physical disturbance has been assessed within the Subject land to determine direct and indirect impacts as a result of the proposed Project. It includes permanent and temporary development footprint.
<b>DNG</b>	Derived Native Grassland
<b>DPIE</b>	Department of Planning, Industry and Environment
<b>EES</b>	Environment, Energy and Science Group in the Department of Planning, Industry and Environment
<b>EIS</b>	The Environmental Impact Statement prepared and exhibited for the Project dated 18 October 2020.
<b>EMS</b>	Environmental Management Strategy
<b>EPBC Act</b>	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
<b>FM Act</b>	<i>Fisheries Management Act 1994</i>
<b>GDEs</b>	Groundwater Dependent Ecosystems
<b>IBRA</b>	Interim Biogeographic Regionalisation for Australia
<b>Landscape assessment buffer</b>	The development footprint plus a 1500m buffer.

<b>LGAs</b>	Local Government Areas
<b>OEH</b>	Office of Environment and Heritage
<b>Permanent development footprint</b>	This is the area of land that will be subject to permanent alteration as a result of installation and operation of Project infrastructure
<b>PCT</b>	Plant Community Type
<b>RTS</b>	The Response to Submissions Report prepared for the Project.
<b>SEAR's</b>	Secretary's Environmental Assessment Requirements
<b>SEPP</b>	State Environmental Planning Policy
<b>SSD</b>	State Significant Development
<b>Subject land</b>	The area to which the BAM has been applied, assessed and studied
<b>TEC</b>	Threatened Ecological Community
<b>Temporary Development Footprint</b>	This is the area of land that will be temporarily disturbed during construction of the project, and rehabilitated following construction in order to minimise permanent impacts to biodiversity. Mitigation measures in these areas are to include revegetation, spreading mulched or cleared vegetation and installing native grass seed using locally occurring species.
<b>WTG</b>	Wind turbine generator

## Executive summary

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### Project description

Hills of Gold Wind Farm (HOGWF or the Proponent, previously Wind Energy Partners), a 100% owned subsidiary of ENGIE Australia, proposes to develop a wind farm on the ridgeline between Hanging Rock and Crawney Pass, approximately 60 km southeast of Tamworth (the project).

The project is State Significant Development and will be assessed under Part 4 of the *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act). A referral under the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) (EPBC Act) was submitted to the Commonwealth Department of Agriculture, Water, and the Environment (DAWE). The Commonwealth Minister for the Environment declared the project to be a controlled project which requires assessment under the provisions of the EPBC Act. This means it is being bilaterally assessed under State and Commonwealth legislation in accordance with the *NSW Bilateral Agreement relating to environmental assessment 2015*.

The Project would have a capacity to generate approximately 390 megawatts (MW) of electricity that would be supplied to the National Grid.

The project will consist of the following:

- Up to 65 wind turbine generators (WTGs), each with:
  - A generating capacity of approximately 6 MW.
  - Three blades mounted to a rotor hub. In turn the hub will be mounted on a tubular steel tower. This will provide a total height from the tip of the blade to the ground of 230 metres.
  - A gearbox and generator assembly housed in a nacelle.
  - Adjacent hardstand areas for use as crane pads and laydown areas. These will be initially used to help build the WTGs. They will remain in place to allow for ongoing maintenance.
- Decommissioning of three operational meteorological monitoring masts and the installation of up to five temporary and five permanent masts to monitor the power of the wind. Up to five of the 10 masts will be permanently installed near one of the WTGs, within the subject land. The other five will be temporarily installed at the location of one of the WTGs and removed after initial testing. All 10 masts will be approximately 150 metres tall; equivalent to the hub height of the final selected WTG model. The exact number and location of the up to 10 masts will be confirmed during detailed design.
- A 330 kilovolt (kV) electrical substation located centrally within the project site. The substation will include transformers, insulators, switchyard, and other ancillary equipment.
- An operations and maintenance facility.
- A battery energy storage system capable of storing up to 400 mega-watthours (MWh).
- Aboveground and underground 33kV electrical reticulation and fibre optic cabling connecting the WTGs to the onsite substation. The cables will follow site access tracks where practicable.
- A 330kV high-voltage overhead transmission line to connect the onsite substation to the existing 330kV TransGrid Liddell to Tamworth overhead transmission line network. The connection point will be approximately 21 km west of the substation.
- A switching station will also be built at the connection point.

- A network of internal private service and access road network that would total a distance of 40 km. The road network will connect the WTGs and other project infrastructure to the public road network.
- Various local road upgrades and waterway crossings as needed to deliver, install and maintain the project.

The final project layout, project infrastructure configuration, and development footprint presented in the Response to Submissions (RTS) and Amendment Report for the Project were developed in consultation with project ecologists and the Proponent, and have been further refined in response to the issues raised in submissions, with a strong focus on further minimising the project's overall biodiversity impact. In summary, the refinements and amendments made to the Project in consultation with ecologists since the original BDAR was prepared include:

- Reducing the number of WTGs from 97 (initial pre-EIS design), to 70 for EIS submission, and further to 65 (current design) to reduce biodiversity impacts following further detailed investigations.
- Optimising wind farm, transmission line and access road layouts to further avoid ecologically sensitive areas based on additional surveys and improved mapping.
- Defining construction and engineering methods to reduce the construction program and amount of earthworks.
- Mapping and prioritising the use of existing access tracks to reduce the amount of vegetation clearance.
- Opting to use the transmission line corridor with the lowest ecological value of the seven options investigated in 2018.
- Undertaking a focussed study on potential ecological impacts along the transmission line corridor associated with the spanning of deep valleys by overhead power cables as part of the ongoing detailed design of the transmission line.

More detail on the amended design and its impact on the assessment of biodiversity impacts is provided below.

## Amended design and addressing submissions

The following design amendments were made following exhibition of the EIS between December 2020 and January 2021 (Table 1). The reduced impact of these changes has been assessed in this updated Biodiversity Development Assessment Report (BDAR). The locations of the amended designs and a summary of the reduction in impacts are presented in Figure 1 below.

**Table 1 Design amendments and impact / benefit**

Project Amendment	Description	Impact/benefit
<b>Development footprint revision</b>	<p>Exhibited project footprint (EIS) comprised:</p> <ul style="list-style-type: none"> <li>• Permanent Development Footprint: approximately 242 ha</li> <li>• Temporary Development Footprint: approximately 271 ha</li> <li>• Total development footprint approximately 513 ha.</li> </ul> <p>Design revisions have resulted in the</p>	<p>Substantial reduction in direct impacts to biodiversity values have been realised through detailed design revision and footprint/infrastructure amendments. This is combined with a material reduction in the indirect impacts arising from the removal and relocation of turbines as well as a reduction in bulk earthworks and associated project infrastructure.</p>



Project Amendment	Description	Impact/benefit
	<p>amended project footprint now comprising:</p> <ul style="list-style-type: none"> <li>• Permanent Development Footprint: approximately 100ha</li> <li>• Temporary Development Footprint: approximately 200 ha</li> <li>• Total development footprint approximately 300 ha</li> </ul>	
<b>Removal of WP1</b>	<p>WP1 was the closest turbine to the Crawney Pass National Park and its removal reduces biodiversity impacts, native vegetation removal and the requirement for bulk earthworks. The road required to access the turbine has also been removed, further benefitting biodiversity values in that location.</p>	<p>WP1 was considered a Moderate Risk turbine and its removal benefits locally occurring threatened and non-threatened fauna species including microbats, Koala, Greater Glider, as well as to approximately 2ha of high condition PCT 1194 vegetation. Removal of this turbine location from the project design has the direct benefit of reducing native vegetation removal, but also reduces potential connectivity impacts as the turbine was acting as an outlier on the south-western extent of the array, and the turbines now occur in a more linear arrangement in that location.</p>
<b>Removal of WP19</b>	<p>WP19 has been removed reducing impacts to biodiversity values in the centre of the wind farm. Its removal will reduce the earthworks and vegetation clearance needed to install the turbine, supporting hardstand area and access road.</p>	<p>The removal of WP19 results in an increase separation gap from 1 – 1.5km between turbines in this location, to approximately 2.1km between turbine WP18 and turbines WP20-22 reducing habitat connectivity impacts in an areas of the wind farm where moderate condition habitats occur on either side of the ridgeline. The removal of WP19 also allows for an approximate 600 metre reduction of the intrusion into intact vegetation to the south of the development footprint.</p>
<b>Removal of WP23, 27 and 31</b>	<p>WP23, 27 and 31 have all been removed to reduce risk of direct and indirect impact biodiversity values including potential microbat breeding habitat, modelled potential owls breeding habitat, and intact vegetation. The removal of these turbines will reduce significant bulk earth works associated with hardstands and associated roads, and reduces the area of impact from the southern-most portion of the wind farm by 400 – 500m at each turbine location.</p>	<p>All three of these turbines were assessed as high risk turbines (four assessed in total) in relation to potential impacts to biodiversity values. WP23 was considered high risk due to its occurrence as southern outlier in high condition intact native vegetation considered likely to support habitat for numerous threatened species, WP27 was located in close proximity to confirmed potential microbat breeding habitat, and WP31 occurred in proximity to modelled potential large forest owl breeding habitat.</p> <p>The removal of these three turbines will substantially benefit biodiversity values utilising</p>

Project Amendment	Description	Impact/benefit
		the habitats along this southern portion of the wind farm, both directly through a reduction in vegetation removal, and indirectly through a reduction in potential collision risk, breeding habitat disturbance, and connectivity impacts.
<b>Reorientation of WP2 hardstand</b>	The hardstand for WP2 has been reorientated such that it now occurs largely on exotic grassland.	This reorientation complements the reduction of impacts associated with the removal of WTG 1 and reduces impacts to high condition PCT 1194 by another 0.3 ha (on top of the 1 ha reduction highlighted above from the removal of WTG 1).
<b>Relocation of WP47</b>	WP47 has been relocated 209 metres north east of the exhibited location. This is to reduce the extent of vegetation clearance in this location.	The relocation of WTG 47 increases buffer distance from retained native vegetation on the escarpment and reduces native vegetation clearing. This reduces impacts to biodiversity values.
<b>Relocation of WP50</b>	WP50 was been moved approximately 130m to the north-east to avoid indirect impacts to conformed microbat potential breeding habitat.	WTG 50 was originally assessed as a high risk turbine. The relocation of WTG 50 avoids indirect impacts to the confirmed microbat potential breeding habitat that occurs to the south-west of the turbine and hardstand location. The turbine, turbine blade and zone of disturbance are now all located well outside the 100 m BAM prescribed microbat breeding habitat buffer to further reduce potential collision risks, and potential vibration impacts during construction.
<b>Monitoring Masts at WTG Location prior to WTG Installation</b>	Decommissioning of three current monitoring masts and installation of up to 10 additional monitoring masts for power testing (five previously proposed in the EIS, and five additional as part of this Amendment Report). The new monitoring masts will be located close to a turbine location with a maximum height of approximately 150 m AGL, equivalent to the hub height of the installed turbines. The additional five masts proposed will be temporary and placed on the same location as a turbine prior to its installation and removed shortly before turbine installation.	Up to 10 temporary monitoring masts are now proposed with the exact number and location being confirmed at the detailed design stage. No additional impacts will result, as the 5 new proposed monitoring masts will be located within assessed turbine footprints. The exact number and location will be defined at the detailed design stage.
<b>Transmission Line realignment</b>	The transmission line north of WP12 and to the east of WP2 has been realigned. This will reduce the vegetation clearance.	Relocation of approximately 3 km of the transmission line corridor in this area has reduced impacts to patches of high condition

Project Amendment	Description	Impact/benefit
	Further analysis of opportunity to reduce clearing of native vegetation where overhead clearance is expected to be sufficient to avoid impacts.	native vegetation and relocated the footprint predominantly in areas of exotic grassland, further to the south and closer to the turbines. This design revision has resulted in materially reduced direct impacts to native vegetation and habits, including mapped habitat for Koala and Spotted-tailed Quoll.
<b>Removal of transmission vegetation</b>	Portions of the vegetation previously assessed to be removed for transmission line have been reassessed in a targeted study by AECOM to identify native vegetation that will remain un-impacted due to the spanning of valleys from the overhead power lines, remaining well over the height of the mature vegetation.	A reduction in the total clearing footprint will ensure an overall reduction in direct impacts to native vegetation. Portions of the vegetation previously assessed to be removed within the transmission line easement have been confirmed as able to remain based on further detailed design following a targeted study by AECOM (2021) to identify native vegetation that will remain un-impacted due to the height of the overhead power lines where they span across valleys. The lines in these areas have now been confirmed to remain well over the height of the mature vegetation, enabling the vegetation to be retained and further reducing biodiversity impacts.
<b>Traffic Access to Project Area</b>	All Project traffic will access the Project Area via Morrisons Gap Road only. The Head of Peel Road will not be used for Project related construction and operational traffic and will be for emergency use only. As a result, road upgrades previously proposed along the Crawney Road / Head of Peel access route ('Southern Route') will not be undertaken	Reduction in number of waterway crossings and impacts to native vegetation and fauna habitat, clearing that would otherwise have been required, through removing access along Head of the Peel Road.
<b>Removal and realignment of internal road networks</b>	<p>Removal of the internal road from the development site near southern end of Head of Peel Road into western area of the Project Site.</p> <p>Sections of track between WP16 to WP17, WP17 to WP18, WP46 to WP47 and WP66 to WP67 and have been reassessed to avoid biodiversity impact and following contractor input on reducing earthworks and required width of footprint.</p>	<p>Sections of access track between WTG 16 to WTG 17, WTG 17 to WTG 18, WTG 46 to WTG 47 and WTG 66 to WTG 67 have been refined to avoid biodiversity impacts and following contractor input on reducing earthworks and required width of footprint.</p> <p>Removal of internal roads no longer required as a result of the turbine removals outlined above will directly and indirectly benefit previously impacted biodiversity values due to reductions in vegetation clearing, and bulk earthworks and resulting fragmentation of vegetation and habitats.</p>
<b>Key Intersection, Devils Elbow and Morrison</b>	The proposed road upgrades at Devils Elbow and the Barry Road/Morrison Gap	Impacts associated with the exhibited project footprint in the EIS at Devils Elbow comprised

Project Amendment	Description	Impact/benefit
<b>Gap Road design update</b>	Road intersection have been modified. Proposed upgrades would require vegetation clearing with the Devils Elbow footprint approximately 2.5 ha and the Barry Road/Morrison Gap Road proposed footprint is approximately 2.4 ha.	approximately 17ha of native vegetation which is generally in high condition. Substantial design revisions and a new bypass have reduced the impact assessed in this location down to 2.5 ha of native vegetation, leading to direct and indirect benefits to previously impacted vegetation and habitats in this area (refer Plate 1 below). This includes Box Gum Woodland Critically Endangered Ecological Community and habitat for threatened fauna species. Previously exhibited impacts considered a number of design options of which only one was intended to be constructed. The final route selected presented the lowest impact option and was further refined to avoid impacts.
<b>Transport Route Updates</b>	<p>The transport route for OSOM from the Port of Newcastle to the Project Area has been amended by the following:</p> <ul style="list-style-type: none"> <li>• Removal of the tower route option via Tamworth;</li> <li>• Removal of the Head of Peel Road route ('Southern Route') (as stated above) and associated alternate routes through Nundle including Happy Valley Road, Jenkins St, Gill St, Innes St;</li> <li>• Inclusion of route optionality in Muswellbrook;</li> <li>• Two additional laybys for OSOM traffic on Lindsay Gap Road and Morrisons Gap Road to allow existing road users to pass slower moving Project traffic.</li> </ul>	Overall, the refined transport route represents a reduction in biodiversity impacts with the remaining impacts fully assessed in the updated BDAR.
<b>Ancillary Infrastructure Amendments</b>	As a result of the removal of the Head of Peel Road access to the Project Area, the construction laydown area and batching plant at the top of the Head of Peel Road access route has been deleted. The laydown area / batch plant has been relocated to the footprint of the BESS / substation and O&M facility.	Changes to the location of temporary concrete batching plant locations, optionality for a new O&M location, alternate construction compound and additional met masts have overall, resulted in a reduction to previously presented impacts on biodiversity values.
	Substation, BESS and O&M configuration has been amended following further substation design works	
	Option to relocate O&M to WP56 based on feedback in the Hazards and Risk	



Project Amendment	Description	Impact/benefit
	Report	
	Laydown Area and Concrete Batching Plant optionality for all laydown areas with the exception of laydowns along Morrisons Gap Road to host concrete batching plants (total number of batching plants for the Project will not increase and will remain as two).	
	An additional temporary construction compounds are proposed adjacent to WTG 56 and at the eastern (downslope) extent of the Devils Elbow bypass in an existing cleared pullover bay. No impacts to vegetation will occur at the evils Elbow compound.	



**Plate 1 Devils Elbow bypass engineering design for the current and EIS exhibited impact assessment**

The following table highlights the impact revised assessment has had on Native Vegetation.

**Table 2 Revised direct vegetation impacts**

Vegetation condition class	2020 BDAR Area (ha)	Updated BDAR Area (ha)	% Reduction	% of mapped vegetation
Planted or urban vegetation	7.39	0.24	97	0.08



Vegetation condition class	2020 BDAR Area (ha)	Updated BDAR Area (ha)	% Reduction	% of mapped vegetation
Exotic grassland	272.36	164.48	40	55.35
Derived Native Grasslands	30.91	29.06	6	9.78
Native vegetation – Low condition	37.11	19.28	48	6.49
Native vegetation – Moderate condition	73.8	46.18	37	15.54
Native vegetation – High condition	64.88	37.92	42	12.76
<b>TOTAL</b>	<b>486.45</b>	<b>297.15</b>	<b>39</b>	<b>100%</b>

The project amendments have significantly reduced the impacts to vegetation as a result of clearing by a total of 39%, with a reduction of 42% occurring in areas of high condition native vegetation. As a result, a total of 72.41 hectares of native vegetation (varying in condition from low to high) will no longer be impacted by the Project.

Table 3 demonstrates the reduction in residual impacts required to be offset under the Biodiversity Offset Strategy to ensure no net loss to biodiversity.

**Table 3 Reductions in project refinements**

Relevant matter	Details	2020 BDAR Direct impacts	2021 Updated BDAR Direct impacts	Change in direct impacts
<b>Native vegetation communities and ecosystem credit species habitats.</b>	Direct loss of native vegetation communities associated with site clearing	207.7 ha	132.43 ha	-75.27 ha
<b>Threatened ecological communities</b>	Direct loss of Ribbon Gum—Mountain Gum—Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion	57.43 ha	23.36 ha	-34.07 ha
	Direct loss of White Box Yellow Box Blakely's Red Gum Woodland and derived native grassland	13.33 ha	6.07 ha	-7.26 ha
<b>Habitat for threatened fauna species – species credit species</b>	Large-eared Pied Bat*	61.08 ha	19.68 ha foraging habitat 0 ha breeding habit	-41.4 ha
	Eastern Cave Bat*	62.49 ha	19.68 ha foraging habitat 0 ha breeding habitat	-42.81 ha
	Large Bent-winged Bat*	23.12 ha	0 ha (breeding habitat)	-23.12 ha
	Little Bent-winged Bat*	23.12 ha	0 ha (breeding habitat)	-23.12 ha

Relevant matter	Details	2020 BDAR Direct impacts	2021 Updated BDAR Direct impacts	Change in direct impacts
	Southern Myotis	2.21 ha	3.97 ha	1.76 ha
	Eastern Pygmy-possum	30.42 ha	18.14 ha	-12.28 ha
	Koala	50.76 ha	36.44 ha	-14.32 ha
	Squirrel Glider	26.20 ha	16.06 ha	-10.14 ha
	Booroolong Frog	1.59 ha	0.64 ha	-0.95 ha
	Border Thick-tailed Gecko	0.17 ha	0.17 ha	0 ha
	Powerful Owl	Assessed as not present as none were observed during surveys	1.99 ha based on assumed presence	No change. However, based the conservative assumption that this species is present despite not being located during surveys, 1.99 ha of potential habitat will be impacted.
	Sooty Owl	As above	As above	As above
	Barking Owl	As above	As above	As above
	Masked Owl	As above	As above	As above
<b>Total Change</b>				-275.88 ha

As a result targeted field survey, significant refinement has been achieved for previously assumed potential roosting / breeding habitat locations for cave dwelling bats including the threatened Eastern Cave Bat, Large Bent-winged Bat, Little Bent-winged Bat and Large-eared Pied Bat within and surrounding the development footprint. The former conclusion of a potential significant impact to Large-eared Pied Bat has been updated to unlikely based on a lack of optimal breeding habitat and removal and relocation of high risk turbines. Further information is provided in Section 8.8.

The Proponent intends to implement best practice processes for minimising these direct impacts noted above, including:

- Pre-clearing protocols, including pre-clearing inspections, establishment of exclusion zones and on-ground identification of specific habitat features to be retained and/ or relocated.
- Vegetation clearing protocols will be implemented including staged habitat removal, fauna handling and unexpected threatened species finds procedures for species (including of wombats, Koala, and other fauna) and any specified seasonal limits on clearing activities.
- A Biodiversity Management Plan will be implemented including the following specific requirements to minimise and manage any risk of fauna injury mortality during construction:

- Strategies for fauna management during construction including any identification roles, responsibilities and contingency measures such as temporary stop works and engagement of fauna specialist.
  - Requirements for temporary deterrent fencing, signage and/or requirements to modify driver behaviour and regular visual inspections to minimise the risk of fauna injury / mortality (particularly Koala and Spotted Tailed Quoll) due to vehicle strike or entrapment in deep excavations, with details to be developed during the preparation of the BMP.
  - Opportunity for egress to any species that may become trapped in any open excavation in the form of graded exits or tools to support climbing out.
  - Opportunities for the salvage and re-use of important habitat features, including tree-hollows and bush rock, are to be identified and detailed procedures for the implementation of these activities are to be adopted.
- A Bird and Bat Adaptive Management Plan will be developed and implemented for the monitoring of threatened or at risk species subject to adverse operational impacts. Operational turbine specific mitigation measures have been included in Section 8.9.1.

This amended BDAR has been prepared in accordance with the requirements of the *Biodiversity Conservation Act 2016* (NSW, BC Act) and the NSW Biodiversity Assessment Method (BAM, [DPIE 2020](#)). This BDAR was originally prepared in accordance with the BAM 2017 ([QEH 2017](#)) method, however as the final submission will occur after October 22, 2021 all amendments have been prepared to comply with BAM 2020 requirements.

Consultation was carried out with the Biodiversity Conservation Division (BCD) of DPIE and NSW National Parks and Wildlife Service (NPWS) before preparing the original BDAR. Consultation has continued since public exhibition of the original BDAR and EIS. BCD was consulted on this amended BDAR on the 3 February 2021 and 27 May 2021. This amended BDAR was also shared with BCD and NPWS prior to formal lodgement.

A single development footprint has been assessed that covers the wind farm infrastructure, internal roads, transmission line easement, access tracks, and transport haul route.

The development footprint includes the construction and operational footprints, including temporary and permanent footprints. A wider 1500 metre landscape buffer was added to the development footprint to assess landscape impacts, as required under the BAM. The development footprint plus the buffer is referred to in this BDAR as the "assessment area".

The following biodiversity values were identified in the subject land through a desktop study and targeted field investigations.

### **Topography**

- The topography includes a range of plateaus, ridgelines, and escarpments. The ridgetop where the WTGs will be installed is relatively flat.

### **Vegetation**

- The majority (55.5 % or 164.72 ha) of the mapped vegetation within the development footprint is composed of exotic grassland or planted/urban vegetation, with 44.5 % of the mapped vegetation being classified as native vegetation.
- The 132.43 ha of mapped native vegetation within the development footprint, occurs across 17 separate PCTs with varying levels of disturbance and condition, stratified into 43 vegetation zones.

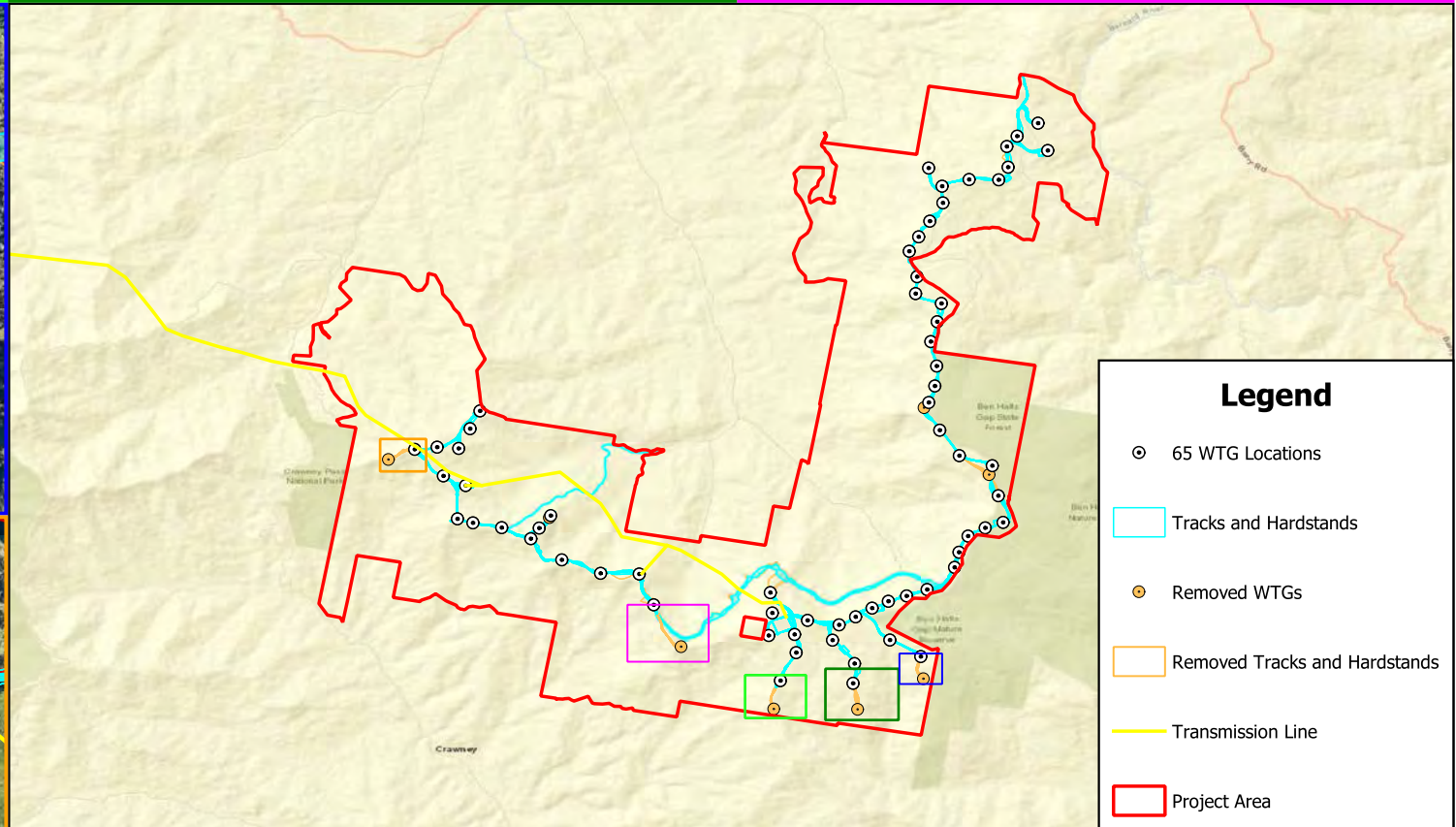
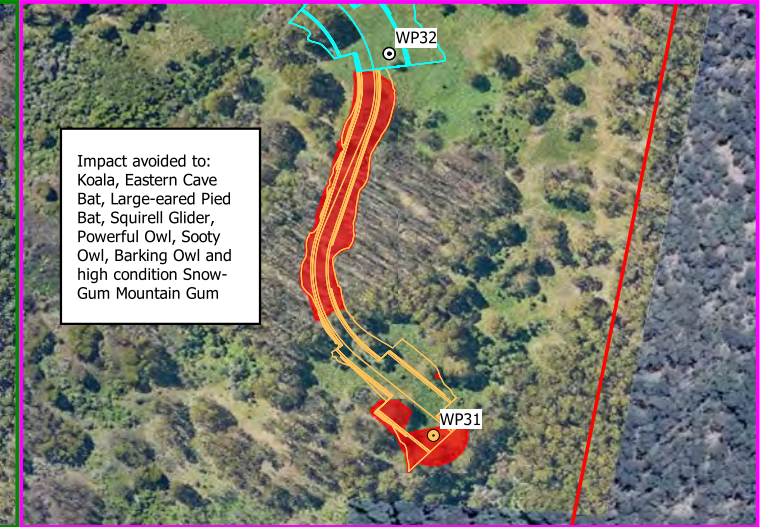
- The mapped native vegetation (132.43 ha) represents 0.61 % of the approximate 21,540 ha contained within the assessment area.


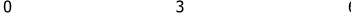

### **Communities and species**

- A total of 24 Plant Community Types (PCTs) were identified and mapped within the subject land, of these PCTs 17 will be impacted by the project.
- Two State-listed Threatened Ecological Communities (TECs) were identified and mapped within the development footprint, White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Box Gum Woodland, Critically Endangered) (6.07ha) and Ribbon Gum - Mountain Gum - Snow Gum Grassy Forest/Woodland (Endangered) (23.36ha).
- One nationally-listed Critically Endangered Ecological Community (CEEC) was identified and mapped, within the development footprint, White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Box Gum Woodland) (6.07ha).
- Ten state-listed fauna BAM species credit species were recorded or assumed to be present, eight mammals, one amphibian, and one reptile.
- Five nationally-listed threatened fauna either occur or are highly likely to occur, Koala, Large-eared Pied Bat, Greater Glider, Spotted-tailed Quoll and Booroolong Frog.
- No migratory fauna flightpaths or routes were observed or mapped throughout the assessment area.
- Nankeen Kestrel, Brown Goshawk and Wedge-tailed Eagles are present, and while not listed these species are protected and considered subject to potential collision risk.

The mitigation approach was to firstly avoid and minimise impacts through design phase refinements. However, there will be certain unavoidable impacts if the project is built. Therefore, mitigation measures have been identified to minimise the Project's biodiversity impacts. This includes (adaptive) management and monitoring measures. It also includes the use of biodiversity offsets to ensure no net loss of biodiversity.

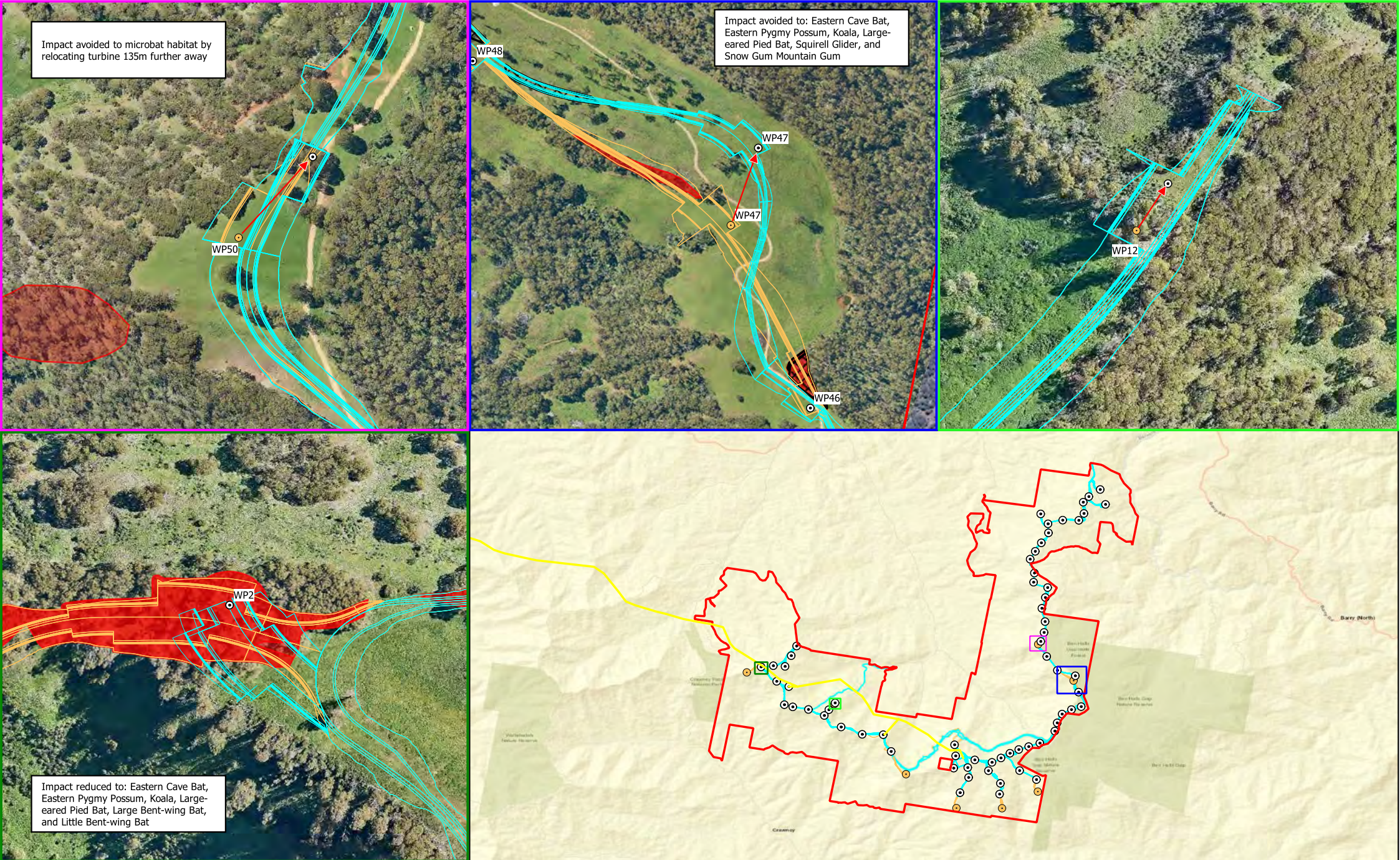




  Coordinate System: WGS 84 EPSG 4326	Removal of Five Wind Turbines			M01
	  0                      3                      6 km	Date: 07/09/2021	<b>Hills of Gold Wind Farm</b>  This figure may be based on third party data or data which has not been verified by Someva Renewables. The figure may not be to scale. This figure is a guide only and Someva Renewables does not warrant its accuracy.	 <b>SOMEVA</b> RENEWABLES
		Version: 1		
		Prepared by: LE Reviewed by: JC		



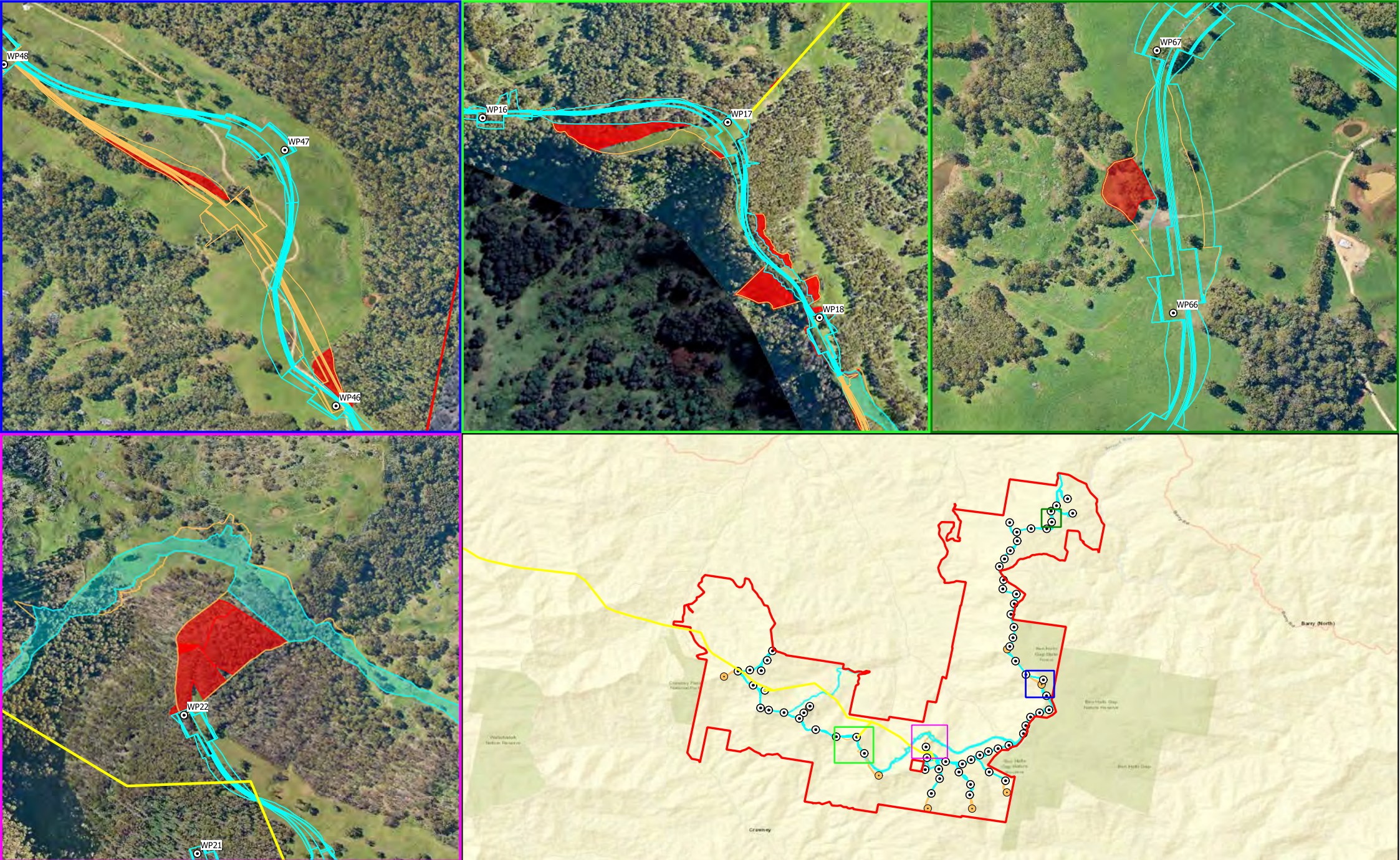












## Legend

- 65 WTG Locations
- Removed WTGs
- Transmission Line
- Tracks and Hardstands
- Removed Tracks and Hardstands
- Project Area
- Species Avoided



0 2.5 5 km

Coordinate System: WGS 84 EPSG 4326

## Internal Road Changes

Date: 07/09/2021

Version: 1

Prepared by: LE  
Reviewed by: JC

## Hills of Gold Wind Farm

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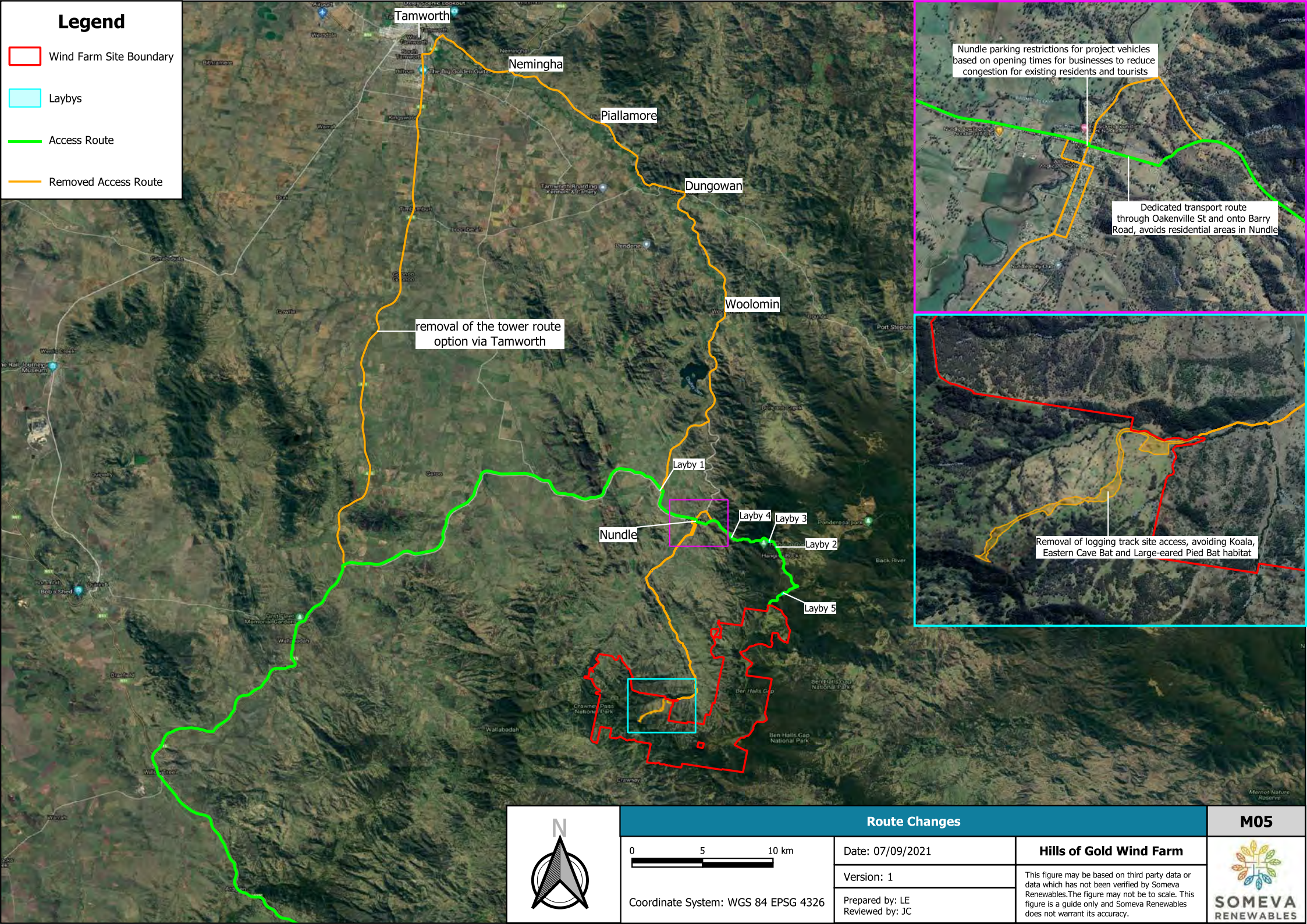
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RENEWABLES

**M04**




# Legend

-  Wind Farm Site Boundary
-  Laybys
-  Access Route
-  Removed Access Route



0 5 10 km



Coordinate System: WGS 84 EPSG 4326

## Route Changes

Date: 07/09/2021

Version: 1

Prepared by: LE  
Reviewed by: JC

## Hills of Gold Wind Farm

This figure may be based on third party data or data which has not been verified by Someva Renewables. The figure may not be to scale. This figure is a guide only and Someva Renewables does not warrant its accuracy.



**M05**



## Key Updates to BDAR

### Additional assessment

The following additional field surveys, desktop assessment and detailed analysis were completed following finalisation of the original BDAR to further assess the impacts of the Project, including the proposed amendments outlined in the Amendment Report as part of updating the BDAR in relation to the submission comments:

- An additional 24 BAM plot were collected in March 2021. This included collection of data to support the design refinements proposed to the Devils Elbow bypass and Morrison Gap Road, upgrades as well as additional data to enable improved calculation of vegetation integrity across the development footprint.
- Additional geomorphological assessment was carried to assess the potential for microbat roosts and breeding habitat. In addition, a microbat cave roost inspection was carried out between 29 March 2021 and 1 April 2021. All high priority areas that were identified via desktop as having a sudden changes in elevation (ie potential large caves, and clifflines) were able to be visually inspected from the nearest accessible point.
- Based on feedback that the surveys carried out as part of the original BDAR, which did not identify any large forest owls (Barking Owl, Powerful Owl, Sooty Owl and Masked Owl), may not have been sufficient to fully exclude the possibility that large forest owls may utilise the Project Area, further large forest owl habitat suitability mapping and assessment was carried out. This assessment conservatively assumed the presence of large forest owls and assessed the updated Project on this basis.
- Serious and irreversible impact (SAIL) assessments were completed for both the Box Gum Woodland TEC and microbat species. However, the subsequent design refinements made to the Project mean that an SAIL assessment for microbats is no longer required.
- An assessment of the prescribed impacts of the updated Project was undertaken in accordance with the BAM, as well as further detailed assessment of indirect impacts to threatened species was completed.
- A qualitative risk assessment was also completed for impacts associated with potential bird and bat turbine blade strike, as well as a turbine specific risk assessment. Additional operational mitigation measures have been provided to manage potential impacts from turbines.
- Further detail has been provided around the BBAMP proposed to be developed, and implemented over the life of the project.

### Residual impacts and their significance

The amended assessment confirms that there is the ability to avoid and minimise impacts through best practise and recognised mitigation measures to mitigate or offset impacts. While there will be an overall ecological impact in delivering the Project, the residual impacts has been minimised through the amendments made to the Project which were strongly focused on further reducing impacts to biodiversity values. Further reduction of impacts will sought throughout the detailed design phase and construction and operational impacts will be minimised through the preparation and implementation of a Construction Biodiversity Management Plan and an Operational Bird and Bat Adaptive Management Plan.

SAIL to cave dwelling microbats and their potential breeding habitat have been avoided through the removal and relocation of specific turbines from the project footprint. The potential for SAIL to Box Gum Woodland CEEC remains, but have been further minimised through project design, and it is considered that the current

level of proposed impact is a worst case and can be mitigated against, and reduced during future design stages.

Potential significant impacts to EPBC Act listed Koala and Spotted-tailed Quoll are considered likely to occur as a result of the Project, however significant impacts to all other EPBC Act listed entities have been avoided including Box Gum Woodland CEEC, Large-eared Pied Bat and Booroolong Frog. Impacts to Koala and Spotted-tailed Quoll have been minimised through project design amendments reducing direct impacts to Koala habitat by approximately 14 hectares and to Spotted-tailed Quoll by approximately 40-50 hectares (with the species being associated with all areas of moderate and high condition native vegetation in the development footprint). Impacts will be further minimised through construction and operational mitigation measures targeting these species and through the establishment of local offsets aimed to increase local habitat connectivity between the existing reserve network. Despite the efforts made to reduce impacts, the residual impacts to both species have been conservatively considered significant in accordance with the EPBC Act significant impact guidelines, and as such the species will require direct offsets in accordance with the EPBC Act Offsets Policy (Commonwealth of Australia 2016), secured via the NSW BOS. Required offsets are expected to be achieved via a combination of establishment of local Biodiversity Stewardship Sites and the securing of biodiversity credits.

Residual impacts will be offset in accordance with the NSW Biodiversity Offset Scheme. Once these offsets are applied, no net loss to biodiversity is expected as a result of the Project. In addition, investigation into the establishment of local offset sites as Biodiversity Stewardship Sites has commenced and yielded a number of viable opportunities. Key to establishing local offsets is the aim of improving biodiversity values, and in particular habitat connectivity, at the local scale to mitigate the Project's impacts and improve biodiversity values in the locality. In particular, the potential to create Biodiversity Stewardship Sites on land surrounding the Project to provide a wildlife corridor between Ben Halls Gap Nature Reserve and Crawney Pass / Wallabadah Nature Reserve has been investigated. There have been seven (7) neighbouring landowners identified who could potentially host a biodiversity stewardship site to deliver the wildlife corridor. The Proponent is seeking to enter into agreements with these neighbouring landowners to secure the potential wildlife corridor. Subject to these agreements being successfully concluded and Biodiversity Stewardship Sites established in accordance with legislative requirements, the Proponent commits to delivering a wildlife corridor between Ben Halls Gap Nature Reserve and Crawney Pass / Wallabadah Nature Reserve as part of the biodiversity offsets required for the Project.

As identified in Section 8.5 of the revised BDAR, there has been an overall reduction in prescribed impacts as a result of the amended Project.

## Environmental assessment requirements

The below table lists the Secretary's environmental assessment requirements (SEARs) relevant to biodiversity and where they are addressed in this report.

**Table 4 SEARs relevant to biodiversity**

SEARs No.	Secretary's requirement	Where addressed
<b>Key issues – Biodiversity (1)</b>	The EIS must assess biodiversity values and the likely biodiversity impacts of the development including impacts associated with transport route road upgrades in accordance with the <i>Biodiversity Conservation Act 2016</i> (NSW), including a detailed description of the proposed regime for minimising, managing and reporting on the biodiversity impacts of the development over time, and a strategy to offset any residual impacts of the development in accordance with the <i>Biodiversity Conservation Act 2016</i> (NSW).	All sections of this BDAR.
<b>Key issues – Biodiversity (2)</b>	The EIS must assess the impact of the development on the National Estate in accordance with the Guidelines for Development Adjoining Land and Water Managed by DECCW (OEH, 2010).	Section 4, 5, 7 and 8 of this BDAR.
<b>Key issues – Biodiversity (3)</b>	The EIS must assess the impact of the project on birds and bats from blade strikes, low air pressure zones at the blade tips (barotrauma), and alteration to movement patterns resulting from the turbines and considering cumulative effects of other wind farms in the vicinity.	Section 4, 5, 7 and 8 of this BDAR.

Relevant agency SEARs requirements are also provided in Table 5.

**Table 5 Agency SEARs requirements relevant to the project**

Assessment requirements	How addressed
<b>DPI Fisheries</b>	
Assess the impact of the design, construction and operation of waterway crossings on access roads across the site in accordance with NSW Fisheries (2013) Fisheries Policy and Guidelines Fish Habitat Conservation and Management (2013 update) and Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings.	Section 8.4 and 8.5 of the BDAR.
<b>Department of Planning, Industry and Environment</b>	
Biodiversity impacts related to the proposed development are to be assessed in accordance with Section 7.9 of the Biodiversity Conservation Act 2017 the Biodiversity Assessment Method and documented in a Biodiversity Development Assessment Report (BDAR). The BDAR must include information in the form detailed in the Biodiversity Conservation Act 2016 (s6.12), Biodiversity Conservation Regulation 2017 (s6.8) and Biodiversity Assessment Method, unless OEH and DPE determine that the proposed development is not likely to have any significant impacts on biodiversity values.	Addressed throughout this document.



Assessment requirements	How addressed
The BDAR must document the application of the avoid, minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the Biodiversity Assessment Method.	Section 7, 8 and 9 of this BDAR.
<p>The BDAR must include details of the measures proposed to address the offset obligation as follows.</p> <ul style="list-style-type: none"> <li>The total number and classes of biodiversity credits required to be retired for the development/project.</li> <li>The number and classes of like-for-like biodiversity credits proposed to be retired.</li> <li>The number and classes of biodiversity credits proposed to be retired in accordance with the variation rules.</li> <li>Any proposal to fund a biodiversity conservation action.</li> <li>Any proposal to conduct ecological rehabilitation (if a mining project).</li> <li>Any proposal to make a payment to the Biodiversity Conservation Fund.</li> </ul> <p>If seeking approval to use the variation rules, the BDAR must contain details of the reasonable steps that have been taken to obtain requisite like-for-like biodiversity credits.</p>	Section 9 of this BDAR.
The BDAR must be submitted with all spatial data associated with the survey and assessment as per Appendix M of the BAM.	All data will be provided upon submission to DPIE.
The BDAR must be prepared by a person accredited in accordance with the Accreditation Scheme for the Application of the Biodiversity Assessment Method Order 2020 under s6.10 of the <i>Biodiversity Conservation Act 2016</i> .	Section 1 of this BDAR.
<p>The EIS must map the following features relevant to water and soils including:</p> <ul style="list-style-type: none"> <li>Rivers, streams, wetlands, estuaries (as described in s4.2 of the Biodiversity Assessment Method).</li> <li>Wetlands as described in s4.2 of the Biodiversity Assessment Method.</li> </ul>	Section 3 of this BDAR.
Fauna survey is to be conducted in native vegetation adjacent to the development site, including Ben Halls Gap Nature Reserve and Ben Halls Gap State Forest.	Section 4 and 5 of this BDAR.
Assessment of impact is to include all components of the proposal, including any road/track widening to enable transport of turbines to the site.	Sections 4, 5, 7 and 8 of this BDAR.
Hollow-bearing trees are to be quantified on the development site and in adjacent native vegetation.	Sections 4 and 5 of this BDAR.
A candidate list of species that may use the development site as a flyway or migration route must be included in the EIS, including: (a) resident threatened aerial species (b) resident raptor species (c) nomadic and migratory species that are likely to fly over the project area.	Section 5 and 7 of this BDAR. Appendix D of this BDAR.
Bird and bat flight paths are to be identified and assessed. Maps of habitual flight paths for nomadic and migratory species likely to fly over the site and maps of likely habitat for threatened aerial species resident on the site are to be included in the EIS.	Section 5, 7 and 8.5.8 of this BDAR. Appendix D of this BDAR.
The cumulative effect of wind farms in the broader area should be considered in relation to migratory birds.	Section 8.5 and 8.9 of this BDAR.
Copies of all raw data sheets for flora and fauna studies are to be included in the EIS or provided to OEH.	To be provided.
ArcGIS compatible spatial data is to be provided including (but not limited to) vegetation	To be provided

Assessment requirements	How addressed
mapping, plot locations, transect locations and the locations of turbines and other infrastructure.	

On the 23 December 2019, the DAWE determined the project was a controlled action under section 75 of the EPBC Act. Controlling provisions for the proposed action are listed threatened species and communities (section 18 and 18A) and listed migratory species (section 20 and 20A). Table 6 details the specific assessment requirements identified by DAWE for these matters.

**Table 6 DAWE assessment requirements for the proposal.**

DAWE requirement	Assessment requirements	How addressed
<b>General (5)</b>	The Environmental Impact Statement (EIS) must address all matters outlined in Schedule 4 of the EPBC Regulations and all the matters outlined below in relation to the controlling provisions.	This BDAR.
<b>General (10)(a)</b>	The EIS must include an assessment of the relevant impacts of the action on the matters protected by the controlling provisions, including: <ul style="list-style-type: none"> <li>A description and detailed assessment of the nature and extent of the likely direct, indirect, and consequential impacts, including short term and long-term relevant impacts.</li> </ul>	Section 6 of this BDAR.
<b>General (10)(b)</b>	<ul style="list-style-type: none"> <li>A statement whether any relevant impacts are likely to be unknown, unpredictable, or irreversible.</li> </ul>	Section 6, 7 and 8 of this BDAR.
<b>General (10)(c)</b>	<ul style="list-style-type: none"> <li>Analysis of the significance of relevant impacts.</li> </ul>	Section 6 of this BDAR.
<b>General (10)(d)</b>	<ul style="list-style-type: none"> <li>Any technical data and other information used or needed to make a detailed assessment of the relevant impacts.</li> </ul>	To be provided.
<b>General (11)(a)</b>	For each of the relevant matters protected that are likely to be significantly impacted by the action, the EIS must provide information on proposed avoidance and mitigation measures to manage the relevant impacts of the action including: <ul style="list-style-type: none"> <li>A description and an assessment of the expected or predicted effectiveness.</li> </ul>	Section 6, 7 and 8 of this BDAR.
<b>General (11)(b)</b>	<ul style="list-style-type: none"> <li>Any statutory policy basis for the mitigation measures.</li> </ul>	Section 6, 7 and 8 of this BDAR.
<b>General (11)(c)</b>	<ul style="list-style-type: none"> <li>The cost of the mitigation measures.</li> </ul>	Detailed costs to be prepared as part of future design phases.
<b>General (11)(d)</b>	<ul style="list-style-type: none"> <li>An outline of an environmental management plan that sets out the framework for continuing management, mitigation, and monitoring programs for the relevant impacts of the action, including any provisions for independent environmental auditing.</li> </ul>	Section 6, 7 and 8 of this BDAR.
<b>General (11)(e)</b>	<ul style="list-style-type: none"> <li>The name of the agency responsible for endorsing or approving each mitigation measures or monitoring program.</li> </ul>	NSW DPIE and DAWE.

DAWE requirement	Assessment requirements	How addressed
<b>General (12)</b>	Where a significant residual adverse impact to a relevant protected matter is considered likely, the EIS must provide information on the proposed offset strategy, including discussion of the conservation benefit associated with the proposed offset strategy.	Section 9 of this BDAR. Offsets to be delivered under the NSW BOS.
<b>General (13)</b>	For each of the relevant matters likely to be impacted by the action, the EIS must provide reference to and consideration of, relevant Commonwealth guidelines and policy statements including any: <ul style="list-style-type: none"> <li>• Conservation advice or recovery plan for the species or community.</li> <li>• Relevant threat abatement plan for a process that threatens the species or community.</li> <li>• Wildlife conservation plan for the species.</li> <li>• Any strategic assessment.</li> </ul>	Section 6 of this BDAR.
<b>Key Issues – Biodiversity (1)</b>	The EIS must identify each EPBC Act listed threatened species and community and migratory species likely to be impacted by the action. For any species and communities that are likely to be impacted, the Proponent must provide a description of the nature, quantum, and consequences of the impacts. For species and communities potentially located in the project area or in the vicinity that are not likely to be impacted, provide evidence why they are not likely to be impacted.	Section 5 and 6 of this BDAR.
<b>Key Issues – Biodiversity (2)(a)</b>	For each of the EPBC Act listed threatened species and communities and migratory species likely to be impacted by the action, the EIS must provide a separate: <ul style="list-style-type: none"> <li>• Description of the habitat (including identification and mapping of suitable breeding habitat, suitable foraging habitat, important populations and habitat critical for survival), with consideration of and reference to any relevant Commonwealth guidelines and policy statements including listing advice, conservation advice and recovery plans.</li> </ul>	Section 5 and 6 of this BDAR.
<b>Key Issues – Biodiversity (2)(b)</b>	<ul style="list-style-type: none"> <li>• Details of the scope, timing and methodology for studies or surveys used and how they are consistent with (or justification for divergence from) published Australian Government guidelines and policy statements.</li> </ul>	Section 5 and 6 of this BDAR.
<b>Key Issues – Biodiversity (2)(c)</b>	<ul style="list-style-type: none"> <li>• Description of the specific proposed avoidance and mitigation measures to deal with relevant impacts of the action.</li> </ul>	Section 7 of this BDAR
<b>Key Issues – Biodiversity (2)(d)</b>	<ul style="list-style-type: none"> <li>• Identification of significant residual adverse impacts likely to occur after the proposed activities to avoid and mitigate all impacts are considered.</li> </ul>	Section 6 of this BDAR.
<b>Key Issues – Biodiversity (2)(e)</b>	<ul style="list-style-type: none"> <li>• Description of any offsets proposed to address residual adverse significant impacts and how these offsets will be established.</li> </ul>	Section 9 of this BDAR.
<b>Key Issues – Biodiversity (2)(f)</b>	<ul style="list-style-type: none"> <li>• Details of how the current published NSW Biodiversity Assessment Methodology has been applied in accordance with the objects of the EPBC Act to offset significant residual adverse impacts.</li> </ul>	Section 4, 5, 6 and 7 of this BDAR.

DAWE requirement	Assessment requirements	How addressed
<b>Key Issues – Biodiversity (2)(g)</b>	<ul style="list-style-type: none"> <li>Details of the offset package to compensate for significant residual impacts including details of the credit profiles required to offset the action in accordance with the NSW biodiversity Assessment Methodology and/ or mapping and descriptions of the extent and condition of the relevant habitat and/ or threatened communities occur on proposed offset sites.</li> </ul> <p>[Note: For the purposes of approval under the EPBC Act, it is a requirement that offsets directly contribute to the ongoing viability of the specific protected matter impacted by a proposed action and deliver an overall conservation outcome that improves or maintains the viability of the MNES i.e. 'like for like'. Like-for-like includes protection of native vegetation that is the same ecological community or habitat being impacted (preferably in the same region where the impact occurs), or funding to provide a direct benefit to the matter being impacted e.g. threat abatement, breeding and propagation programs or other relevant conservation measures.]</p>	Section 9 of this BDAR.
<b>Key Issues – Biodiversity (2)(h)</b>	<ul style="list-style-type: none"> <li>Any significant residual impacts not addressed by the NSW Biodiversity Assessment Methodology may need to be addressed in accordance with the EPBC Act Environmental Offsets Policy.</li> </ul>	Section 9 of this BDAR.

The following table summarises key submission issues raised by agencies and organisations and where they have been addressed in the amended BDAR.

**Table 7 Biodiversity-related submission comments**

Issue raised	Project response
<b>BCS (Biodiversity, Conservation and Science Directorate)</b>	
Given the nature of the project, the Proponent may wish to stage construction.	<ul style="list-style-type: none"> <li>Section 1.6 of the Updated BDAR provides a description of the proposed project staging.</li> </ul>
Not all components of the BAM assessment were included in the BDAR. The BDAR should be updated to fulfil the requirements of the BAM as described in Appendix L of the BAM.	<ul style="list-style-type: none"> <li>Section 1.9 includes an update to report structure and overall BAM assesment.</li> </ul>
The field data sheets should be provided as an appendix to the BDAR for a more complete BAM assessment.	<ul style="list-style-type: none"> <li>Appendix H includes the field data hat was collected electronically.</li> </ul>
<p>The method used to determine non-native vegetation must be clearly articulated. Justification for areas of non-native vegetation must be clearly provided in the BDAR. The selection of PCTs has not been adequately justified. Justification should be provided in the BDAR for the selection of all PCTs.</p> <p>All vegetation zones must be clearly mapped. Inclusion of vegetation plots located outside the project footprint must be justified. Where vegetation plots are not located in the project footprint, justification must be</p>	<ul style="list-style-type: none"> <li>Section 4.1.3 provides criteria used to assign PCTs, vegetation condition class, and determination of non-native vegetation.</li> <li>PCT justification, based on plot data, descriptions and photographs are provided in Appendix B.</li> <li>Section 4.1.4 provides information about the existing and additional 24 BAM plots and justification for existing plots being located outside of Development Footprint (but within representative vegetation zones). Plot data was interrogated and used to justify PCT selection.</li> </ul>

Issue raised	Project response
provided, including evidence that the plot is in the correct PCT and vegetation zone, and that the plot data are consistent with other plot data collected in that vegetation zone.	<ul style="list-style-type: none"> <li>Figure 7 provides vegetation zone mapping.</li> <li>Section 4.2 Vegetation Communities has been updated.</li> </ul>
Permanent and temporary impacts for each vegetation category should be presented. A table should be created that states the permanent and temporary impacts for each vegetation category: exotic grassland, planted vegetation, cleared land and each PCT to clearly reconcile impacts across the development footprint.	<ul style="list-style-type: none"> <li>Table 22 summarises the PCTs, vegetation zones, extent, integrity score, and associated TECs for the total combined development footprint. This data has been used to reassess the project's overall impacts.</li> <li>Table 8 provides a summary of permanent and temporary impacts of the project.</li> </ul>
Ecosystem species have been included in discussions regarding species credit species. Table 21 of the BDAR should contain only species credit species.	<ul style="list-style-type: none"> <li>Table has been updated.</li> </ul>
Inconsistencies exist between the field data and the data in the BAM calculator. Ensure that all data entered in the BAM-C is consistent with the field data.	<ul style="list-style-type: none"> <li>The BAM Calculator has been revised and submitted with this updated BDAR.</li> </ul>
Serious and Irreversible Impacts (SII) have not been addressed. A standalone section addressing serious and irreversible impacts as required by sections 9.1.2 and 9.1.3 of the BAM for all listed entities known or likely to occur in the assessment area is required.	<ul style="list-style-type: none"> <li>Section 8.6 has been updated and provides a summary of the detailed assessment. Appendix E provides detailed SII assessments.</li> </ul>
The potential impact to fauna relating to turbine placement has not been adequately addressed. The potential impacts of turbine spacing should be addressed as prescribed impacts.	<ul style="list-style-type: none"> <li>Section 8.3.2, 8.3.3 and 8.5 have been updated to include a qualitative risk assessment of turbine strike and to address impacts prescribed by the BAM.</li> </ul>
<p>Prescribed impacts relating to wind farms have not been adequately addressed:</p> <ul style="list-style-type: none"> <li>Further assessment of the potential for blade strike on fauna, particularly microbats, is required.</li> <li>Proposed mitigation measures for prescribed impacts such as blade strike and barotrauma should be presented in the BDAR.</li> <li>Options to compensate for unavoidable prescribed impacts, and the decision pathway and justification for suggested credit numbers or other compensatory actions, should be clearly documented in the BDAR.</li> </ul>	<ul style="list-style-type: none"> <li>Section 8.3.2 and Section 8.3.3 have been updated to include a qualitative risk assessment of turbine bird and bat strike.</li> <li>Section 8.5 has been included to assess prescribed impacts.</li> <li>Section 8.9 describes mitigation measures for prescribed and indirect fauna impacts.</li> <li>Local offset feasibility has been assessed through in a biodiversity offset strategy including a combination of field surveys and desktop analysis or target properties. Information on the estimated available local credits is provided in Section 9.1.2. This is expected to provide further options to compensate for unavoidable impacts.</li> </ul>
Direct impacts on cave bat roosts needs to be clarified. Justification is required for the placement of turbines within cave bat roosting habitat buffers.	<ul style="list-style-type: none"> <li>The project will not result in any direct impacts to cave bat roosts, nor will any project infrastructure occur within cave bat roosting habitat buffers, based on both field assessment and design revisions.</li> <li>Section 5.4.2 includes the detailed findings of additional desktop assessment, ground-truthing surveys, and geomorphological assessment of</li> </ul>



Issue raised	Project response
	<p>potential microbat roots surrounding the development footprint.</p> <ul style="list-style-type: none"> <li>Figure 15 provides the updated mapped microbat roosting habitat areas.</li> <li>Appendix E provides details associated with assessments undertaken in accordance with serious and irreversible impact assessment, providing further assessment of impacts to cave roosting bats.</li> <li>Section 8.5 provides an assessment of the prescribed impacts of the project to bats.</li> <li>Appendix G includes advice regarding the presence of geological features of significance within the assessment area and in the broader landscape. Section 3.1.6 summarises this information.</li> </ul>
<p>Indirect impacts on microbats have not been adequately addressed. Further study to determine the size, extent and nature of the local bat population is required.</p>	<ul style="list-style-type: none"> <li>Section 5.4.2 includes updated additional assessment of the microbat local microbat population.</li> <li>Section 8.3.1 includes a qualitative risk assessment for indirect impacts to the local microbat population.</li> <li>Section 8.5 has been included to assess prescribed impacts, many of which are indirect impacts to microbats.</li> <li>Section 8.9 describes mitigation measures for prescribed and indirect fauna impacts. Appendix E provides details associated with assessments undertaken in accordance with serious and irreversible impact assessment, providing further assessment of impacts to cave roosting bats.</li> <li></li> </ul>
<p>Additional assessment of a locally important population of the greater glider is required. Further justification should be provided as to why the local population of the greater glider is not considered an important population.</p>	<ul style="list-style-type: none"> <li>Section 8.8.5 and Table 72 includes an updated EPBC Act significant impact assessment for Greater Glider and provides evidence population does not constitute an important population.</li> </ul>
<p>The surveys completed for large forest owls are inadequate. Either additional surveys for large forest owls (equating to that required for a 90 percent probability of detection) be conducted, or an expert report be obtained, to confirm the presence or absence of large forest owls.</p>	<ul style="list-style-type: none"> <li>Out of abundant caution, Large forest owls (Barking Owl, Powerful owl, Sooty owl and Masked owl) have been assumed to be present (even though none have been identified in the extensive surveys completed to date) because further survey was not able to be completed.</li> <li>The approach to mapping breeding habitat species credit polygons is provided in Section 5.5.</li> <li>Figure 21 provides updated habitat mapping.</li> <li>Table 60 provides a qualitative risk assessment for potential blade strike to birds including assessed owl species.</li> <li>It should be noted that WP31 previously intersected with what has now been modelled to be owl breeding habitat, and was subsequently removed from the design.</li> </ul>



Issue raised	Project response
<b>NPWS</b>	
<p><i>In response to Appendix D, p. 3  </i> 1.5 km buffer around footprint includes a significant portion of both BHGMR and CPNP, yet very few survey points were undertaken within this buffer, and only 100 metres into BHGMR. NPWS recommends a robust survey be conducted within the 1.5 km buffer.</p>	<ul style="list-style-type: none"> <li>• The 1.5 km buffer exists only for assessment of landscape context and connectivity around the development footprint. It is a standard requirement of the BAM, and only requires desktop analysis and mapping of specific landscape features. There is no requirement to undertake detailed survey within the 1.5 km buffer under the BAM.</li> <li>• Ecological surveys were carried out within the subject land development footprint and within a 100-metre buffer along the project boundary with Ben Halls Gap Nature Refuge.</li> <li>• The abbreviations, glossary and Section 1.5 have been updated to clarify where field surveys were undertaken and the scope of the desktop searches required within the landscape assessment buffer.</li> </ul>
<p><i>In response to Appendix D, p. 73-74  </i> Weather conditions at Quirindi Post Office were used. Murrurundi Gap weather conditions are closer to those experienced in the higher parts of the survey area. The difference in temperature between Quirindi and higher elevations should be noted. Sub-zero temperatures are regularly experienced during winter. Why wasn't data from the Meteorological Masts located at the site used? NPWS recommends a more accurate assessment of weather conditions be conducted at higher elevations during the survey.</p>	<ul style="list-style-type: none"> <li>• Section 4.1.2 has been updated to include climate details at Murrurundi GAP AWS.</li> </ul>
<p><i>In response to Appendix D, Table 21  </i> Booroolong Frog – known from Barnard River in BHGMR, Wombramurra Creek (close to CPNP) and a tributary to the Isis River in CPNP. NPWS recommends sediment controls to be in place close to origin of potential sediment to prevent soil movement in the landscape and impacting on streams.</p>	<ul style="list-style-type: none"> <li>• Section 8.8.6 provides a detailed assessment of Booroolong Frog habitat and impacts in accordance with the EPBC Act requirements.</li> <li>• The Proponent will implement an Erosion and Sediment Control Plan in the Construction Environmental Management Plan. This will include identification of sensitive receivers, such as waterways and adjacent protected areas, with measures provided in Table 74 in Section 8.9 of this BDAR.</li> <li>• Significant impacts to EPBC listed Booroolong Frog have been avoided with project design amendments reducing impact to the Booroolong Frog habitat from 1.59ha to 0.64ha.</li> </ul>
<p><i>In response to Appendix D  </i> Ben Halls Gap Sphagnum Moss Cool Temperate Rainforest EEC occurs adjacent to the proposed project. It is vulnerable to sediment entering the streams due to soil disturbance in track construction. This was identified as an issue in meetings with the Proponent and has not been addressed in the BDAR. NPWS recommends incorporating Ben Halls Gap Sphagnum Moss Cool Temperate Rainforest</p>	<ul style="list-style-type: none"> <li>• Section 4.3 of the Updated BDAR makes reference to the location of the Sphagnum Moss TEC in the adjacent Ben Halls Gap Nature Refuge, with the location of this TEC mapped in Figure 9.</li> <li>• Table 74 in Section 8.9 of the Updated BDAR has also been amended to make reference to management of stormwater and runoff on the Sphagnum Moss TEC.</li> <li>• An updated assessment of site gradients and risk to this community is updated in the Soil and Water</li> </ul>

Issue raised	Project response
EEC in the BDAR assessment, with appropriate mitigating measures.	report including project commitments to avoid impact in the EIS (Someva 2021)
<p><i>Appendix D 5.3.2  </i> Refers to survey locations being shown on Figure 9. Figure 9 is not included in the document. Supply Figure 9.</p>	<ul style="list-style-type: none"> <li>Figure 12 (previously Figure 9) includes all fauna survey locations.</li> </ul>
<p><i>Appendix D  </i> The ridgeline (watershed) is shown in the wrong place. This means O&amp;C and a number of WTGs SW of park drain into park, intersects with headwaters of Brayshaws Creek and Ben Halls Gap Nature Reserve Sphagnum Moss Cool Temperate Rainforest EEC. Based on this information, there is potential for sedimentation to impact on these creek lines. With correct information, the project area impacts on the Brayshaws Creek catchment, as discussed with the Porponent prior to release of the EIS. Correct the map and develop mitigating measures to prevent sediment impacting Brayshaws Creek and Ben Halls Gap Nature Reserve Sphagnum Moss Cool Temperate Rainforest EEC.</p>	<ul style="list-style-type: none"> <li>The ridgeline shown on the site maps and the location maps has not been drawn to represent the boundary of the watershed, rather it shows indicative fauna movement corridors across the ridgeline. The BAM requires fauna corridors to be identified and mapped by the accredited assessor.</li> </ul>
<p><i>Appendix D  </i> Site maps reference DPIE, 2020. This is not included in reference list.</p>	<ul style="list-style-type: none"> <li>This reference has been included in the reference list of the Updated BDAR to make reference to the DPIE (2020) Biodiversity Values Map.</li> </ul>
<b>Hills of Gold Preservation Inc (HOGPI)</b>	
List significant species in, and protection measures required for Ben Halls Gap Nature Reserve and Crawney Pass National Park. Take into consideration TEC including Ben Halls Gap National Park Sphagnum Moss Cool Temperate Rainforest located adjacent to the project area.	<ul style="list-style-type: none"> <li>Section 4.3 of the Updated BDAR makes reference to the location of the Sphagnum Moss TEC in the adjacent Ben Halls Gap Nature Refuge, with the location of this TEC mapped in Figure 9.</li> <li>Table 74 in Section 8.9 of the Updated BDAR has also been amended to make reference to management of stormwater and runoff on the Sphagnum Moss TEC.</li> </ul>
Assess and mitigate the cluttering effect on bird and bat strike of the southern cluster of turbines forming three fingers in an overlapping barrier of 27 turbines, placed unusually close together.	<ul style="list-style-type: none"> <li>This has been addressed in the updated Section 8.3 and specifically within Table 63.</li> </ul>
State the duration of the five field studies in November 2018, August 2019, November 2019, February 2020, and August 2020.	<ul style="list-style-type: none"> <li>Section 4.1 details the vegetation and flora survey effort and duration</li> <li>Section 5.3 details the threatened fauna survey effort and duration.</li> </ul>
<p>Provide a more in-depth study of the north eastern section of the wind farm project area.</p> <p>Local knowledge suggests Threatened Fragrant Pepperbush (<i>Tasmannia glaucifolia</i>) is extensive between the northern project area and Morrisons Gap Road and could potentially be impacted by roadside clearing to</p>	<ul style="list-style-type: none"> <li>Table 30 provides survey efforts for the Fragrant Pepperbush.</li> <li>It is assessed and acknowledged that the species occurs within eucalypt forest within PCT 934, 931 and 927. However, no individuals or populations were recorded within the development footprint during field surveys.</li> </ul>

Issue raised	Project response
enable access.	<ul style="list-style-type: none"> <li>• Preconstruction surveys will be undertaken to determine whether this is present on any modified final development footprint.</li> </ul>
Conduct a thorough search for <i>Eucalyptus oresbia</i> , listed as vulnerable in NSW, which has been observed neighbouring the proposed project area, and can sometimes look like Mountain Gum.	<ul style="list-style-type: none"> <li>• Habitat suitability within subject land for <i>Eucalyptus oresbia</i> was assessed. It was concluded that the development footprint is not suitable to support this species due to the lack of 'very steep valleys and deeply incised creek lines with primarily south to southwest exposure' (NSW BioNet, DPIE 2021). Due to this habitat limitation, the species was excluded from assessment under the BAM.</li> <li>• Notwithstanding the habitat suitability constraints, the survey effort employed would have detected <i>Eucalyptus oresbia</i>.</li> </ul>
The impact on biodiversity and the effect of those impacts on the Peel River (and Chaffey Dam) and the Barnard River and Pages Creek and catchments.	<ul style="list-style-type: none"> <li>• Section 3.1.3 describes the reduced impact to waterway crossings that has resulted from the project design changes described.</li> </ul>
<p>Concerns about the intent to clear some 487 hectares of vegetation – native and introduced – as well as direct and indirect impacts on the nearby Timor Caves and other geological features and also bats which roost in, and in forest around, the caves which they forage in the area proposed for the wind farm.</p> <p>The proximity to caves means clearing and erosion will be part of the impact in the hydrological process associated with caves and karst let alone the loss of flora for all animals and the insects which are the food source of microbats whether they be forest dependant or cave dependant species.</p>	<ul style="list-style-type: none"> <li>• The project has reduced the impact to vegetation by 39% in this revised design and updated BDAR. This includes a reduction of 42% to high condition native vegetation. A total of 74 ha of native vegetation has been assessed as avoided in this updated layout and BDAR. There is now 132.43 ha of proposed impact to native vegetation, mostly in low to moderate condition.</li> <li>• Section 7 provides detail on the assessment and design process that was included to avoid and minimise impacts on biodiversity, including measures to reduce and avoid all direct impacts on cave bat roosts.</li> <li>• The project will not result in any direct impacts to cave bat roosts and indirect impacts have been minimised through turbine relocation and removal.</li> <li>• Section 5.4.2 includes the detailed findings of additional desktop assessment, ground-truthing surveys, and geomorphological assessment of potential microbat roosts surrounding the development footprint.</li> <li>• Sections 5.4.2 and 5.5 includes the updated maps illustrating microbat habitat throughout the project area.</li> <li>• Section 8.3.1 provides a qualitative risk assessment for bat species.</li> <li>• Section 8.5 provides an assessment of the prescribed impacts of the project to bats.</li> <li>• Appendix E provides details associated with assessments undertaken in accordance with serious and irreversible impact assessment, providing further assessment of impacts to cave roosting bats.</li> </ul>

Issue raised	Project response
	<ul style="list-style-type: none"> <li>Appendix G includes advice regarding the presence of geological features of significance within the assessment area and in the broader landscape. Section 3.1.6 summarises this information.</li> <li>Section 8.5 provide additional assessment of the indirect impacts associated with bat strike.</li> <li>Impacts associated with blade strike will be managed by the preparation and implementation of a Bird and Bat Adaptive Management Plan (BBAMP). The plan will be prepared prior to operation of the wind farm and implemented over the life of the project.</li> </ul>
<p>Concern that the study undertaken to collect data on threatened species was only taken over a couple of short periods and is most likely considerably lacking in providing a holistic picture of species and their movements.</p>	<ul style="list-style-type: none"> <li>Surveys were undertaken over a total of six separate seasonal survey events between spring 2018 to autumn 2021. This is considered a comprehensive survey effort and sufficient to capture seasonal variation in the biodiversity values present within the project area.</li> <li>Table 29 provides the survey design employed and survey effort for each candidate species and demonstrates how survey effort is sufficient to meet the requirements of the BAM. Where survey effort was not sufficient and habitat for the species is present on the site, areas of habitat for these species has been mapped.</li> </ul>
<b>Tamworth Regional Council</b>	
<p>Lack of information in relation to Collision Risk for Bats and Birds. Appendix D contains data and modelling in relation to the collision risk for birds but does not include any modelling in relation to bats or nocturnal bird species such as owls. The report states that of the fifty-one (51) species of birds present in the development footprint, all of these have the capacity to fly at the same height as the turbine blades but only eighteen (18) bird species were recorded as doing so. The report goes on to state the risk of collision is estimated as being very low. The report includes little evidence to support this conclusion.</p>	<ul style="list-style-type: none"> <li>Section 8.3.2 and Section 8.3.3 have been updated to include a qualitative risk assessment of turbine bird strike, including on the assumption that large owl species are present in the Project Area.</li> <li>Section 8.5 has been included to assess prescribed impacts to bats.</li> <li>Section 8.9 describes mitigation measures for prescribed and indirect fauna impacts.</li> <li>Appendix E provides details associated with assessments undertaken in accordance with serious and irreversible impact assessment, providing further assessment of impacts to cave roosting bats.</li> </ul>
<p>Section 8.3 does address the potential impact of the wind turbines on threatened bat species within the development footprint and basically concludes that there is limited data on the heights that the bats will fly and forage. It states that the spacing between the turbines (ranging from 300m to 500m) will allow substantial locations for migrating and foraging bats to pass through the landscape. The report provides insufficient data/modelling to support this conclusion.</p>	<ul style="list-style-type: none"> <li>Section 8.3 has been updated provide a more detailed assessment of the risk of bat species and each turbine.</li> <li>Section 8.5 provides prescribed impacts to the bats.</li> <li>Section 3.1.6 provides an updated area of geological significance for suitable habitat.</li> <li>Section 8.9 describes mitigation measures for prescribed and indirect fauna impacts.</li> <li>Appendix E provides details associated with assessments undertaken in accordance with serious and irreversible impact assessment, providing further assessment of impacts to cave roosting bats.</li> </ul>

Issue raised	Project response
<p>Lack of information in relation to impact on fauna (particularly aerial fauna) located in the adjoining Ben's Hall Gap Nature Reserve (2,500 Ha) and Crawney National Park (310 hectare). It is strongly recommended that the indirect impacts from the wind turbines be examined within a 10 km buffer from the development footprint.</p>	<ul style="list-style-type: none"> <li>• Indirect impacts are assessed under chapter 8.3 including updates to chapter 8.3.2 Collision risk (birds).</li> <li>• The Collision Risk Modelling presented in the Updated BDAR and in Appendix D was supported by three seasons of field survey across the subject land.</li> </ul>
<p>Like the Biodiversity Offset Strategy, the BDAR states that a BBAMP will not be developed until after the wind farm is approved. It is strongly recommended that a BBAMP be submitted prior to final determination of the project.</p>	<ul style="list-style-type: none"> <li>• Section 8.10 provides more detail on the contents of a BBAMP including sections on the adaptive management recommendations and further project commitments. The final BBAMP will need to respond to the detailed design layout and operational requirements.</li> <li>• It is standard that a BBAMP is developed once detailed design of the project is further progressed following development consent being granted and prior to any turbines becoming operational.</li> </ul>
<p>Council officers have noted during site inspections, the presence of wombat holes across the development site. In this respect Council requires further expert information outlining the assessment of the impact of construction on these mammals and details of the proposed management, protection, and preservation of these mammals during the construction phase of the project.</p>	<ul style="list-style-type: none"> <li>• Table 74 in Section 8.9 of the Updated BDAR has been updated to make reference to wombat burrows and management as part of the Biodiversity Management Plan.</li> <li>• Section 8.10.1 provides details of occupation surveys for wombats as part of the measures outlined in the Biodiversity Management Plan. This includes: <ul style="list-style-type: none"> <li>– Pre-clearing protocols, including pre-clearing inspections, establishment of exclusion zones and on-ground identification of specific habitat features to be retained and/ or relocated.</li> <li>– For example, occupation surveys for wombat burrows, application of exclusion measures/ deterrents prior to vegetation clearing/ earthworks, works undertaken in presence of spotter/ catcher.</li> </ul> </li> </ul>
<b>Australasian Cave and Karst Management Association</b>	
<p>Concerns about the intent to clear some 487 hectares of vegetation – native and introduced – as well as direct and indirect impacts on the nearby Timor Caves and other geological features and also bats which roost in, and in forest around, the caves which they forage in the area proposed for the wind farm. The proximity to caves means clearing and erosion will be part of the impact in the hydrological process associated with caves and karst let alone the loss of flora for all animals and the insects which are the food source of microbats whether they be forest dependant or cave dependant species.</p>	<ul style="list-style-type: none"> <li>• Section 3.1.6 provides an updated area of geological significance for suitable habitat.</li> <li>• Section 7 provides detail on the assessment and design process that was included to avoid and minimise impacts on biodiversity, including measures to reduce and avoid all direct impacts on cave bat roosts.</li> <li>• Section 8.3 and Section 8.5 provide additional assessment of the indirect impacts associated with bird and bat strike.</li> <li>• Impacts associated with blade strike will be managed by the preparation and implementation of a Bird and Bat Adaptive Management Plan (BBAMP). The plan will be prepared prior to operation of the wind farm.</li> </ul>
<b>Newcastle and Hunter Valley Speleological Society</b>	



Issue raised	Project response
<p>Concern that the study undertaken to collect data on threatened species was only taken over a couple of short periods and is most likely considerably lacking in providing a holistic picture of species and their movements.</p>	<ul style="list-style-type: none"> <li>• Surveys were undertaken over a total of six separate seasonal survey events between spring 2018 to autumn 2021. This is considered a comprehensive survey effort and sufficient to capture seasonal variation in the biodiversity values present within the project area.</li> <li>• Table 29 provides the survey design employed and survey effort for each candidate species and demonstrates how survey effort is sufficient to meet the requirements of the BAM. Where survey effort was not sufficient and habitat for the species is present on the site, they were assumed to be present and areas of habitat mapped.</li> </ul>
<p>Impacts to threatened ecological communities and species with reference to white box-yellow box-Blakely's red gum grassy woodland, koala, large-eared pied and the spotted-tailed quoll.</p>	<ul style="list-style-type: none"> <li>• Threatened species and ecological communities with the potential to be impacted by the project have been surveyed, identified and mapped in accordance with the NSW BAM and EPBC Act requirements.</li> <li>• Section 8 of this BDAR presents a detailed impact assessment, quantifying direct impacts and describing potential indirect impacts.</li> </ul>
Upper Peel Landcare Group, Yass Landcare Guardians and Timor Community	
<p>Concerns about the land clearing needed for the project and the impact this will have on the biodiversity of the area.</p>	<ul style="list-style-type: none"> <li>• Threatened species and ecological communities with the potential to be impacted by the project have been surveyed, identified and mapped in accordance with the NSW BAM and EPBC Act requirements.</li> <li>• Section 8 of this BDAR presents a detailed impact assessment, quantifying direct impacts and describing potential indirect impacts.</li> <li>• The project has reduced direct clearing impacts by 39% from the exhibited EIS.</li> </ul>



# 1 Introduction

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## 1.1 Project description

The Project involves the construction, operation and commissioning of a wind farm with up to 65 wind turbine generators (WTG), together with associated and ancillary infrastructure.

The Project consists of the following key permanent components:

- Up to 65 WTGs with a generating capacity of approximately 6MW. Each WTG has:
  - Three blades mounted to a rotor hub on a tubular steel tower, with a combined height of blade and tower limited to a maximum tip height of 230m AGL.
  - A gearbox and generator assembly housed in a nacelle.
  - Adjacent hardstands for use as crane pads and assembly and laydown areas.
- Decommissioning of three operational meteorological monitoring masts and the installation of up to five temporary and five permanent masts to monitor the power of the wind. Up to five of the 10 masts will be permanently installed near one of the WTGs. The other five will be temporarily installed at the location of one of the WTGs and removed after initial testing. All 10 masts will be approximately 150 metres tall; equivalent to the hub height of the installed WTGs. The exact number and location of the 10 masts will be confirmed during detailed design.
- A 330 kilovolt (kV) electrical substation located centrally within the project site. The substation will include transformers, insulators, switchyard, and other ancillary equipment.
- An operations and maintenance facility.
- A battery energy storage system of 100 to 400Mwh.
- Aboveground and underground 33kV electrical reticulation and fibre optic cabling connecting the WTGs to the onsite substation (following site access tracks where practicable).
- A 330kV high-voltage overhead transmission line to connect the onsite substation to the existing 330kV TransGrid Liddell to Tamworth overhead transmission line network. The connection point will be approximately 21 km west of the substation.
- A switching station to connect the Project to the 330kV TransGrid Liddell to Tamworth line.
- An internal private access road network (up to a combined total length of approximately 40 km) connecting the WTGs and other Project infrastructure to the public road network.
- Upgrades to local roads and waterway crossings, as required for the delivery, installation and maintenance of WTG components and other associated materials and structures.

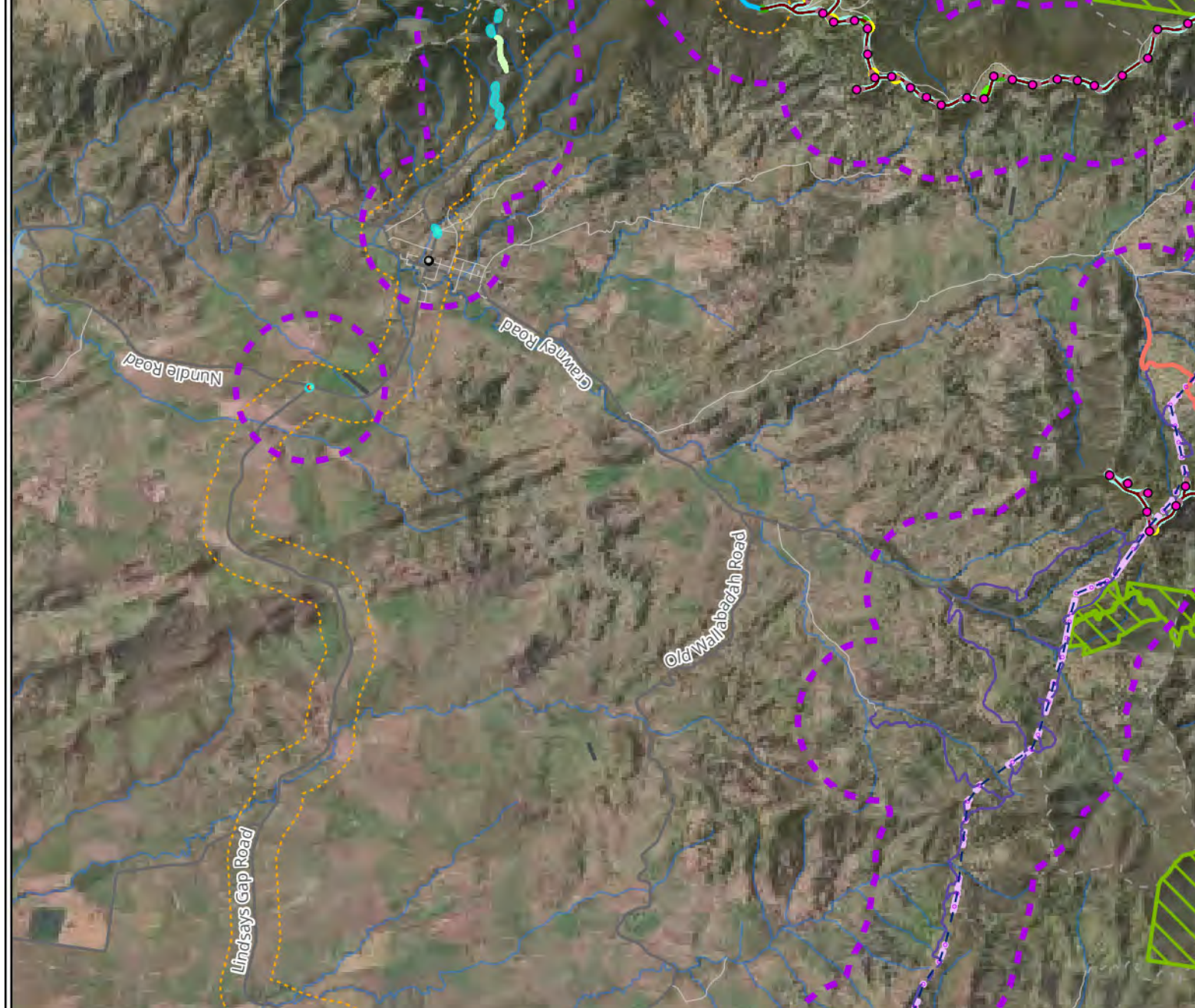
The following temporary elements will be required during construction of the Project:

- Temporary site buildings and facilities for construction contractors / equipment, including site offices, car parking and amenities for the construction workforce.
- Two temporary concrete batching plants to supply concrete for WTG footings and substation construction works.
- Earthworks, including cut and fill, for constructing access roads, WTG platforms and foundations.

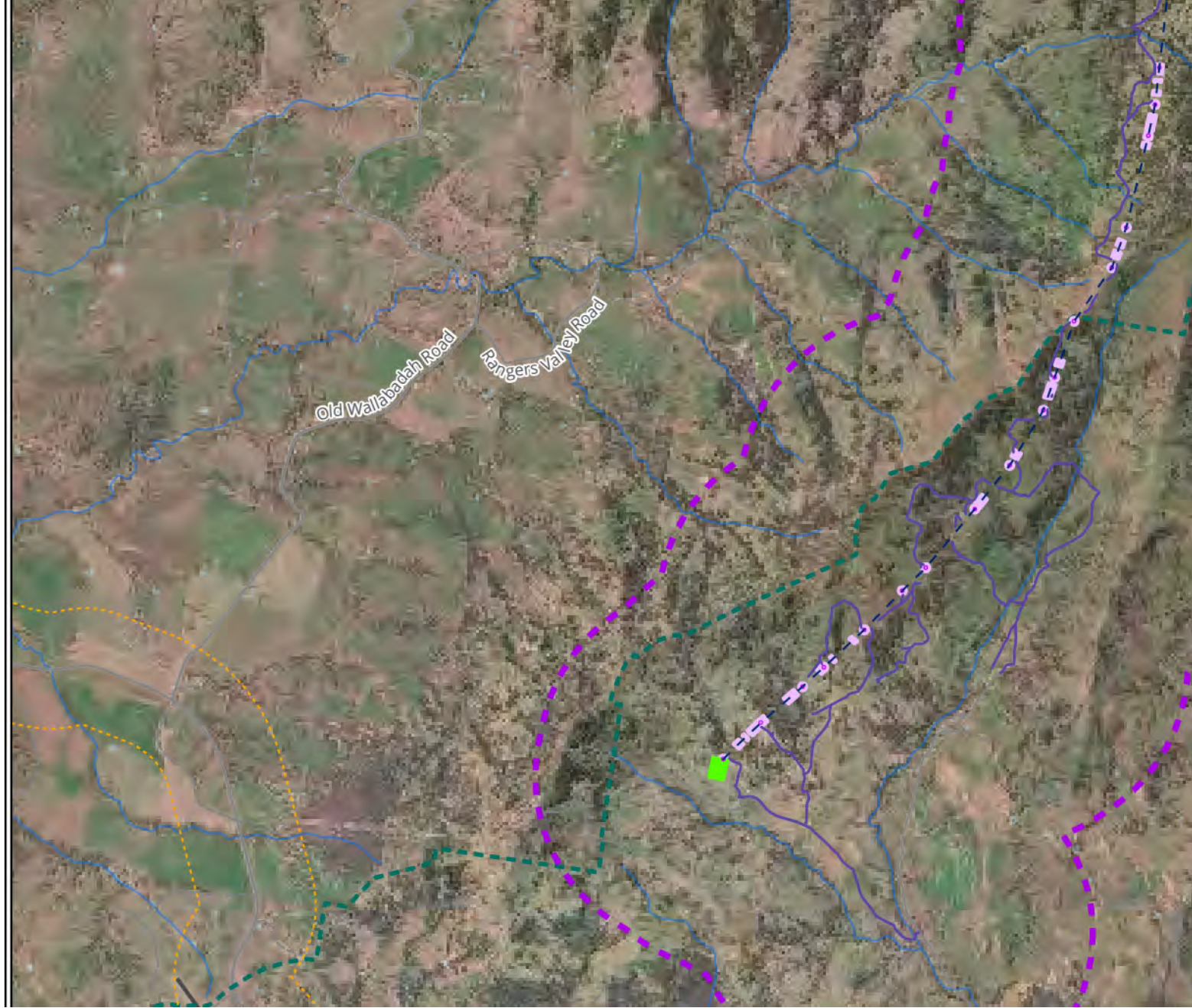
- Potentially rock crushing facilities for the generation of suitable aggregates for concrete batching or sized rock for access road and hardstand construction.
- Up to eight additional hardstand laydown areas for the temporary storage of construction materials, plant, and equipment construction.

The indicative Project layout for the wind farm infrastructure, including the WTGs, internal access roads and supporting infrastructure are shown in Figure 2 and the biodiversity impacts have been assessed based on this development footprint. In order to facilitate refinement of the layout during the detailed design process, an allowance for micro-siting of WTGs and infrastructure within the subject land from the locations identified in the RTS and Amendment Report is proposed, while all other infrastructure may be relocated within the subject land and subject to a modification. Figure 2 shows the layout of all components, and provides more detail on the wind farm and internal roads layout, as well as the transmission line corridor and construction access tracks.

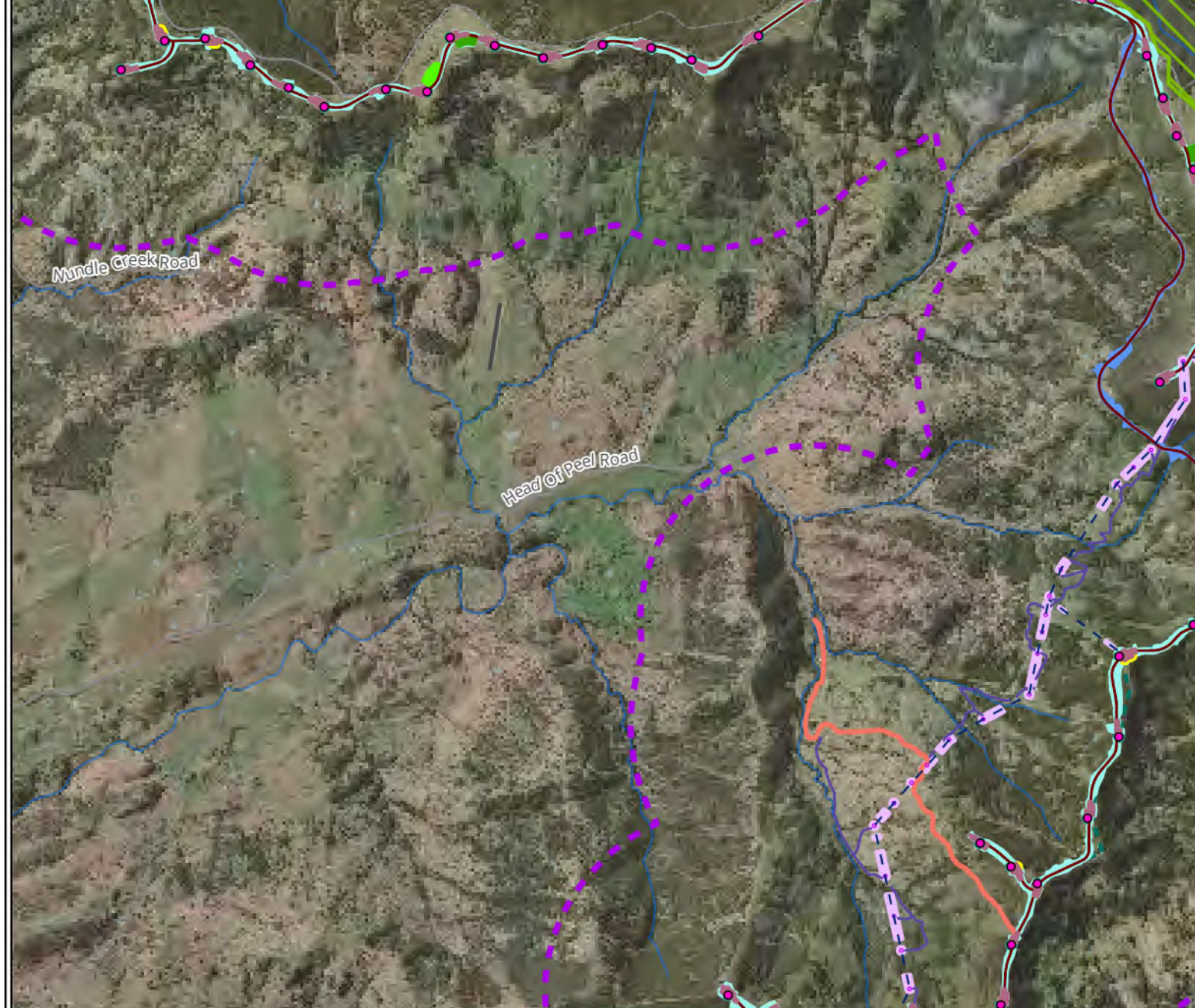
In addition to the wind farm infrastructure, the Project will require minor upgrades to the highway and local road network to facilitate haulage of the turbine components from Port of Newcastle to the subject land (Figure 3). Some of these works will require modifications to the curve radii of intersections that will involve clearing of vegetation. Where clearing of vegetation is required, these areas along the haul route have also been subject to assessment in this BDAR and form part of the development footprint. This assessment included fieldwork to verify vegetation communities and habitat condition for suitability to support threatened species.



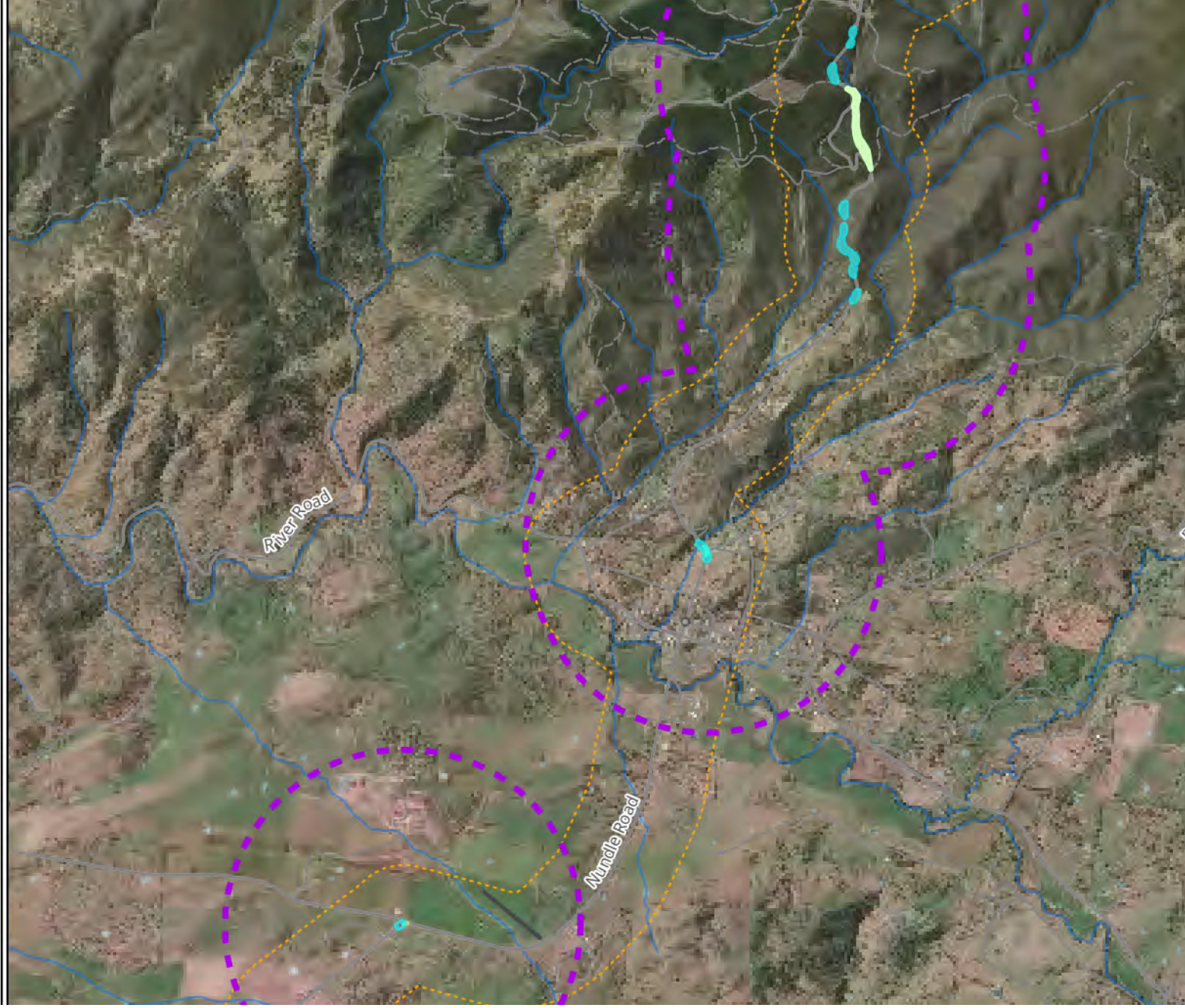




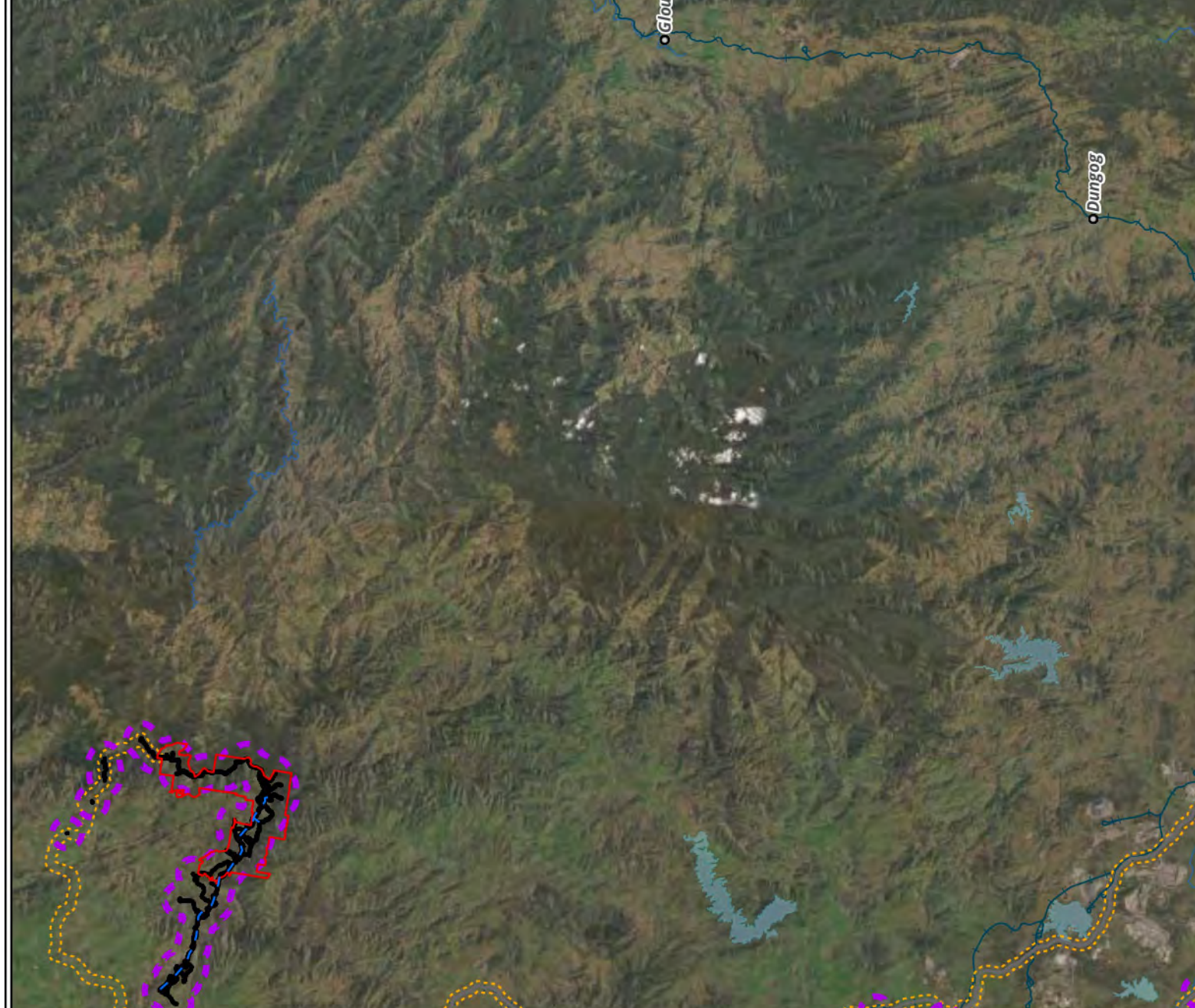












## 1.2 Project location

The Project is located approximately 4km south of Hanging Rock, 8km south east of the Nundle and 60km south east of Tamworth, within the Tamworth Regional Local Government Area (LGA), Upper Hunter Shire LGA and Liverpool Plains LGA. The eastern boundary of the site is adjacent to Ben Halls Gap Nature Reserve. Crawney Pass National Park is situated to the west of the project.

The development footprint predominately supports agricultural land on flatter topographies that are dominated by exotic grasslands created as part of cattle grazing activities. There is a higher percentage of overstorey native vegetation within steeper terrain and situated adjacent to the development footprint associated with the wind farm infrastructure. The development footprint is primarily classified as primary production land zone and lies adjacent to forestry, National Parks and Nature Reserves zones.

## 1.3 Development corridor

During early planning phases of the project, a wind farm development corridor was designated, based on property boundaries and a broader area of investigation for the placement of wind farm infrastructure and location of access routes. This development corridor should also be considered the 'subject land', as defined by the BAM, and has undergone ground-validated assessment as described in the following chapters of this BDAR.

Preliminary ecological surveys were completed across the subject land in 2019, with a vegetation zone and habitat constraints map prepared to inform layout decisions. Fieldwork was also carried out over the broader area referred to as the development corridor, however much of the focus on the BAM assessment refer to the direct and indirect impacts associated with the development footprint.

## 1.4 Development footprint

For the purpose of assessing impacts to biodiversity, a single development footprint has been assessed covering the five project elements that comprise the overall project infrastructure described in Section 1.5.1 and Table 8. This development footprint has been prepared based on the current design developed to date to understand the maximum impacts associated with the construction and operation of the Project.

The proposed design is advanced, however it still remains indicative and subject to further detailed design which will occur in tandem with construction contracting requirements and further detailed geotechnical investigations and the selection of the final wind turbine model. The development footprint design has been significantly updated since that exhibited with the EIS so as to materially reduce the biodiversity impacts of the Project.

In order to continue to reduce impacts to the assessed worst case in this BDAR, the Proponent will continue to refine the layout during the detailed design process in order to achieve reduced biodiversity impacts. The Proponent commits to undertaking pre-clearing surveys and micro-siting of wind turbines and ancillary infrastructure during the detailed design stage of the project to further avoid impacts to any previously unrecorded threatened species and ecologically sensitive areas, as far as practicable.

To permit this allowance, micro-siting of infrastructure within the subject land from the locations identified in the Amendment Report is sought. Micro-siting in areas outside of the subject land may require additional survey. Other project infrastructure components may also be relocated within the subject land, subject to ensuring that change in location does not result in greater impacts than assessed in this BDAR and complies with all conditions imposed on any development consent granted for the Project.

Modifications would be sought only to re-determine associated residual impacts and credit liabilities if micro-siting results in increased impacts and associated credit requirement. Reduction in impacts would not require a modification, however an addendum to the BDAR outlining the re-assessment of impacts and credit liabilities would be required, if a reduction in credit requirements is sought.

Final layout documentation will be prepared and submitted to DPIE prior to commencement of construction along with updated vegetation integrity surveys and required BAM plots to confirm biodiversity impact is no greater than this assessment.

## 1.5 Assessment Area

The assessment area for this BDAR includes the development footprint, as defined in Section 1.4 and Section 1.5.1, as well as a 1,500m buffer for the landscape assessment (Figure 2 and Figure 3). This buffer has been applied in accordance with Section 3.1 of the BAM, which requires landscape attributes to be assessed for a 1,500m buffer around the development footprint.

Detailed field surveys were carried out within the subject land and development footprint, as defined below, and desktop information was used to assess landscape attributes within the 1,500m buffer area.

### 1.5.1 Project infrastructure

Lands within the development footprint will be subject to direct impacts as a result of the project. This includes the permanent and temporary elements outlined in Table 8, and includes:

1. Wind turbine infrastructure, consisting of wind turbine generators and hardstands for construction.
2. Ancillary infrastructure including operations and maintenance buildings, substation, battery energy storage system, switching station and parking/storage/laydown areas.
3. Internal roads connecting wind farm infrastructure.
4. Internal and External transmission line and switching station.
5. Transmission line access tracks.
6. Transport haul route from Port of Newcastle to the wind farm site.

Concept design work was completed to confirm a conservative maximum development footprint to be assessed in this BDAR. The concept design was developed by the project team, which included wind farm designers and civil designers, with input from ecologists and other specialists to minimise impacts as much as practicable.

The concept design has also considered temporary construction phase impacts associated with ancillary sites, access routes, hardstand and laydown areas, storage, stockpile and site office facilities. This development footprint is considered to be a maximum footprint based on the current level of concept design, with refinements and reductions expected during detailed design.

The development footprint for the assessment of biodiversity impacts has also considered a network of access tracks for the construction of the transmission line. As much as possible these tracks have been mapped using the existing farm track network to minimise impacts to areas of native vegetation. A 10m corridor on each of these tracks has been included in the development footprint to capture any potential vegetation clearing required to use these tracks. The intent of including these areas in the biodiversity impact assessment is to understand the potential maximum development footprint that will be subject to assessment under the BAM.

The majority of the impacted areas associated with the transport route upgrades are required to enable the over mass and oversize construction vehicles required to transport Project components are also included in Table 8. The majority of these areas are developed or modified areas that are not required to be assessed under the BAM. A detailed desktop assessment of all works areas along the haul route was carried out to



identify areas that contain biodiversity features and required field survey to identify vegetation communities, condition and habitat suitability for threatened species (Appendix A).

From the desktop assessment, a total of 25 sites along the haul route were confirmed to have biodiversity values that required assessment under the BAM. These areas were included in the development footprint and ecological fieldwork was carried out to confirm Plant Community Type (PCT) and habitat value for threatened fauna.

**Table 8 Wind farm infrastructure project elements for biodiversity assessment**

Project Component		Permanent (ha)	Temporary (ha)	Total (ha)
<b>Wind Farm (WF)</b>	WTGs including crane pad assembly areas and asset protection zones	40.67	6.52	47.19
	Internal access roads <sup>3,4</sup>	19.13	29.27	48.41
	Ancillary infrastructure including: <ul style="list-style-type: none"> <li>• Operations and maintenance building</li> <li>• Substation</li> <li>• BESS</li> <li>• Temporary facilities (Parking, storage, laydown areas and batching plants)</li> </ul>	11.45	6.61	18.06
	Temporary construction footprint <sup>5</sup>	-	92.11	92.11
<b>Total WF</b>		<b>71.25</b>	<b>134.52</b>	<b>205.77</b>
<b>Transmission Line (TL)</b>	Transmission line <sup>7</sup>	0.15	63.82	63.97
	Transmission line access roads	21.10	-	21.10
<b>Total TL</b>		<b>21.16</b>	<b>63.82</b>	<b>85.08</b>
<b>Transport Route (TR)</b>	Transport route upgrades	7.73	1.47	9.20
<b>Total TR</b>		<b>7.73</b>	<b>1.47</b>	<b>9.20</b>
<b>Total WF + TL + TR</b>		<b>100.24</b>	<b>199.81</b>	<b>300.05</b>

<sup>1</sup> Estimated permanent footprint does not allow for rehabilitation. In areas where existing Permanent Disturbance from farm tracks are utilised for wind farm infrastructure, this will not contribute to Development Footprint calculations.

<sup>2</sup> Temporary footprint areas are areas that will be rehabilitated after completion of construction.

<sup>3</sup> Internal access road calculation includes internal roads between hardstands, emergency access track from Head of the Peel Road to Project Area and transverse track.

<sup>4</sup> Calculation based on Turnbull Engineering designs assuming inclusion of cut/fill batters, 33kV cable runs, and drainage

<sup>5</sup> Underground 33kV electrical reticulation network will generally be located within the disturbance footprint of the access road network where possible, to the side of the trafficable pavement, unless design or construction optimisations do not allow this.

<sup>6</sup> Temporary areas to be rehabilitated include cut and fill batters (where possible), non-permanent roads, Asset Protection Zones (APZ), non-permanent ancillary infrastructure, and transmission line easement.

<sup>7</sup> 330kV transmission line is 24km of 60m easement and 33kV aboveground power line is 2.46km of 15m easement.

<sup>8</sup> It has been estimated that 90% of the 330kV easement can be rehabilitated using native grasses. Spans that would not impact the existing vegetation underneath were determined based on further design work and were not included as part of the project footprint.

<sup>9</sup> Access tracks for the transmission line have been developed at a concept level only to provide for a worst-case scenario for biodiversity impacts. The concept alignment of these tracks has followed existing tracks as much as practicable.

<sup>10</sup> It is estimated that 50% of the transport route upgrades will be rehabilitated with native grass.

For all project elements, a maximum development footprint has been proposed for assessment in this BDAR and it is expected to be refined and reduced during detailed design phases.

The amendments to this updated BDAR to reduce impacts to the Development Footprint and associated biodiversity is summarised in Table 9. Details on each project element change is provided in Table 1.

**Table 9 Total Development Footprint changes in this amendment**

Project Component	BDAR Nov 2020 (ha)	Updated BDAR Sept 2021 (ha)	Change (ha)
Wind Farm (WF) including: <ul style="list-style-type: none"> <li>• WTGs including crane pad assembly areas and asset protection zones.</li> <li>• Internal access roads.</li> <li>• Operations and maintenance building.</li> <li>• Substation.</li> <li>• BESS.</li> <li>• Temporary facilities (Parking, storage, laydown areas and batching plants).</li> <li>• Wind monitoring masts.</li> </ul>	261	206	-55
Transmission Line (TL) including: <ul style="list-style-type: none"> <li>• Transmission line.</li> <li>• Switching station.</li> <li>• Transmission line access roads.</li> </ul>	196	85	-111
Transport route (TR) including: <ul style="list-style-type: none"> <li>• Transport route upgrades.</li> </ul>	56	9	-47
<b>Total WF + TL + TR</b>	<b>513</b>	<b>300</b>	<b>-213</b>

## 1.6 Project staging plan

The Project proposes to stage the construction to ensure ongoing avoidance and minimisation of impact can be achieved as the detailed design of the project progresses, as well as staged retirement of biodiversity credit liabilities. A detailed staging plan will be based on final turbine and balance of plant contractor selected and associated construction plan preferences.

Prior to works commencing for each of the construction stages listed below, the biodiversity offset required associated with each stage will be secured through the creation and/or transfer, followed by the retirement of biodiversity credits, or via payment to the Biodiversity Offset Fund. Further detail is provided in Section 9.1.

The following set of example construction stages (or components) provided in Table 10 has been considered possible to be discrete packages of work for which staging of offset obligations is feasible, resultant offset credit liabilities for each of these stages is provided in Section 9.1.

**Table 10 Construction Staging Concept Scope of Works**

Scope of Work	Description
<b>Haulage and External Route Upgrades</b>	Required public road upgrades associated with bringing in materials and commencing construction on site.
<b>Construction Compound and Internal Roads, Turbine Hardstands and Foundations</b>	Establishment of construction facility and temporary laydown areas and commencement of internal road upgrades. This may be further broken up in stages by area of the project.
<b>Ancillary Infrastructure</b>	Substation, batching plant, O&M Facility and temporary laydown areas.
<b>Transmission Line</b>	External Transmission line construction.
<b>Switching Station</b>	This is located 20km from the wind farm Project Site and may be staged separately.

The Proponent will provide a final project staging plan to DPIE with final detailed layout plan, updated surveys (if required and outside of the current subject land) and BAM calculations during detailed design and prior to the commencement of construction.

## 1.7 Report purpose

This Biodiversity Development Assessment Report (BDAR) has been prepared in accordance with the requirements of the BC Act to address the Secretary's Environmental Assessment Requirements (SEARs) for the proposed Hills of Gold Wind Farm.

Specifically, this report assesses:

- Impacts to native vegetation, including threatened ecological communities listed under the BC Act and the EPBC Act.
- Impacts to listed threatened species under the BC Act and the EPBC Act.
- Impacts of blade strike on birds and bats, with specific focus on listed threatened bats and raptors observed.
- Impacts associated with development near to National Parks or State Reserves, including the adjacent Ben Halls Gap Nature Reserve.
- Measures to manage identified impacts (including details of adaptive management protocols and ability to obtain achievable offsets).
- Measures to avoid, mitigate and offset impacts, with the objective of achieving an overall 'improve or maintain' environmental outcome for the project.

## 1.8 Sources of information

The following information sources were used in the preparation of this BDAR:

- Project spatial information provided by Hills of Gold Wind Farm Pty Limited (Formerly Wind Energy Partners).



- Preliminary Environmental Assessment (PEA), Hills of Gold Wind Energy Project (NGH Environmental 2018).
- Hills of Gold Wind Farm Preliminary Biodiversity and EPBC Act Significant Impact Assessment ('EPBC Assessment') (Arup 2019).
- DAWE EPBC Protected Matters Search Tool (PMST).
- DAWE Species Profiles and Threats (SPRAT) database.
- DAWE Interim Biogeographic Regionalisation for Australia (IBRA) mapping.
- NSW Mitchell Landscapes mapping, version 3.1.
- DPI Key Fish Habitat mapping.
- OEH BioNet Atlas of NSW database.
- OEH Threatened Biodiversity Data Collection (formerly known as the Threatened Species Profiles database).
- State Vegetation Type Map: Border Rivers Gwydir / Namoi Region Version 2.0. VIS\_ID 4467 (OEH, 2020a).
- State Vegetation Type Map: Upper Hunter Version 1.0. VIS\_ID 4894 (OEH, 2020b).
- Greater Hunter Native Vegetation Mapping Version 4.0. VIS\_ID 3855 (DPIE, 2015).
- OEH BioNet Vegetation Classification Database.
- OEH online BAM calculator.
- Biodiversity Assessment Method (OEH, 2020).
- Groundwater Dependent Ecosystems Atlas (Bureau of Meteorology (BOM), 2020).
- LiDAR Survey data was used to assess areas of steep cliffs and rocky outcrops for cave-dwelling bat roost habitats.
- Relevant published literature on threatened biota.
- Submissions received through the Major Projects Website relevant to the BDAR update.

## 1.9 Report structure

In accordance with the requirements of the BAM, the assessed development footprint includes the area of land that may be directly and indirectly impacted by the project. This updated BDAR also includes all information as outlined in Appendix K of the BAM (2020) Table 11 provides a summary of where the required information for a BDAR is located, to demonstrate compliance with the BAM.

**Table 11 Minimum information requirements for BDAR from Appendix K of BAM**

Required report section	Required information	Required maps, tables and data	Section of this BDAR
<b>Introduction</b>	<p>Introduction to the biodiversity assessment including: brief description of the proposal</p> <p>identification of subject land boundary, including:</p> <ul style="list-style-type: none"> <li>Operational footprint (if BDAR)</li> <li>Construction footprint indicating clearing associated with temporary/ancillary construction facilities and infrastructure (if BDAR)</li> <li>General description of the subject land</li> </ul> <p>Sources of information used in the assessment, including reports and spatial data</p>	<ul style="list-style-type: none"> <li>Map of the subject land boundary showing the final proposal footprint, including the construction footprint for any clearing associated with temporary/ancillary construction facilities and infrastructure (if BDAR)</li> </ul>	<p>Section 1 provides a description of the project elements, the project location, the development footprints and the subject land.</p> <p>Project overview figures are provided as Figure 2 and Figure 3.</p>
<b>Landscape Context</b>	<p>Identification of site context components and landscape features, including:</p> <ul style="list-style-type: none"> <li>General description of subject land topographic and hydrological setting, geology and soils</li> <li>Percent native vegetation cover in the assessment area (as described in BAM Section 3.2)</li> <li>IBRA bioregions and subregions (as described in BAM Subsection 3.1.3(2.))</li> <li>Rivers and streams classified according to stream order (as described in BAM Subsection 3.1.3(3.) and Appendix E)</li> <li>Wetlands within, adjacent to and downstream of the site (as described in BAM Subsection 3.1.3(3.))</li> <li>Connectivity of different areas of habitat (as described in BAM Subsection 3.1.3(5–6.))</li> <li>Karst, caves, crevices, cliffs, rocks and other geological features of significance and for vegetation clearing proposals, soil hazard features (as described in BAM Subsections 3.1.3(7.) and 3.1.3(12.))</li> </ul>	<ul style="list-style-type: none"> <li>Site Map <ul style="list-style-type: none"> <li>Boundary of subject land</li> <li>Cadastral of subject land</li> <li>Landscape features identified in BAM Subsection 3.1.3</li> </ul> </li> <li>Location Map <ul style="list-style-type: none"> <li>Digital aerial photography at 1:1,000 scale or finer</li> <li>Boundary of subject land</li> <li>Assessment area, (i.e. the subject land and either 1500 m buffer area or 500 m buffer for linear development)</li> </ul> </li> <li>Landscape features identified in BAM Subsection 3.1.3</li> <li>Additional detail (e.g. local government area boundaries) relevant at this scale</li> </ul> <p>Landscape features identified in BAM Subsection 3.1.3 and to be shown on</p>	<p>Section 3 provides all of the required landscape features identified within the 1,500m landscape assessment buffer.</p> <p>The required elements for the Location Map are shown on the series of maps in Figure 4 and the native vegetation extent is shown on the series of maps in Figure 5.</p>

Required report section	Required information	Required maps, tables and data	Section of this BDAR
	<ul style="list-style-type: none"> <li>Areas of outstanding biodiversity value occurring on the subject land and assessment area (as described in BAM Subsection 3.1.3(8–9.))</li> <li>Any additional landscape features identified in any SEARs for the proposal</li> <li>NSW (Mitchell) landscape on which the subject land occurs</li> </ul>	<p>the Site Map and/or Location map include:</p> <ul style="list-style-type: none"> <li>IBRA bioregions and subregions</li> <li>Rivers, streams and estuaries</li> <li>Wetlands and important wetlands</li> <li>Connectivity of different areas of habitat</li> <li>Karst, caves, crevices, cliffs, rocks and other geological features of significance and if required, soil hazard features</li> <li>Areas of outstanding biodiversity value occurring on the subject land and assessment area</li> <li>Any additional landscape features identified in any SEARs for the proposal</li> <li>NSW (Mitchell) landscape on which the subject land occurs</li> </ul>	
<b>Native vegetation</b>	<ul style="list-style-type: none"> <li>Identify native vegetation extent within the subject land, including cleared areas and evidence to support differences between mapped vegetation extent and aerial imagery (as described in BAM Section 4.1(1–3.) and Subsection 4.1.1).</li> <li>Provide justification for all parts of the subject land that do not contain native vegetation (as described in BAM Subsection 4.1.2).</li> <li>Review of existing information on native vegetation including references to previous vegetation maps of the subject land and assessment area (described in BAM Section 4.1(3.) and Subsection 4.1.1)</li> </ul>	<ul style="list-style-type: none"> <li>Map of native vegetation extent within the subject land at scale not greater than 1:10,000 including identification of cleared areas (as described in BAM Section 4.1(1–3.)) and all parts of the subject land that do not contain native vegetation (BAM Subsection 4.1.2).</li> <li>Map of PCTs within the subject land (as described in BAM Section 4.2(1.)).</li> </ul>	<p>The native vegetation extent within the development footprint is described in detail in Section 4 of the Updated BDAR.</p> <p>Section 4.2 and Table 22 provides a list of the PCTs, vegetation class and vegetation type, as well as the area of each PCT within the development footprint.</p> <p>Appendix B provides the detailed PCT descriptions and the list of species used for identification. The field data sheets for the</p>

Required report section	Required information	Required maps, tables and data	Section of this BDAR
	<ul style="list-style-type: none"> <li>Describe the systematic field-based floristic vegetation survey undertaken in accordance with BAM Section 4.2</li> <li>Where relevant, describe the use of more appropriate local data, provide reasons that support the use of more appropriate local data and include the written confirmation from the decision-maker that they support the use of more appropriate local data (as described in BAM Subsection 1.4.2 and Appendix A).</li> </ul> <p>For each PCT within the subject land, describe:</p> <ul style="list-style-type: none"> <li>Vegetation class.</li> <li>Extent (ha) within subject land.</li> <li>Evidence used to identify a PCT including any analyses undertaken, references/sources, existing vegetation maps (BAM Section 4.2(1–3.)).</li> <li>Plant species relied upon for identification of the PCT and relative abundance of each species.</li> <li>If relevant, TEC status including evidence used to determine vegetation is the TEC (BAM Subsection 4.2.2(1–2.)).</li> <li>Estimate of percent cleared value of PCT (BAM Subsection 4.2.1(5.)).</li> </ul> <p>Describe the vegetation integrity assessment of the subject land, including:</p> <ul style="list-style-type: none"> <li>Identification and mapping of vegetation zones (as described in BAM Subsection 4.3.1).</li> <li>Assessment of patch size (as described in BAM Subsection 4.3.2).</li> <li>Survey effort (i.e. number of vegetation integrity survey plots) as described in BAM Subsection 4.3.4(1–2.).</li> <li>Use of relevant benchmark data from BioNet Vegetation Classification (as described in BAM Subsection 4.3.3(5.)).</li> </ul>	<ul style="list-style-type: none"> <li>Map of vegetation zones within the subject land (as described in BAM Subsection 4.3.1).</li> <li>Map the location of floristic vegetation survey plots and vegetation integrity survey plots relative to PCTs boundaries.</li> <li>Map of TEC distribution on the subject land and table of TEC listing, status and area (ha).</li> <li>Map of patch size locations for each native vegetation zone and table of patch size areas (as described in BAM Subsection 4.3.2).</li> </ul> <p>Table of current vegetation integrity scores for each vegetation zone within the site and including:</p> <ul style="list-style-type: none"> <li>Composition condition score.</li> <li>Structure condition score.</li> <li>Function condition score.</li> <li>Presence of hollow bearing trees.</li> </ul>	<p>BAM plots include evidence of the quantitative information used to allocate PCTs. This information also includes details on the vegetation class, type and percent cleared for each PCT. This information is available in Appendix H (and in electronic form).</p> <p>Vegetation zones are presented in Table 18 and mapped in Figure 7.</p> <p>The patch size assessment for the development footprint is presented in Section 3.2.2 and mapped on Figure 8.</p> <p>The number of BAM plots surveyed and where benchmark data was used is presented in Section 4.1.4 and Table 18.</p> <p>TEC status of the PCTs and vegetation zones are provided in Table 23, with additional description of TECs in Section 4.3. Maps of TECs are provided in Figure 9.</p> <p>The current vegetation integrity scores for the development footprint area provided in Table 22.</p>



Required report section	Required information	Required maps, tables and data	Section of this BDAR
<b>Threatened species</b>	<p>Identify ecosystem credit species likely to occur on the subject land, including:</p> <ul style="list-style-type: none"> <li>list of ecosystem credit species derived from the BAM-C (as described in BAM Subsection 5.1.1 and Section 5.2(1.))</li> <li>justification and supporting evidence for exclusion of any ecosystem credit species based on geographic limitations, habitat constraints or vagrancy (as described in BAM Subsections 5.2.1 and 5.2.2)</li> <li>justification for addition of any ecosystem credit species to the list</li> </ul> <p>Identify species credit species likely to occur on the subject land, including:</p> <ul style="list-style-type: none"> <li>list of species credit species derived from the BAM-C (as described in BAM Subsection 5.1.1)</li> <li>justification and supporting evidence for exclusions based on geographic limitations, habitat constraints or vagrancy (as described in BAM Subsections 5.2.1 and 5.2.2)</li> <li>justification and supporting evidence for exclusions based on degraded habitat constraints and/or microhabitats on which the species depends (as described in BAM Subsection 5.2.2)</li> <li>justification for addition of any species credit species to the list</li> </ul> <p>From the list of candidate species credit species, identify:</p> <ul style="list-style-type: none"> <li>species assumed present within the subject land (if relevant) (as described in BAM Subsection 5.2.4(2.a.))</li> <li>species present within the subject land on the basis of being identified on an important habitat map for a species (as described in BAM Subsection 5.2.4(2.d.))</li> <li>species for which targeted surveys are to be completed to determine species presence (Subsection 5.2.4(2.b.))</li> </ul>	<p>Table showing ecosystem credit species in accordance with BAM Section 5.1.1, and identifying:</p> <ul style="list-style-type: none"> <li>the ecosystem credit species removed from the list</li> <li>the sensitivity to gain class of each species</li> </ul> <p>Table detailing species credit species in accordance with BAM section 5.2 and identifying:</p> <ul style="list-style-type: none"> <li>the species credit species removed from the list of species because the species is considered vagrant, out of geographic range or the habitat or micro habitat features are not present</li> <li>the candidate species credit species not recorded on the subject land as determined by targeted survey, expert report or important habitat map</li> </ul> <p>Table detailing species credit species recorded or assumed as present within the subject land, habitat constraints or microhabitats associated with the species, counts of individuals (flora)/extent of suitable habitat (flora and fauna) (as described in BAM Subsection 5.2.6) and biodiversity risk weighting (BAM Section 5.4)</p>	<p>Ecosystem credit species on the development footprint, as identified in the BAM Calculator are provided in Table 27.</p> <p>A list of species credit species and justification for their inclusion or exclusions based on habitat features is provided in Table 28, with more detailed analysis provided in Appendix C.</p> <p>Field survey methods, including technique, effort, timing and weather conditions are provided in Section 5.3. These are summarised in Table 29. The location of field surveys is provided in Figure 10 showing flora survey tracks and Figure 12 for the targeted fauna surveys.</p> <p>Threatened species survey results are provided in Section 5.4.</p> <p>The methodology for developing species habitat polygons is provided in Section 5.5, with detailed descriptions of the habitat features used provided in Table 43.</p> <p>No expert reports were used to include or exclude candidate species. The list of candidate species to be assessed was identified from assessment of habitat suitability and targeted surveys.</p>

Required report section	Required information	Required maps, tables and data	Section of this BDAR
	<ul style="list-style-type: none"> <li>species for which an expert report is to be used to determine species presence (Subsection 5.2.4(2.c.))</li> </ul> <p>Present the outcomes of species credit species assessments from:</p> <ul style="list-style-type: none"> <li>threatened species survey (as described in BAM Section 5.2.4)</li> <li>expert reports (if relevant) including justification for presence of the species and information used to make this determination (as described in BAM Section 5.2.4 and 5.3, Box 3)</li> </ul> <p>Where survey has been undertaken include detailed information on:</p> <ul style="list-style-type: none"> <li>survey method and effort, (as described in BAM Section 5.3)</li> <li>justification of survey method and effort (e.g. citation of peer-reviewed literature) if approach differs from the Department's taxa-specific survey guides or where no relevant guideline has been published</li> <li>timing of survey in relation to requirements in the TBDC or the Department's taxa-specific survey guides. Where survey was undertaken outside these guides include justification for the timing of surveys</li> <li>survey personnel and relevant experience</li> <li>describe any limitations to surveys and how these were addressed/overcome</li> </ul> <p>Species polygon completed for species credit species present within the subject land (assumed present or determined on the basis of survey, expert report or important habitat map) ensuring that:</p> <ul style="list-style-type: none"> <li>the unit of measure for each species is documented</li> <li>for species assessed by area:</li> </ul>	<ul style="list-style-type: none"> <li>Map indicating the GPS coordinates of all individuals of each species recorded within the subject land and the species polygon for each species (as described in BAM Subsection 5.2.5)</li> </ul>	

Required report section	Required information	Required maps, tables and data	Section of this BDAR
	<ul style="list-style-type: none"> <li>the polygon includes the extent of suitable habitat for the target species within the subject land (as described in BAM Subsection 5.2.5)</li> <li>a description of, and evidence-based justification for, the habitat constraints, features or microhabitats used to map the species polygon including reference to information in the TBDC for that species and any buffers applied</li> <li>for species assessed by counts of individuals: <ul style="list-style-type: none"> <li>the number of individual plants present on the subject land (as described in BAM Subsection 5.2.5(3.))</li> <li>the method used to derive this number (i.e. threatened species survey or expert report) and evidence-based justification for the approach taken</li> <li>the polygon includes all individuals located on the subject land with a buffer of 30 m around the individuals or groups of individuals on the subject land</li> </ul> </li> </ul> <p>Identify the biodiversity risk weighting for each species credit species identified as present within the subject land (as described in BAM Section 5.4)</p>		
<b>Prescribed impacts</b>	<p>Identify potential prescribed biodiversity impacts on threatened entities, including:</p> <ul style="list-style-type: none"> <li>Karst, caves, crevices, cliffs, rocks and other geological features of significance (as described in BAM Subsection 6.1.1).</li> <li>Occurrences of human-made structures and non-native vegetation (as described in BAM Subsection 6.1.2).</li> <li>Corridors or other areas of connectivity linking habitat for threatened entities (as described in BAM Subsection 6.1.3).</li> </ul>	<ul style="list-style-type: none"> <li>Map showing location of any prescribed impact features (i.e. karst, caves, crevices, cliffs, rocks, human-made structures, etc.).</li> <li>Maps of habitual flight paths for nomadic and migratory species likely to fly over the site and maps of likely habitat for threatened aerial species resident on the site (for wind farm developments only).</li> </ul>	<p>Prescribed impacts are addressed in Section 8.5 with some aspects addressed as part of the assessment of Indirect Impacts in Section 8.3.</p> <p>Requirements for wind farm developments are specifically addressed in these two Sections.</p> <p>The results of three seasons worth of bird utilisation surveys did not identify any</p>



Required report section	Required information	Required maps, tables and data	Section of this BDAR
	<ul style="list-style-type: none"> <li>Water bodies or any hydrological processes that sustain threatened entities (as described in BAM Subsection 6.1.4).</li> <li>Protected animals that may use the proposed wind farm development site as a flyway or migration route (as described in BAM Subsection 6.1.5).</li> <li>Where the proposed development may result in vehicle strike on threatened fauna or on animals that are part of a threatened ecological community (as described in BAM Subsection 6.1.6).</li> </ul> <p>Identify a list of threatened entities that may be dependent upon or may use habitat features associated with any of the prescribed impacts.</p> <p>Describe the importance of habitat features to the species including, where relevant, impacts on life-cycle or movement patterns (e.g. Subsection 6.1.3).</p> <p>Where the proposed development is for a wind farm:</p> <ul style="list-style-type: none"> <li>Identify a candidate list of protected animals that may use the development site as a flyway or migration route, including: resident threatened aerial species, resident raptor species and nomadic and migratory species that are likely to fly over the proposal area (as described in BAM Subsection 6.1.5).</li> <li>Provide details of targeted survey for candidate species of wind farm developments undertaken in accordance with BAM Subsection 6.1.5(2–3.).</li> <li>Predict the habitual flight paths for nomadic and migratory species likely to fly over the subject land and map the likely habitat for resident threatened aerial and raptor species (BAM Subsection 6.1.5(4.)).</li> </ul>		<p>habitual flight paths for nomadic and migratory species likely to fly over the site and maps of likely habitat for threatened aerial species resident on the site.</p> <p>Location of prescribed impacts are mapped on Figure 27.</p>
<b>Avoid and minimise impacts</b>	Demonstration of efforts to avoid and minimise impacts on biodiversity values (including prescribed impacts) associated with the proposal location in accordance with	<ul style="list-style-type: none"> <li>Table of measures to be implemented to avoid and minimise the impacts of the proposal, including action,</li> </ul>	Section 7 provides a detailed summary of the design phase measures to avoid and minimise impacts.

Required report section	Required information	Required maps, tables and data	Section of this BDAR
	<p>Chapter 7, including an analysis of alternative:</p> <ul style="list-style-type: none"> <li>Modes or technologies that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed mode or technology</li> <li>Routes that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed route.</li> <li>Alternative locations that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed location.</li> <li>Alternative sites within a property on which the proposal is located that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed site.</li> </ul> <p>Describe efforts to avoid and minimise impacts (including prescribed impacts) to biodiversity values through proposal design (as described in BAM Sections 7.1 and 7.2).</p> <p>Identification of any other site constraints that the Porponent has considered in determining the location and design of the proposal (as described in BAM Section 7.2.1(3.)).</p>	<p>outcome, timing and responsibility.</p> <ul style="list-style-type: none"> <li>Map of alternative footprints considered to avoid or minimise impacts on biodiversity values; and of the final proposal footprint, including construction and operation.</li> <li>Maps demonstrating indirect impact zones where applicable.</li> </ul>	<p>A table of mitigation and management measures is summarised in Section 8.9 and Table 74.</p> <p>Maps of the assessed development footprint include areas that will be impacted by construction and operation of the project.</p> <p>Figure 23 presents alternative development footprints considered, and Figure 25 shows the area of indirect impact from the operation of the wind turbines.</p>
<b>Assessment of Impacts</b>	<p>Determine the impacts on native vegetation and threatened species habitat, including a description of direct impacts of clearing of native vegetation, threatened ecological communities and threatened species habitat (as described in BAM Section 8.1).</p> <p>Assessment of indirect impacts on vegetation and threatened species and their habitat including (as described in BAM Section 8.2):</p> <ul style="list-style-type: none"> <li>Description of the nature, extent, frequency, duration and timing of indirect impacts of the proposal.</li> </ul>	<ul style="list-style-type: none"> <li>Table showing change in vegetation integrity score for each vegetation zone as a result of identified impacts</li> </ul>	<p>Direct impacts associated with the project are outlined in Section 8.2.</p> <p>Indirect impacts associated with the project area outlined in Section 8.3.</p> <p>Prescribed impacts associated with the project area outlined in Section 8.5.</p> <p>Changes in vegetation integrity scores are presented in Appendix G.</p>

Required report section	Required information	Required maps, tables and data	Section of this BDAR
	<ul style="list-style-type: none"> <li>Documenting the consequences to vegetation and threatened species and their habitat including evidence-based justifications.</li> <li>Reporting any limitations or assumptions, etc. made during the assessment.</li> <li>Identification of the threatened entities and their habitat likely to be affected.</li> </ul> <p>Assessment of prescribed biodiversity impacts (as described in BAM Section 8.3) including the assessment of the nature, extent and duration of impacts on the habitat of threatened species or ecological communities associated with:</p> <ul style="list-style-type: none"> <li>Karst, caves, crevices, cliffs, rocks and other features of geological significance.</li> <li>Human-made structures.</li> <li>Non-native vegetation.</li> <li>Connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range.</li> <li>Movement of threatened species that maintains their life cycle.</li> <li>Water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities.</li> <li>Assessment of the impacts of wind turbine strikes on protected animals.</li> <li>Assessment of the impacts of vehicle strikes on threatened species of animals or on animals that are part of a TEC.</li> </ul>		
<b>Mitigation and Management of Impacts</b>	Identification of measures to mitigate or manage impacts in accordance with the recommendations in BAM Sections 8.5 and 8.5 including:	Table of measures to be implemented to mitigate and manage impacts of the proposal, including action, outcome, timing and responsibility.	Section 8.9 provides a detailed summary of the measures to be implemented to mitigate and manage impacts of the proposal.



Required report section	Required information	Required maps, tables and data	Section of this BDAR
	<ul style="list-style-type: none"> <li>Techniques, timing, frequency and responsibility.</li> <li>Identify measures for which there is risk of failure.</li> <li>Evaluate the risk and consequence of any residual impacts.</li> <li>Document any adaptive management strategy proposed.</li> </ul> <p>Identification of measures for mitigating impacts related to:</p> <ul style="list-style-type: none"> <li>Displacement of resident fauna (as described in BAM Subsection 8.4.1(2.)).</li> <li>Indirect impacts on native vegetation and habitat (as described in BAM Subsection 8.4.1(3.)).</li> <li>Mitigating prescribed biodiversity impacts (as described in BAM Subsection 8.4.2).</li> </ul> <p>Details of the adaptive management strategy proposed to monitor and respond to impacts on biodiversity values that are uncertain (BAM Section 8.5).</p>		Table 74 outlines the mitigation and management measures to be implemented.
<b>Impact Summary</b>	<p>Identification and assessment of impacts on TECs and threatened species that are at risk of a serious and irreversible impacts (SAIL, in accordance with BAM Section 9.1) including:</p> <ul style="list-style-type: none"> <li>Addressing all criteria in Subsection 9.1.1 for each TEC listed as at risk of an SAIL present on the subject land</li> <li>Addressing all criteria in Subsection 9.1.2 for each threatened species at risk of an SAIL present on the subject land.</li> <li>Documenting assumptions made and/or limitations to information.</li> <li>Documenting all sources of data, information, references used or consulted.</li> <li>Clearly justifying why any criteria could not be addressed.</li> </ul> <p>Identification of impacts requiring offset in accordance</p>	<p>Map showing the extent of TECs at risk of an SAIL within the subject land.</p> <p>Map showing location of threatened species at risk of an SAIL within the subject land.</p> <p>Map showing location of:</p> <ul style="list-style-type: none"> <li>Impacts requiring offset.</li> <li>Impacts not requiring offset.</li> <li>Areas not requiring assessment.</li> </ul>	<p>The impact summary is provided in Section 9, with Table 76 showing the direct impacts and the number of offset credits for each vegetation zone and threatened species.</p> <p>Impacts requiring offset, not requiring offset and areas not requiring assessment are provided on Figure 29.</p> <p>SAIL entities are addressed in Section 8.6 and Appendix E and mapped on Figure 28.</p> <p>A summary of ecosystem credit and species credits required by the project is provided in Section 9 and Appendix G.</p>

Required report section	Required information	Required maps, tables and data	Section of this BDAR
	<p>with BAM Section 9.2.</p> <p>Identification of impacts not requiring offset in accordance with BAM Subsection 9.2.1(3.).</p> <p>Identification of areas not requiring assessment in accordance with BAM Section 9.3.</p>		
	<p>Ecosystem credits and species credits that measure the impact of the development on biodiversity values, including:</p> <ul style="list-style-type: none"> <li>• Future vegetation integrity score for each vegetation zone within the subject land (Equation 25 and Equation 26 in BAM Appendix H).</li> <li>• Change in vegetation integrity score (BAM Subsection 8.1.1).</li> <li>• Number of required ecosystem credits for the direct impacts of the proposal on each vegetation zone within the subject land (BAM Subsection 9).</li> <li>• Number of required species credits for each candidate threatened species that is directly impacted on by the proposal (BAM Subsection 10.1.3).</li> </ul>	<ul style="list-style-type: none"> <li>• Table of PCTs requiring offset and the number of ecosystem credits required.</li> <li>• Table of threatened species requiring offset and the number of species credits required.</li> </ul>	
<b>Biodiversity credit report</b>	Description of credit classes for ecosystem credits and species credits at the development or clearing site or land to be biodiversity certified (BAM Section 10.2).	Table of credit class and matching credit profile.	The biodiversity credit report as output from the BAM-Calculator is provided in Appendix G.

### 1.9.1 Interpretation of maps

Map sets presenting survey effort, survey results, and biodiversity constraints are provided for the total development footprint, in accordance with the requirements of the BAM. Each map set contains an overview map and a set of detailed maps. The overview map shows the order in which the detailed maps are referenced and their location within the assessment area.

When locations are referenced within the report, they are described using the infrastructure elements defined in Section 1.5.1 and Table 8.

### 1.9.2 Relevant personnel

The BDAR has been prepared in accordance with the BAM (OEH 2017) by Arup and Biosis, followed by updates to meet the requirements of the BAM (DPIE 2020) by Biosis following the end of the 12 month transitional arrangements period for SSD projects. The following accredited biodiversity assessors have prepared, provided input into and reviewed sections of this BDAR in accordance with the BAM:

- Chani Wheeler (BAAS 19077) – Arup
- Matt Davis (BAAS 18090) – Arup
- Nicola Trulock (BAAS 19058) – Biosis
- Callan Wharfe (BAAS 18138) – Biosis
- Rebecca Dwyer (BAAS 17067) – Biosis
- Mitchel Palmer (BAAS17051) – Biosis

Additional personnel contributed to the field survey effort, data analysis, interpretation and mapping, including:

- Caroline Tan – Arup Terrestrial Ecologist
- Andrea McPherson – Arup Aquatic Ecologist
- Tony Cable – Biosis Senior Zoologist
- Paul Price – Biosis Consultant Botanist
- Brooke Corrigan – Biosis Consultant Botanist
- Matthew Hyde - Biosis Consultant Zoologist
- Carragh Heenan – Biosis Zoologist
- Joel Nicholson – Biosis Zoologist
- Kayla Asplet - Biosis Zoologist
- Sarah Allison - Biosis Zoologist
- Byron Dale – Biosis Zoologist
- Adam Baus – Biosis Zoologist (Aquatic)
- Bianca Klein – Biosis Botanist
- Tobias Scheid – Biosis Botanist
- Heather Lee-Kiorgaard – Biosis Botanist

This amended BDAR has been compiled by various authors from Arup and Biosis, including the accredited assessors listed above. Callan Wharfe (BAAS 18138) completed the attached BAM Calculator to identify offset credit requirements, updated from the previous version established by Matt Davis (BA 18090).



## 2 Statutory considerations

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### 2.1 NSW legislation and policies

#### 2.1.1 *Environmental Planning and Assessment Act 1979 (EP&A Act)*

The Project is State Significant Development (SSD) and development consent is being sought under Section 4 of the NSW EP&A Act. An EIS is a requirement of the development assessment process.

Environmental Assessment Report (now called Scoping Report) was prepared and submitted to the NSW Department of Planning and Environment (now Department of Planning, Industry and Environment (DPIE)) in October 2018. Secretary's Environmental Assessment Requirements (SEARs) were issued for the Project on 22 November 2018. The SEARs form the basis of the assessment criteria for the Project. Supplementary SEARs were issued on 18 February 2020 in relation to the determination of the Project as a Controlled Action under the Commonwealth EPBC Act.

#### **State Environmental Planning Policy (Koala Habitat Protection) 2020 & State Environmental Planning Policy (Koala Habitat Protection) 2021**

State Environmental Planning Policy (Koala Habitat Protection) 2021 (Koala SEPP 2021) applies to identified LGAs in areas not zoned as RU1 Primary Production, RU2 Rural Landscape or RU3 Forestry, and within these rural land zonings, the former State Environmental Planning Policy (Koala Habitat Protection) 2020 (Koala SEPP 2020) continues to apply. Portions of the development footprint occur on both rural zonings and non-rural zoning so both Koala SEPP 2020 and Koala SEPP 2021 are potentially relevant to the project.

However, both SEPPs only apply to development applications where Council is the consent authority, which is not the case for the project that has been designated as SSD under Section 4 of the EP&A Act, neither SEPP is applicable to the project.

However the aims of both Koala SEPP 2020 and Koala SEPP 2021 are to encourage the conservation and management of areas of natural vegetation that provide habitat for koalas to support a permanent free-living population over their present range and reverse the current trend of koala population decline.

These aims and considerations have been addressed in accordance with the BAM and the NSW *Biodiversity Conservation Act 2016* (BC Act), as well as the Commonwealth EPBC Act, in preparation of this BDAR. Targeted surveys have been undertaken for Koala to ascertain their presence within the subject land, specific measures to avoid and minimise impacts to the species have been employed, detailed impact assessments have been carried out, and like-for-like offsets will be secured for residual impacts that have been unable to be avoided.

#### 2.1.2 *Biodiversity Conservation Act 2016 (BC Act)*

The BC Act and Biodiversity Conservation Regulation 2017 (BC Regulation) provide a framework for the assessment of biodiversity and the implementation of the Biodiversity Offset Scheme (BOS) in NSW. The NSW Biodiversity Assessment Method (BAM) supports the implementation of the BOS and establishes a consistent approach to assessing biodiversity values on lands within NSW.

Under the BC Act, impacts to biodiversity, including those associated with land clearing and development, must be assessed by an accredited person to determine proposal requirements for entry into the BOS. Entry into the BOS may be triggered where areas of mapped biodiversity value will be impacted, where land clearing exceeds area thresholds or where impacts to threatened species or ecological communities are likely to be significant. A proposal may also be refused where it is likely to result in serious or irreversible impacts to biodiversity, as defined by the BC Act.

## 2.2 Commonwealth legislation

### 2.2.1 *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)*

The project has also been referred under the EPBC Act (2019/8535) and determined to be a controlled action which is required to be assessed under the Bilateral Agreement made under section 45 of the EPBC Act relating to environmental assessment between the Commonwealth of Australia and the State of New South Wales. The bilateral agreement endorses the BAM and the NSW Biodiversity Offsets Scheme as accredited processes. Guidelines for preparing the EIS under the Bilateral Agreement have been provided by DAWE (Supplementary SEARS). This BDAR has been prepared to address approval requirements under the EPBC Act as set out in the Supplementary SEARS.

## 3 Landscape features

In accordance with Section 3.1 of the BAM, a landscape assessment was completed for the assessment area, as shown in Figure 4. This landscape assessment has been carried out for the 1,500m buffer around the development footprint, as required by Section 3.1 of the BAM. For the purpose of this BDAR, the 1,500m landscape buffer around the development footprint is defined as the assessment area.

This assessment area includes a total 42,315.90 hectares of land comprising the development footprint and the 1,500m buffer around all parts of the development footprint. This section provides a summary of the wider landscape features of the assessment area that contribute to the ecological values within the development footprint.

### 3.1 Identified features

Section 3.1.3 of the BAM lists the required identified features that need to be mapped in this BDAR. Relevant landscape features identified for the assessment area are shown in Figure 4.

#### 3.1.1 IBRA bioregions and subregions

The assessment area intersects four Interim Biogeographic Regionalisation for Australia (IBRA) subregions, as detailed in Table 12 and shown in Figure 4. The Nandewar IBRA bioregion and Peel IBRA subregion dominates the assessment area. In accordance with Section 5.2,1,7 of the BAM, these have formed the basis for the habitat suitability assessment documented within this BDAR.

At the scale of the development footprint, the majority of the project is located within the Peel sub-region within the Nandewar bioregion.

**Table 12 IBRA region and sub-regions in which the subject land is located**

IBRA Region	IBRA Sub-region	Extent (ha)	% Assessment area
New England Tablelands	Walcha Plateau	59,71	19%
Nandewar	Peel	13,655	44%
NSW North Coast	Tomalla	3,183	10%
Sydney Basin	Hunter	8,586	27%

#### 3.1.2 NSW landscape regions (Mitchell Landscapes)

The assessment area supports 19 NSW landscapes, as detailed in Table 13.



**Table 13 NSW (Mitchell) Landscapes within the assessment area**

Landscape	Corresponding Ecosystem Meso Grouping	Extent (ha)	% assessment area
<b>Mount Royal Tops</b>	NNC Barrington - Gloucester	7161	23%
<b>Mount Royal Ridges</b>	NNC Barrington - Gloucester	9112	29%
<b>Manning Great Escarpment Southern Aspects</b>	NNC Barrington - Gloucester	143	<1%
<b>Manning Great Escarpment Western Aspects</b>	NNC Barrington - Gloucester	18	<1%
<b>Nundle Hills</b>	NAN Peel	5969	19%
<b>Slippery Rock Range</b>	NAN Peel	42	0<1%
<b>Tamworth- Keepit Slopes and Plains</b>	NAN Peel	192	1%
<b>Central Hunter Alluvial Plains</b>	SB Hunter	155	1%
<b>Central Hunter Foothills</b>	SB Hunter	4053	13%
<b>Lower Hunter Channels and Floodplains</b>	SB Hunter	492	2%
<b>Newcastle Coastal Ramp</b>	SB Hunter	394	1%
<b>Upper Hunter Channels and Floodplain</b>	SB Hunter	2517	8%
<b>Gosford-Cooranbong Coastal Slopes</b>	SB Wyong	142	1%
<b>Moonbi-Walcha Granites</b>	NET Granites	77	<1%
<b>Nowendoc- Yarras Serpentinite</b>	NNC Ultramafics	93	<1%
<b>Sydney- Newcastle Barriers and Beaches</b>	SB Coastal Barriers	609	2%

### 3.1.3 Rivers and streams

There are several waterways and wetland/farm dams in the assessment area, with many being defined as first order streams as per Appendix E of the BAM.

Rivers and streams (classified by stream order and including riparian buffers) are shown on the Site Map and Location Map in Figure 4. The majority of the streams that occur within the assessment area are first-order watercourses, which is characteristic of the location of the project on a ridgeline. The majority of these flow north and west of the ridgeline into the Namoi catchment area. The southern portion of the development footprint for the wind farm and transmission line flows south to the Hunter catchment area. A small portion of the eastern portion of this development footprint flows east to the Manning Catchment Area.

There are 76 named streams within the assessment area for the wind farm and transmission line, the 20 watercourses with the longest mapped extent within the assessment area include:

- Hunter River
- Basin Creek
- Wombramurra Creek
- Oakenville Creek
- Woodleys Creek
- Barnard River
- Wallis Creek
- Happy Valley Creek
- Back Creek
- Peel River
- Talbots Creek
- Ryans Oaky Creek
- Wiles Gully
- Goonoo Goonoo Creek
- Throsby Creek
- Woodleys Gully
- Burrows Creek
- Rosebrook Creek
- Limestone Oaky Creek
- Paynes Gully

A desktop assessment of aquatic habitats impacted as a result of the development are discussed in Section 5, including identification of where works forming part of the development footprint are required within waterways, primarily for site access and transport haul route upgrades.

### 3.1.4 Wetlands

The assessment area supports 388.51ha of mapped NSW wetlands, as detailed in Table 14. However, each of these are contained within the 1,500m assessment area around small areas of road upgrades and related works along the transport route and none will be impacted by the development footprint.

Mapped wetlands include the Hunter River, Southern Hunter River, Throsby Creek and the Kooragang Nature Reserve (refer to Figure 4). As outlined above, none of these will be directly or indirectly impacted by the development footprint.

Approximately 2.8 hectares of coastal wetlands, and 13.1 hectares of coastal wetlands proximity areas are mapped under the State Environmental Planning Policy (SEPP) (Coastal Management) 2018, also occur within the assessment area, but will not be subject to any direct or indirect impacts associated with the project. These are situated at Newcastle and include the Southern Hunter River and Throsby Creek.

**Table 14 NSW (2006) wetlands within the assessment area**

Wetland group	Extent within assessment area (ha)
Reservoir/ dam	3.2
Floodplain wetland	5.3
Estuarine wetland	245.8
Non-wetland	144.3
<b>Total</b>	<b>398.7</b>

### 3.1.5 Connectivity features

The wind farm and transmission line is well connected to vegetation both within and outside of the 1,500m landscape assessment area surrounding the subject land, with biodiversity features conserved in reserves, steep slopes and watercourses.

In the subject land and assessment buffer, there are extensive agricultural pastures along ridgelines and low-lying topography is used as grazing land, with existing access roads, tracks and fence lines. Scattered and intermittent tree cover is present within grazing land. There are also grassy woodlands on the undulating foothills and escarpments.

Forested mountain tops are dominated by dense, mature forests, most notably associated with Ben Halls Gap Nature Reserve to the east, Hanging Rock to the north and Crawney Pass National Park to the west. Adjacent land uses include predominantly cattle grazing, as well as areas of forestry present to the north.

As required under Section 3.1 of the BAM for connectivity features:

- The connectivity of different areas of habitat that may facilitate the movement of threatened species across their range are identified on the Location Map (Figure 4).
- No flyways for migratory species have been identified within the assessment area during desktop assessments, including extracts from the Bionet records and field assessments completed for this BDAR. As part of the Collision Risk Model (CRM) validation three seasons of bird utilisation surveys were completed. In addition, targeted surveys for threatened and migratory bird species surveys were undertaken in winter, spring and summer 2019 and autumn/winter 2020 and not flyways or substantial numbers of migratory species were observed.

The biodiversity corridors that facilitate the movement of threatened species across their range for this project can broadly be classified into two types. The first corridor provides for the maintenance of movement

across the vegetated ridgelines and the second provides for movement of altitudinal migrants between the Mount Royal and Liverpool Ranges (Figure 4). The ridgeline corridors are associated with vegetation retained on upper ridgelines and steep slopes, with previous grazing land uses removing vegetation on more gentle slopes and foothills. Corridors extend from the range and escarpment, largely following vegetated watercourses where thin strips of riparian vegetation have been retained.

There is also a network of protected areas in the wider landscape associated with Ben Halls Gap Nature Reserve, Wallabadah Nature Reserve and Crawney Pass National Park. The biodiversity corridors within the assessment area, particularly along the ridgelines, provide important connectivity between these conservation areas.

The majority of these mapped corridors occur outside the development footprint and will not be directly or indirectly impacted by the project. The corridor that runs along the ridgeline connecting Ben Halls Gap to areas of native vegetation to the north and to Crawney Pass National Park intersects and adjoins part of the development footprint. This corridor will be maintained, as the spatial distribution of vegetation on the ridgeline where wind farm infrastructure and internal roads are proposed is fragmented and patchy. The larger patches of contiguous vegetation and habitat are located to the south and north of the ridgeline, within protected area reserves and steeper terrain and are not impacted by the development footprint.

### **3.1.6 Areas of geological significance and soil hazard features**

The presence of habitat features including karsts, caves, crevices and cliffs or other areas of geological significance likely to occur within and adjacent to the assessment area have been assessed. Field surveys have identified a number of areas of steep, rocky crevices on either side of the escarpment that provide potential roosting habitat for microbats. The location of steep cliff lines on the edge of the escarpments in the assessment area were mapped. The GIS desktop analysis was undertaken as follows:

- A 5 m Digital Elevation Model (DEM) was created from a LiDAR bare earth point cloud.
- Focal statistics were run on the DEM to create a surface representing the range of elevation in a 2x2m cell neighbourhood around each input cell (roughly a 10m buffer).
- Focal range surface was reclassified to remove areas with a range less than 3m between highest and lowest points in the neighbourhood.
- The resulting cliff lines layer was symbolised to show areas of potential cliff lines based on where the range was 3, 4, 5, 6, 7 or >7 metres within the 2x2 neighbourhood.

These areas of steep cliff lines were initially used to identify all potential areas where cave-dwelling microbats could establish breeding or diurnal roosts. Follow-up desktop and ground-truthing surveys have been able to be undertaken to better refine areas of potential habitat within and surrounding the development footprint.

Furthermore, expert advice regarding the presence of geological features of significance within the development footprint and in the broader landscape has been provided by Environmental Geosurveys Pty Ltd (Neville Rosengren, Geomorphologist and Honorary Associate La Trobe University). The full report (Environmental Geosurveys 2021) is attached as Appendix F of this BDAR. The assessment found that the landscape surrounding and encompassing the assessment area supports highly diverse terrain and lithology, which combined with dynamic geomorphology result in a high potential for geological features potentially suitable for microbat roosting sites to occur at all elevations.

The detailed findings of the geomorphological assessment and the follow-up desktop and ground-truthing assessment of potential microbat roosts surrounding the assessment area are provided in Section 5.4.2. The updated microbat roosting habitat areas have been mapped in more detail in Section 5.5 of this BDAR.



In the wider landscape, outside of the development footprint defined by the BAM, there are known caves that support threatened cave bats:

- The presence of a known important winter roost site for Large Bent-winged Bat *Miniopterus orianae* subsp. *oceanensis* at Timor Caves, approximately 5 kilometres south-west of the assessment area.
- Known breeding and non-breeding roosts for Large Bent-winged Bat and Little Bent-winged Bat *Miniopterus australis* are also known to occur at Willi National Park (130 kms north-east), Wellington Cave (225 kms south-west), Borenore Karst (260 kms south-west), Kangara Boyd (270 kms south) and Wee Jasper (460 kms south-west).
- Four other known karst systems (caves) within 50 kilometres that support potential habitat for roosting and/or breeding microbats.
- The location of the development site is approximately 150 – 280 kilometres away from four known important maternity roost sites for Large-eared Pied Bat *Chalinolobus dwyeri* which are located on the same side of the dividing range as the development footprint. This the distance bats move from maternity roosts to non-breeding roosts has not been established but it likely to be less than 100 kilometres (DAWE 2020).

Due to the presence of cliffs within and directly adjacent to the development site, and caves and karst landscapes in the wider locality, a detailed assessment of the presence and relative abundance of cave-dwelling bats was carried out and is reported on in subsequent sections of this BDAR.

There are no known significant soil hazard features at the time of preparing this BDAR.

A search of the ASC Soil Type Map of NSW (OEH, 2019) reveals that the Ferrosols soil type dominates the Project Area. Ferrosols are characterised by their deep red friable soils that lack strong texture contrast, which are high in free iron oxide and generally have a high clay content. Soils appeared generally stable during the field surveys, with a reasonable cover of exotic grasses or native vegetation in areas. There was some minor erosion associated with waterways observed during the field survey.

A search of the NSW EPA Contaminated Sites Register, identified the closest sites recorded to the project area are two sites within the Tamworth LGA and two sites within the Upper Hunter Shire LGA, located within Tamworth and Scone (over 50km away from the assessment area). As such it was determined that the project location does not appear on the list of NSW contaminated sites. It was considered unlikely that contamination is present.

### **3.1.7 Biodiversity Values Map**

The NSW Biodiversity Values Map identifies land with high biodiversity value that is particularly sensitive to impacts from development and clearing. The map forms part of the Biodiversity Offsets Scheme Threshold which is one of the triggers for determining whether the Biodiversity Offset Scheme (BOS) applies to a clearing or development proposal.

Based on a search of the NSW Biodiversity Values Map, there are areas of mapped high biodiversity value located within the assessment area as shown in Figure 4). The majority of the areas mapped in the Biodiversity Values Map are located outside of the development footprint and are associated with adjacent nature reserves, national park and higher order streams in the wind farm and transmission line corridor section of the project. There are only very small areas mapped in the Biodiversity Values Map within the development footprint in these areas (Figure 4).

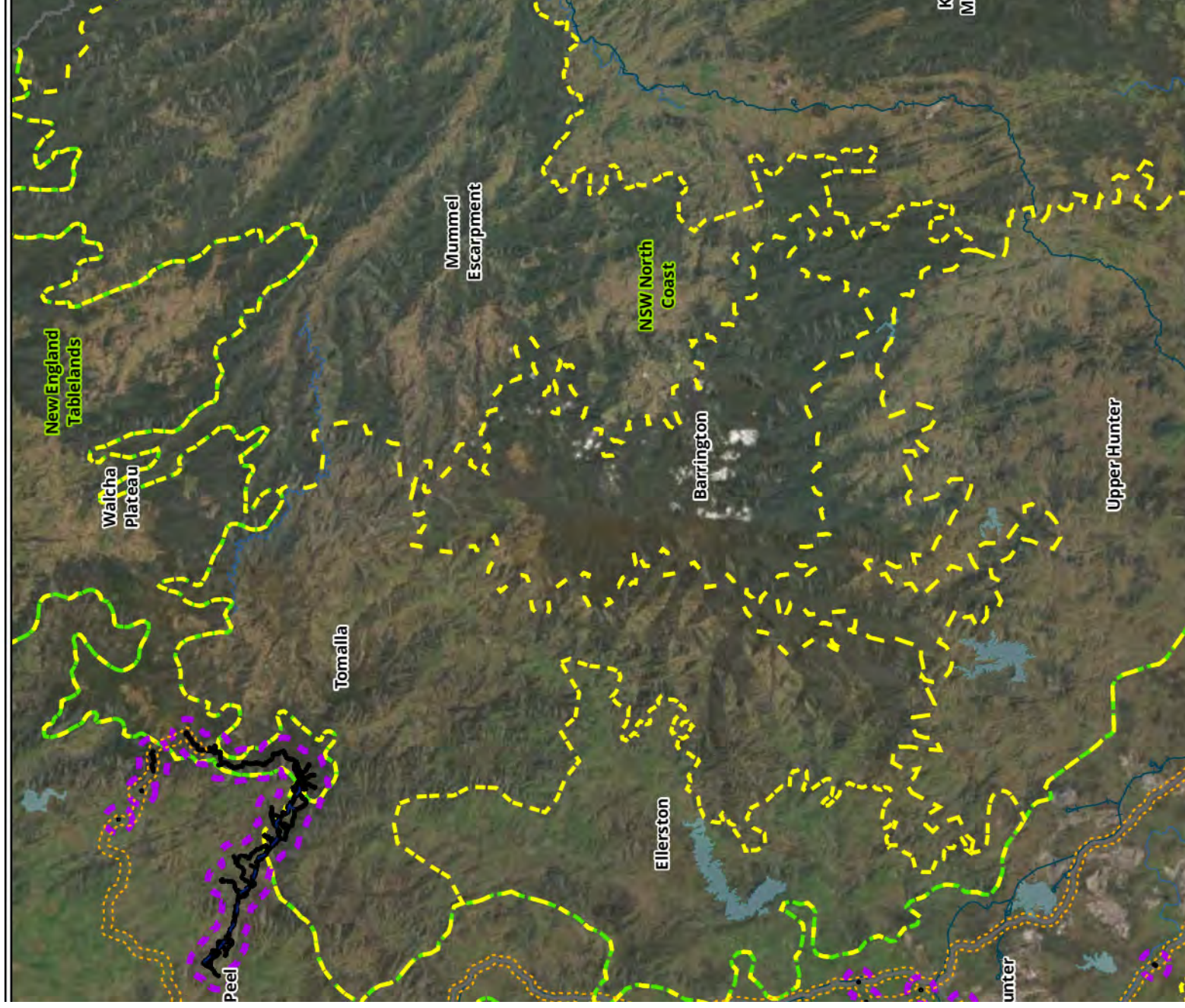
For the development footprint associated with the transport haul route there are no areas mapped in the Biodiversity Values Map (Figure 4).

### 3.1.8 Protected areas

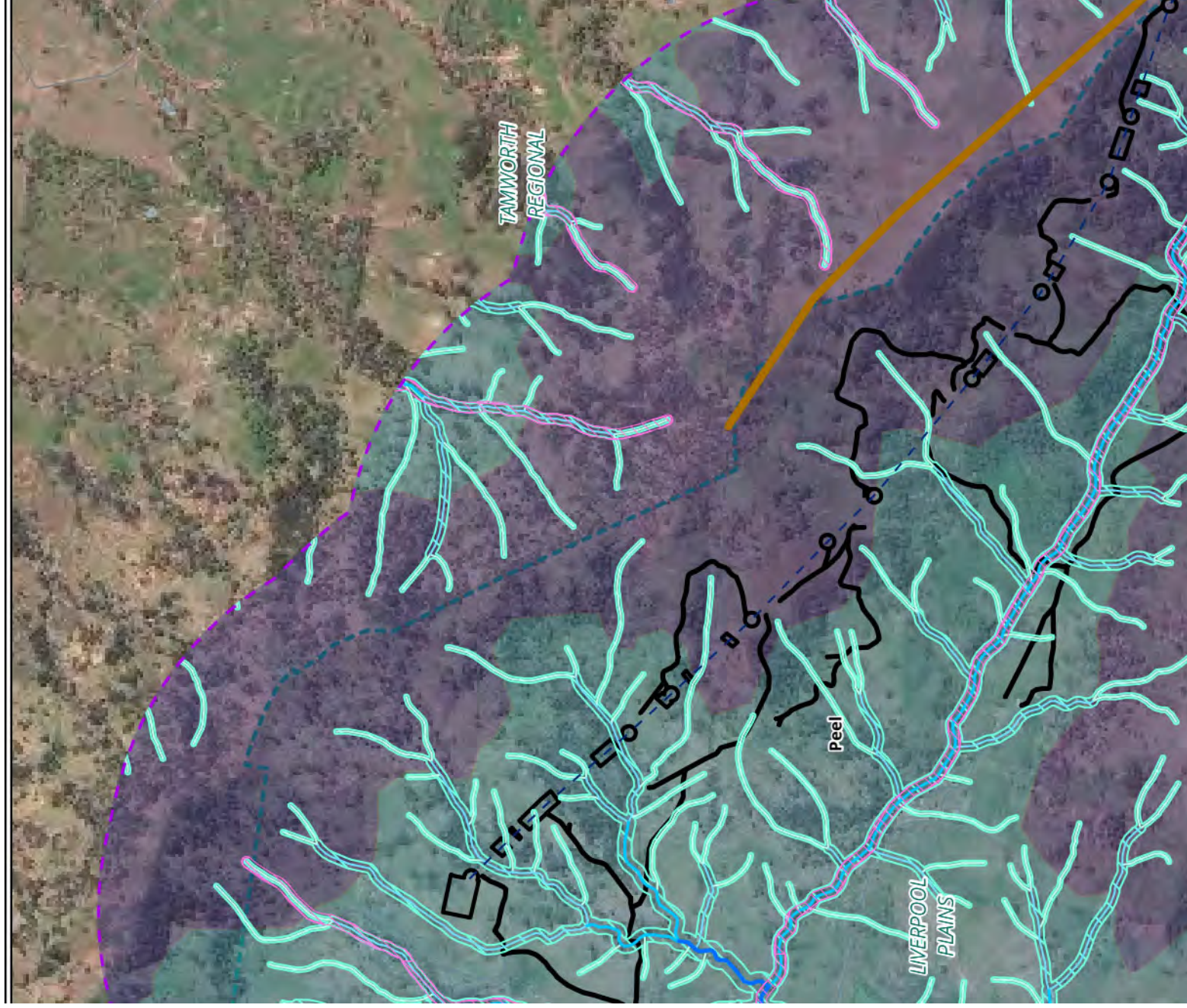
Within the assessment area, but outside the development footprint there are two conservation areas protected by NSW legislation, which have been considered as part of the collection of baseline information on the ecological values of the assessment area and as part of the impact assessment.

Ben Halls Gap Nature Reserve is located directly adjacent to the development area and in close proximity to the certain infrastructure and internal roads elements of the development footprint. This reserve covers over 2,500 hectares of tall, old growth eucalypt forest, with a mix of grassy eucalypt woodland, tall moist eucalypt forest and rainforest (NPWS, 2002). It contains important fauna habitat for a number of threatened species, including Koala *Phascolarctos cinereus*, Spotted-tailed Quoll *Dasyurus maculatus*, forest owls and microbats. Given the proximity of the Ben Halls Gap Nature Reserve to the development footprint additional field surveys were carried out to ground-truth the vegetation communities, condition and habitat features 100m into those parts of the reserve which adjoin the development footprint.

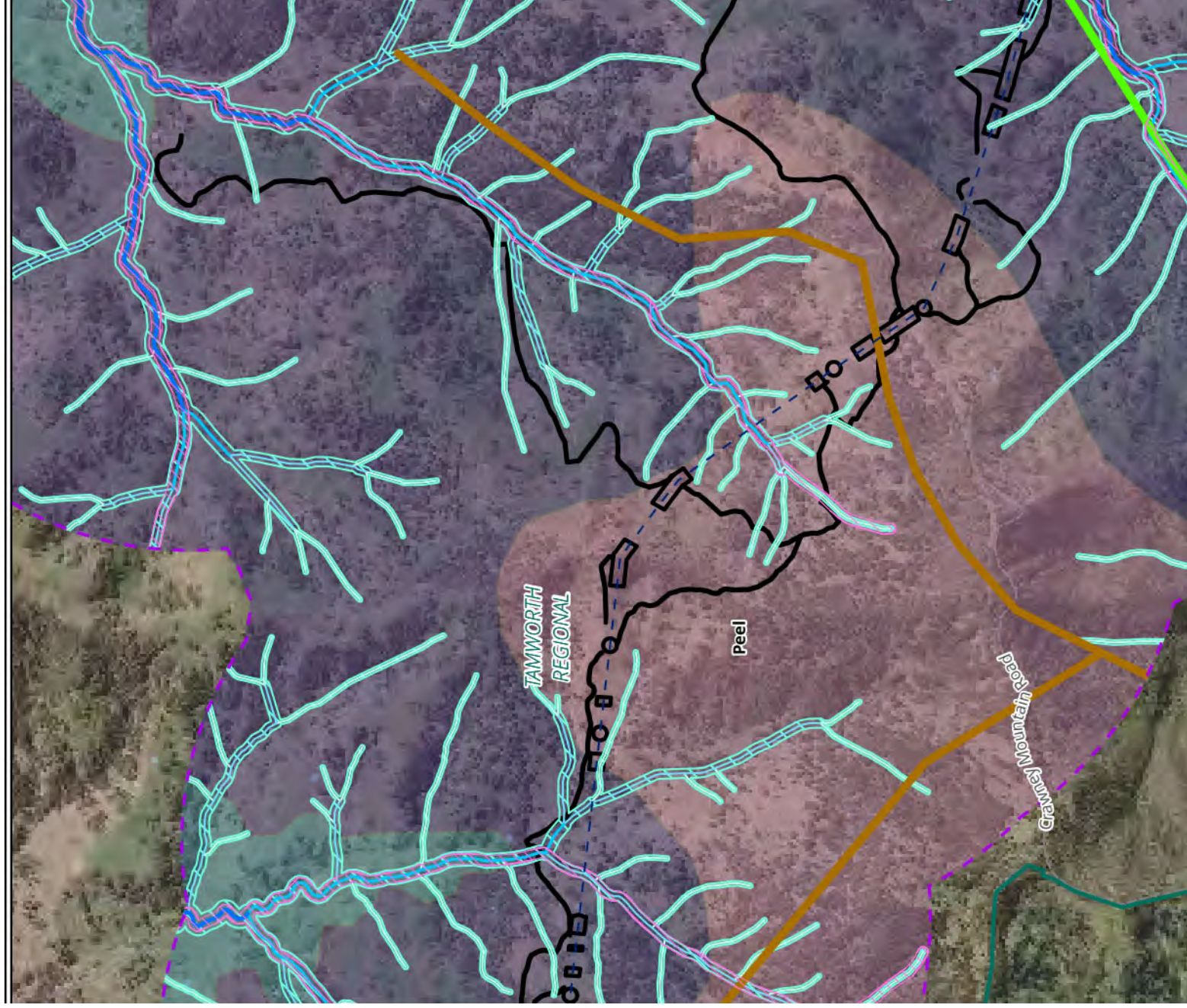
At its closest point, Crawney Pass National Park is located 50m from parts of the development footprint for the transmission line corridor. In most sections, there is an approximately 300m buffer from the national park boundary to the development footprint. The national park is just over 310ha in size and contains mostly grassy open eucalypt forests and woodlands, with some smaller patches of rainforest on lower slopes on major creeklines on the southern side of the park (NPWS, 2019). There are no known populations of threatened plants in the National Park; however, it does provide habitat for Koala, forest owls, gliders and microbats.



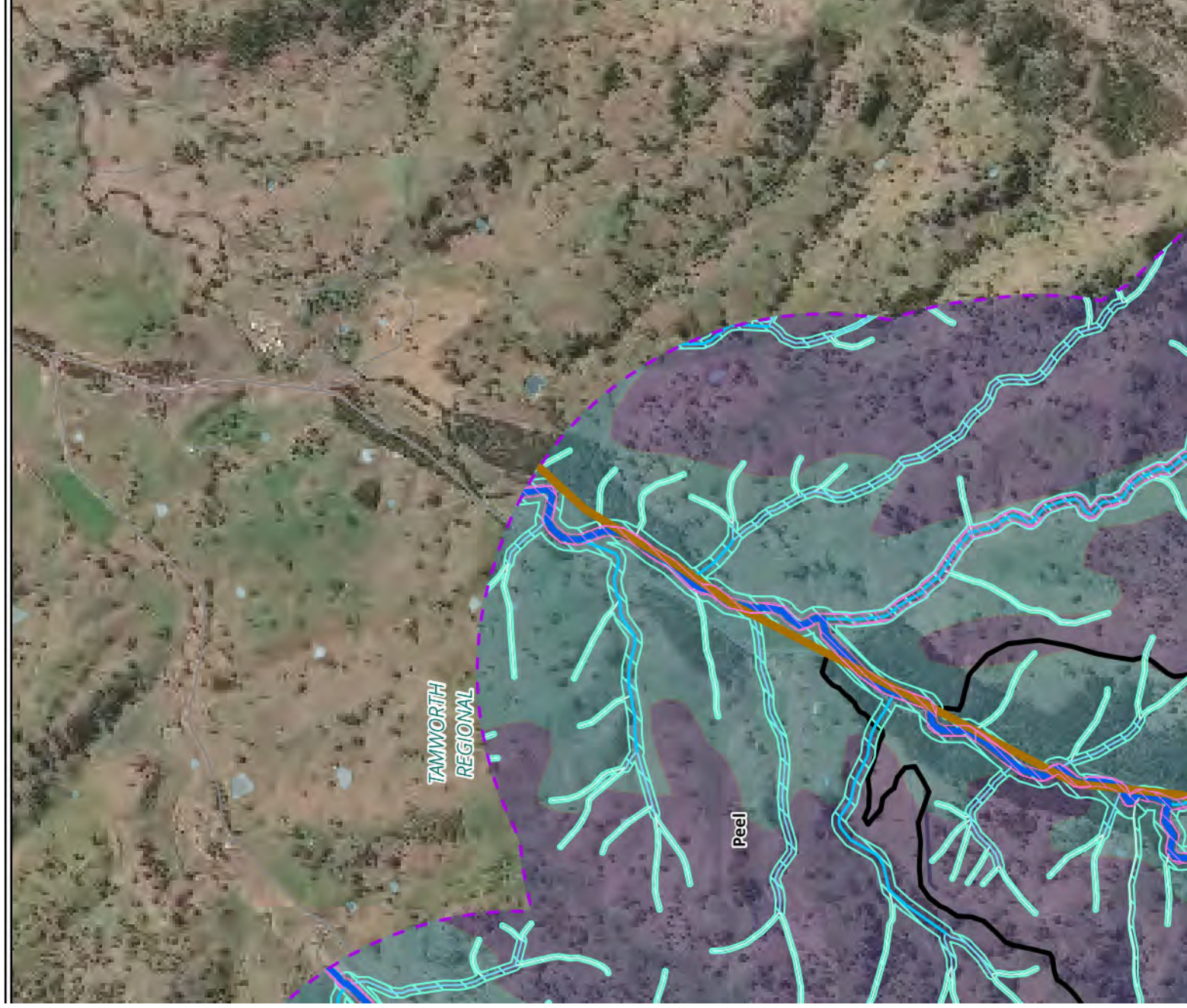








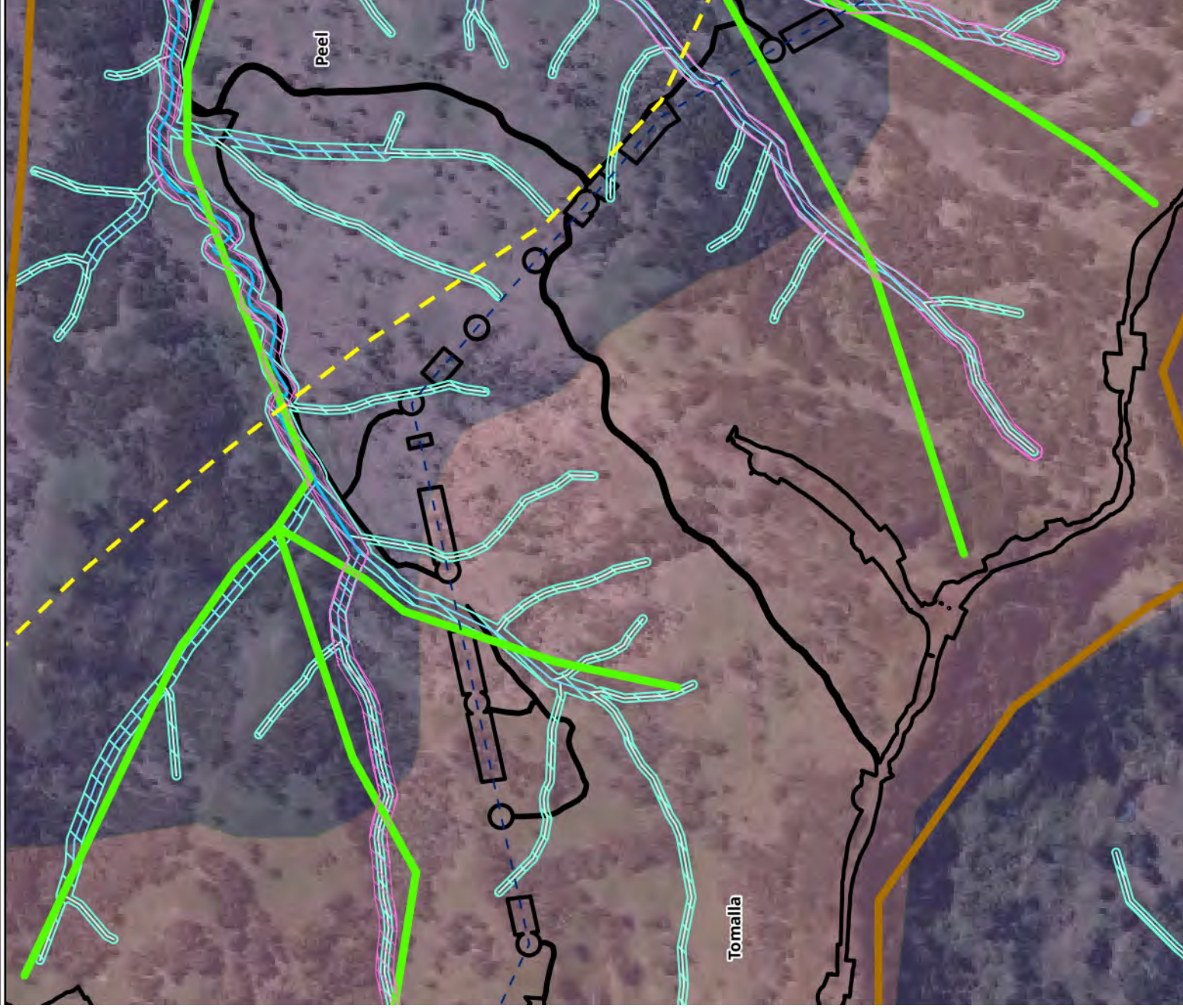




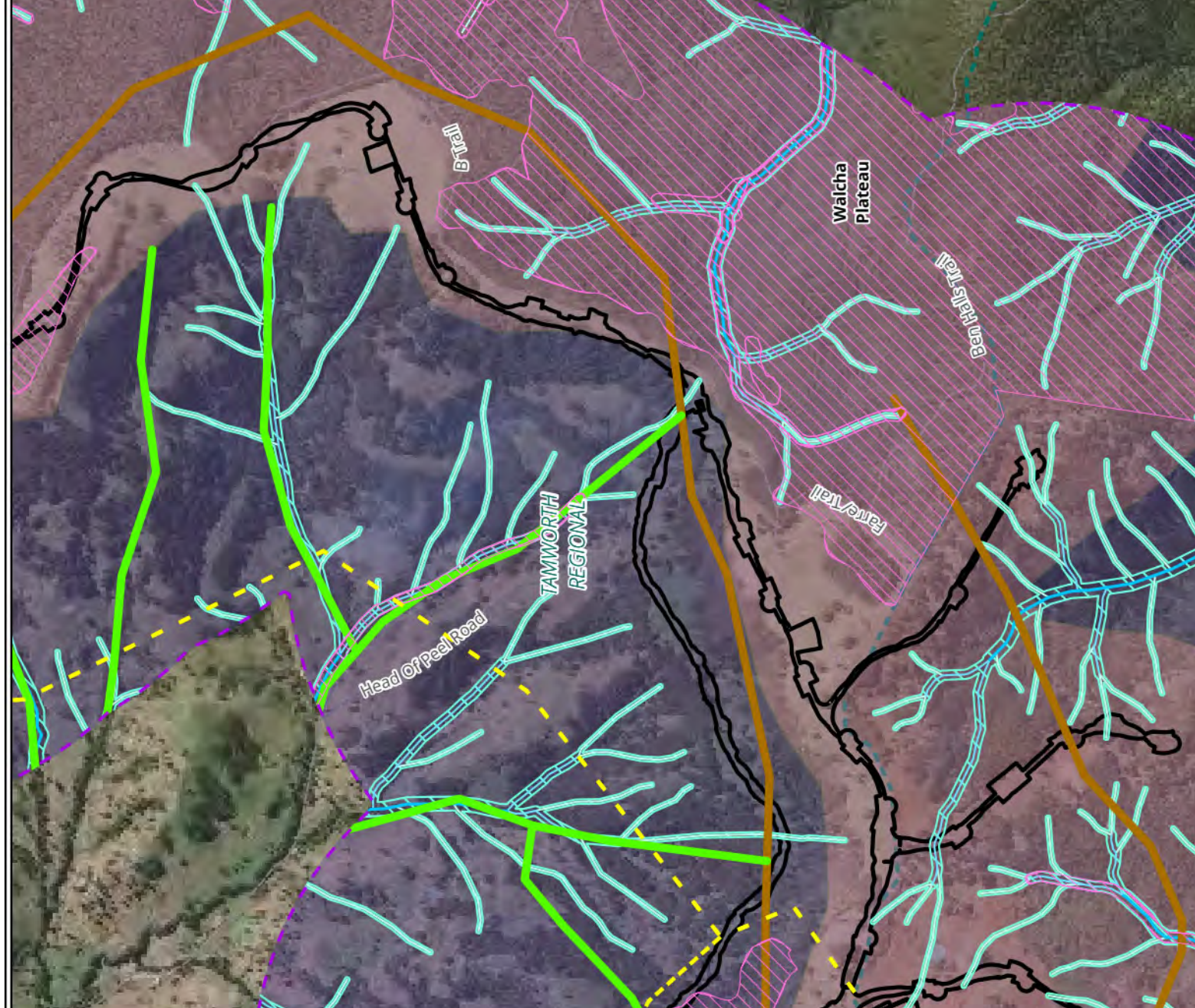


Peel

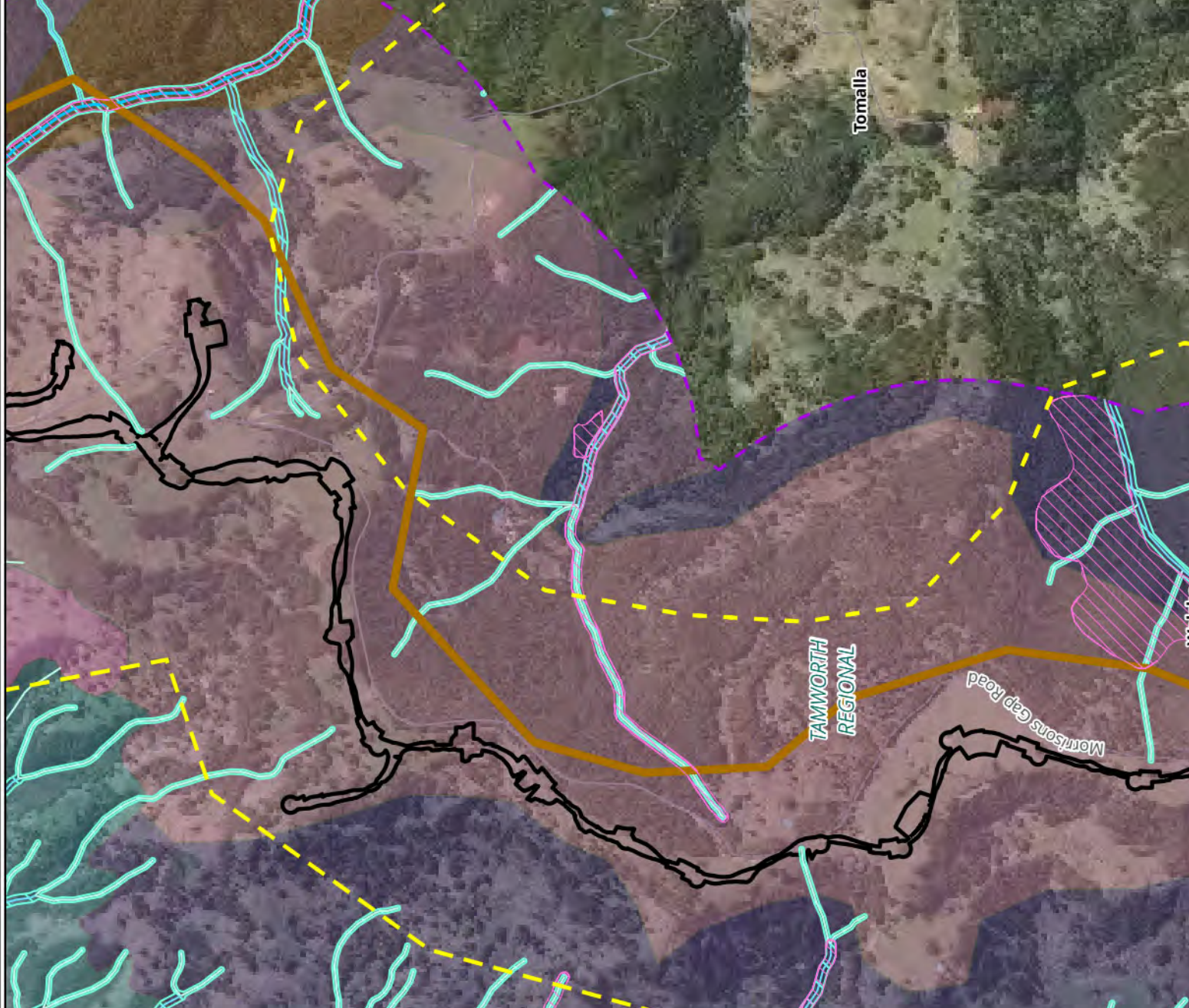
Tomalla



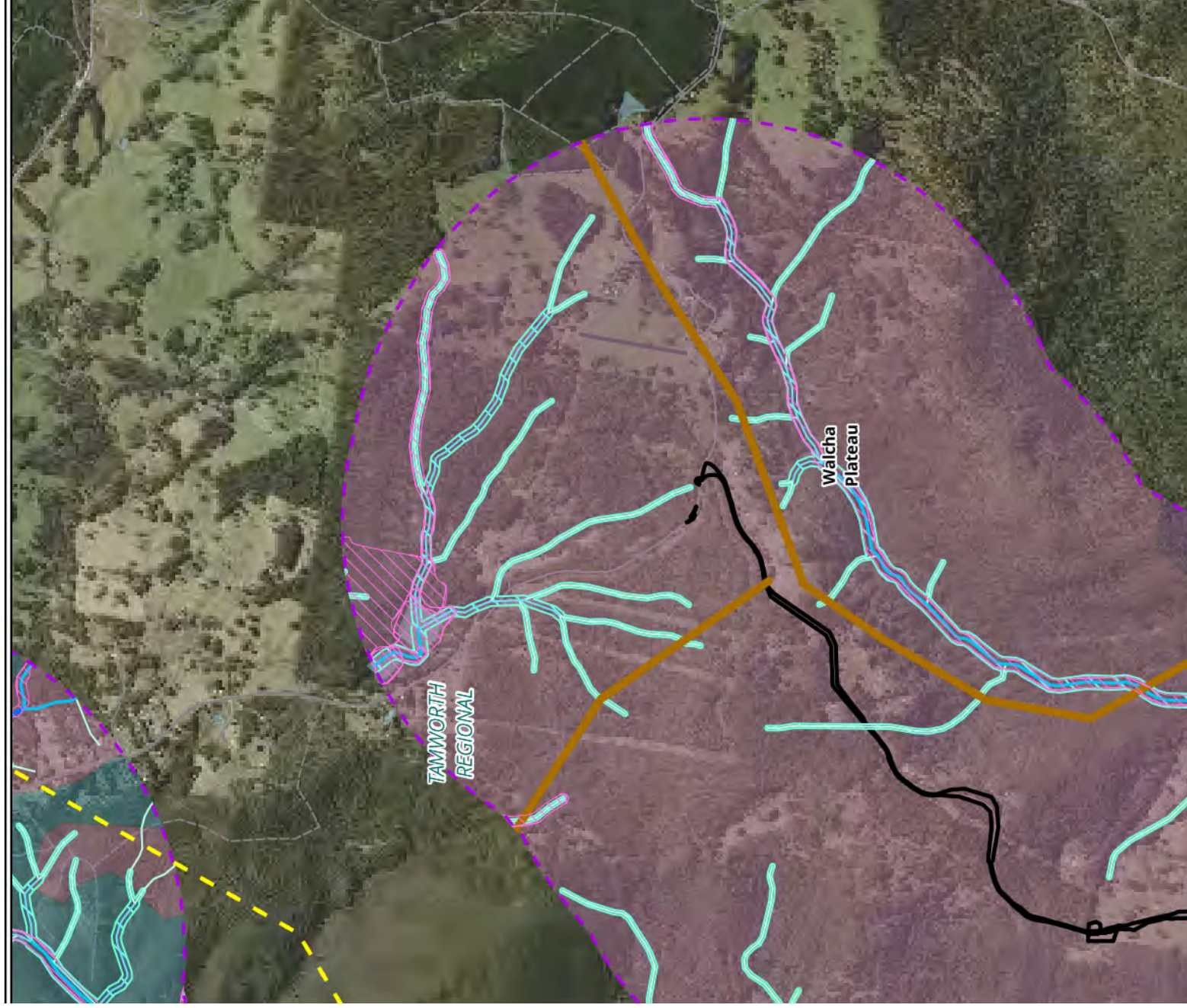




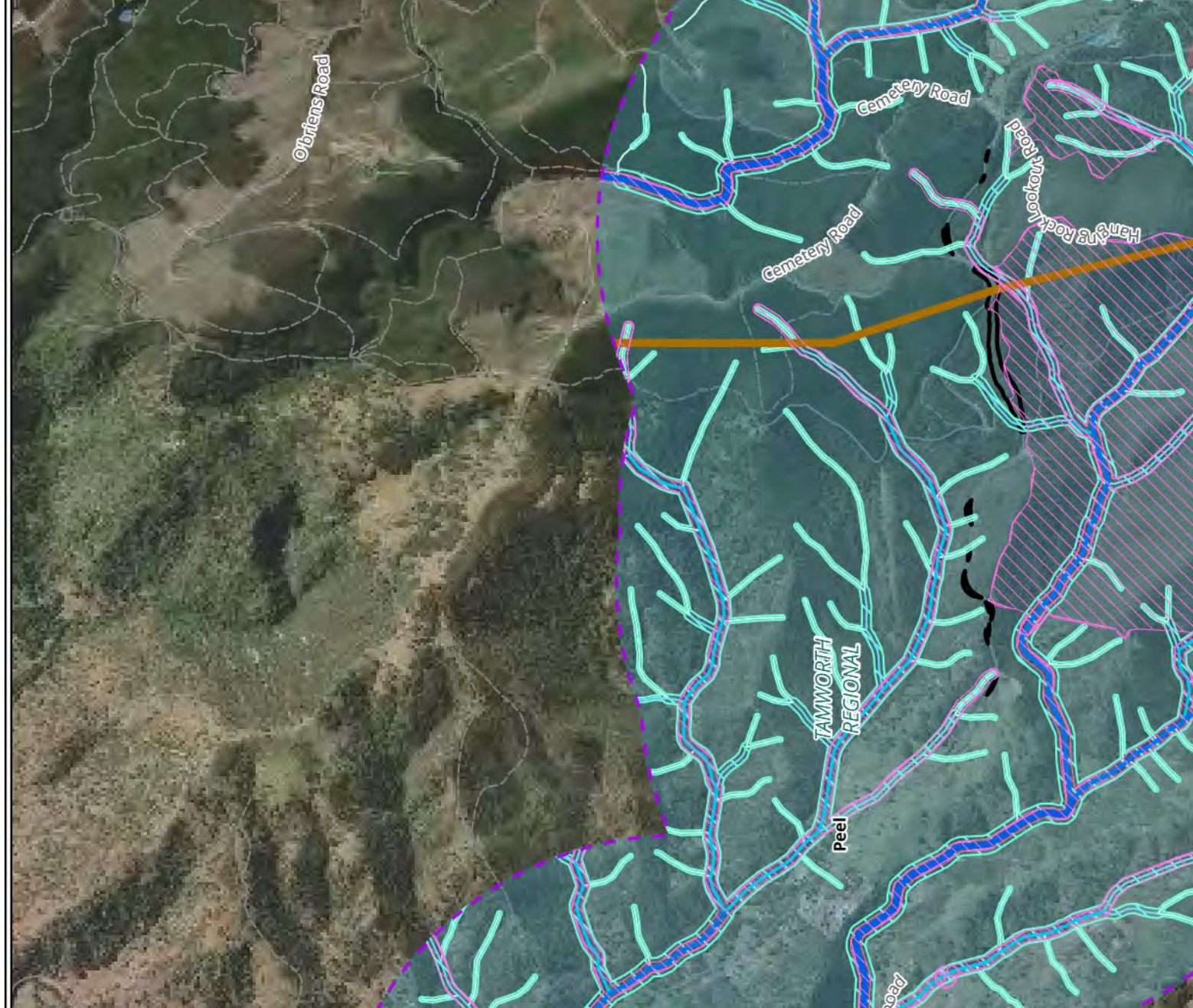








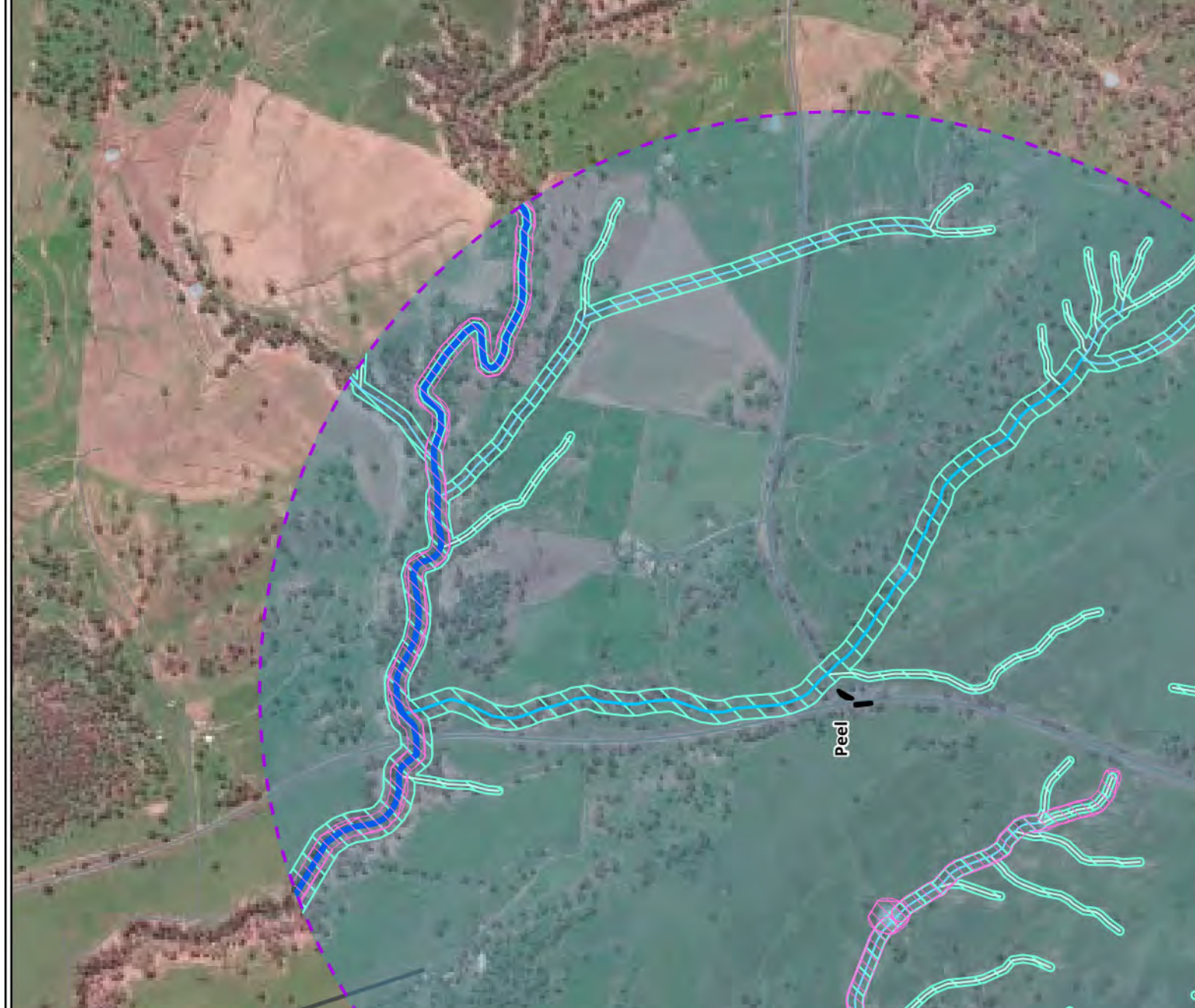




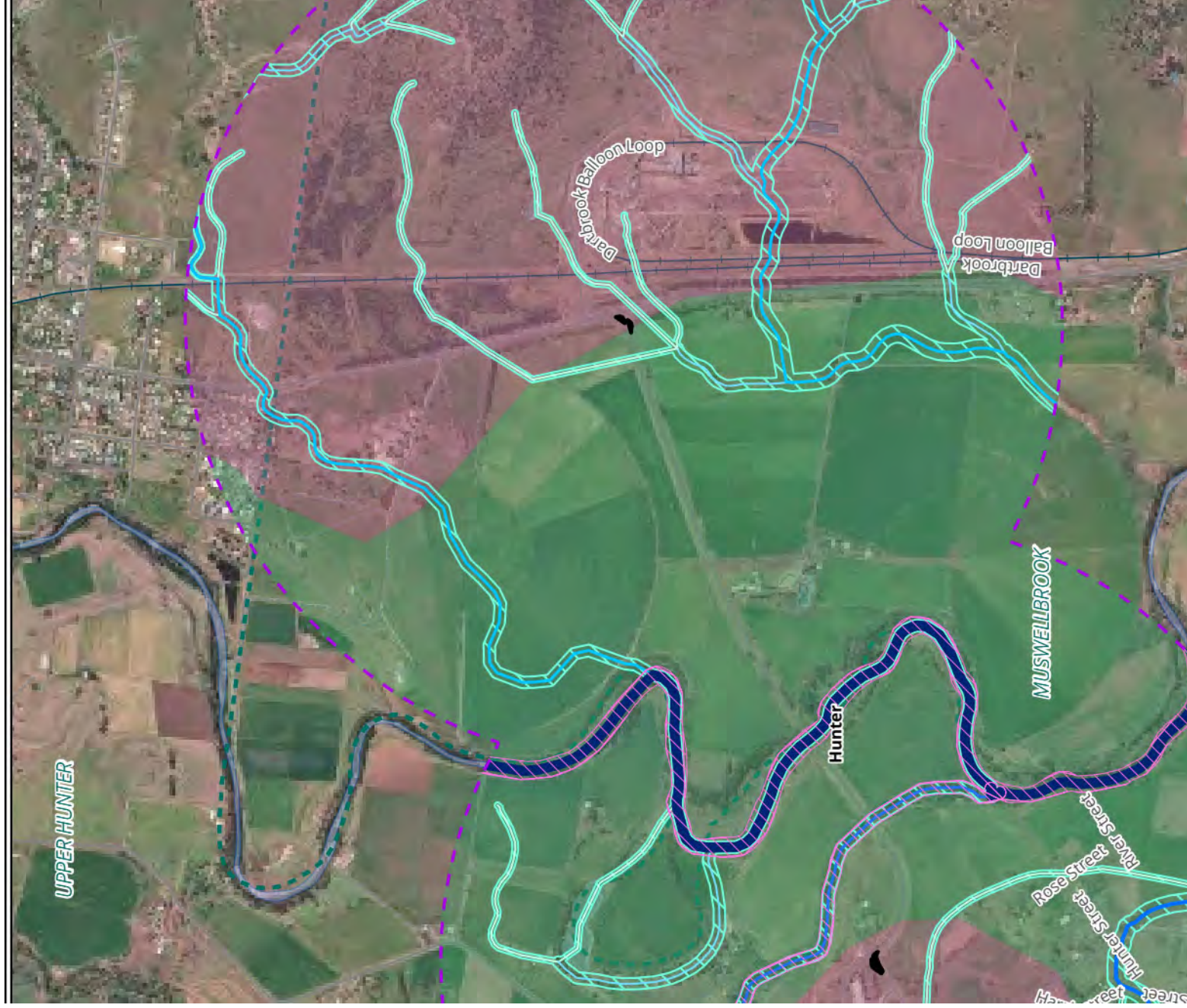








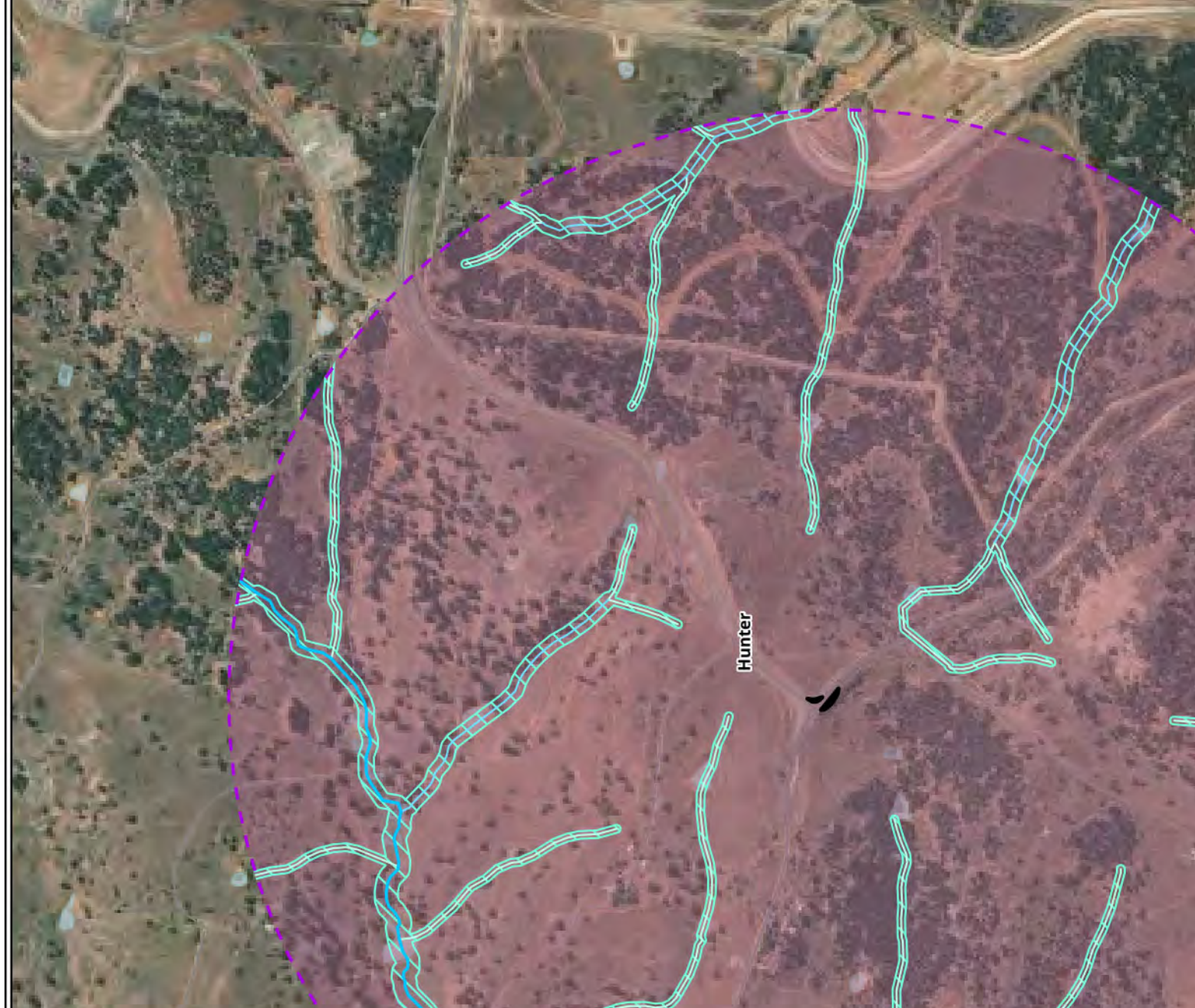




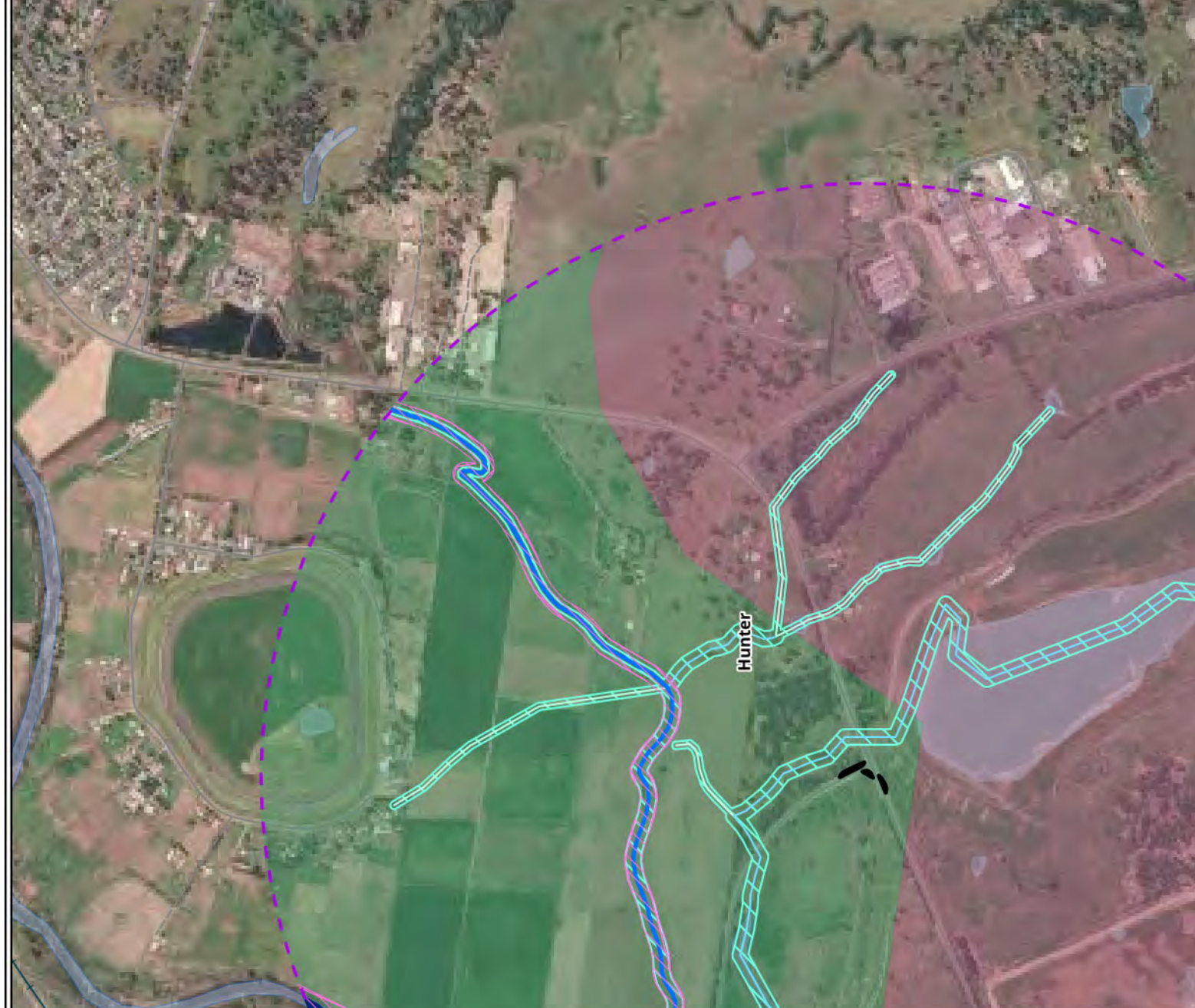


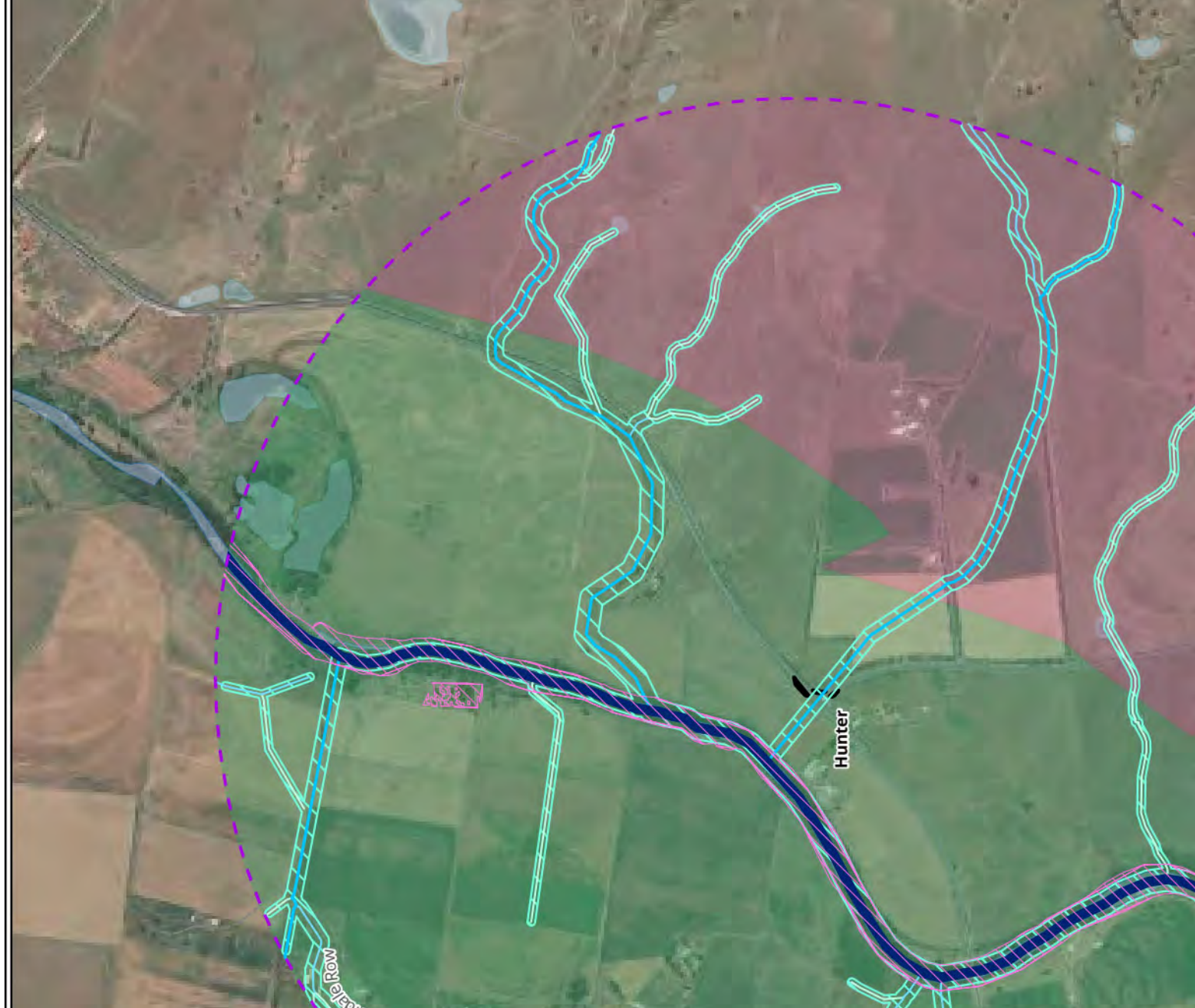




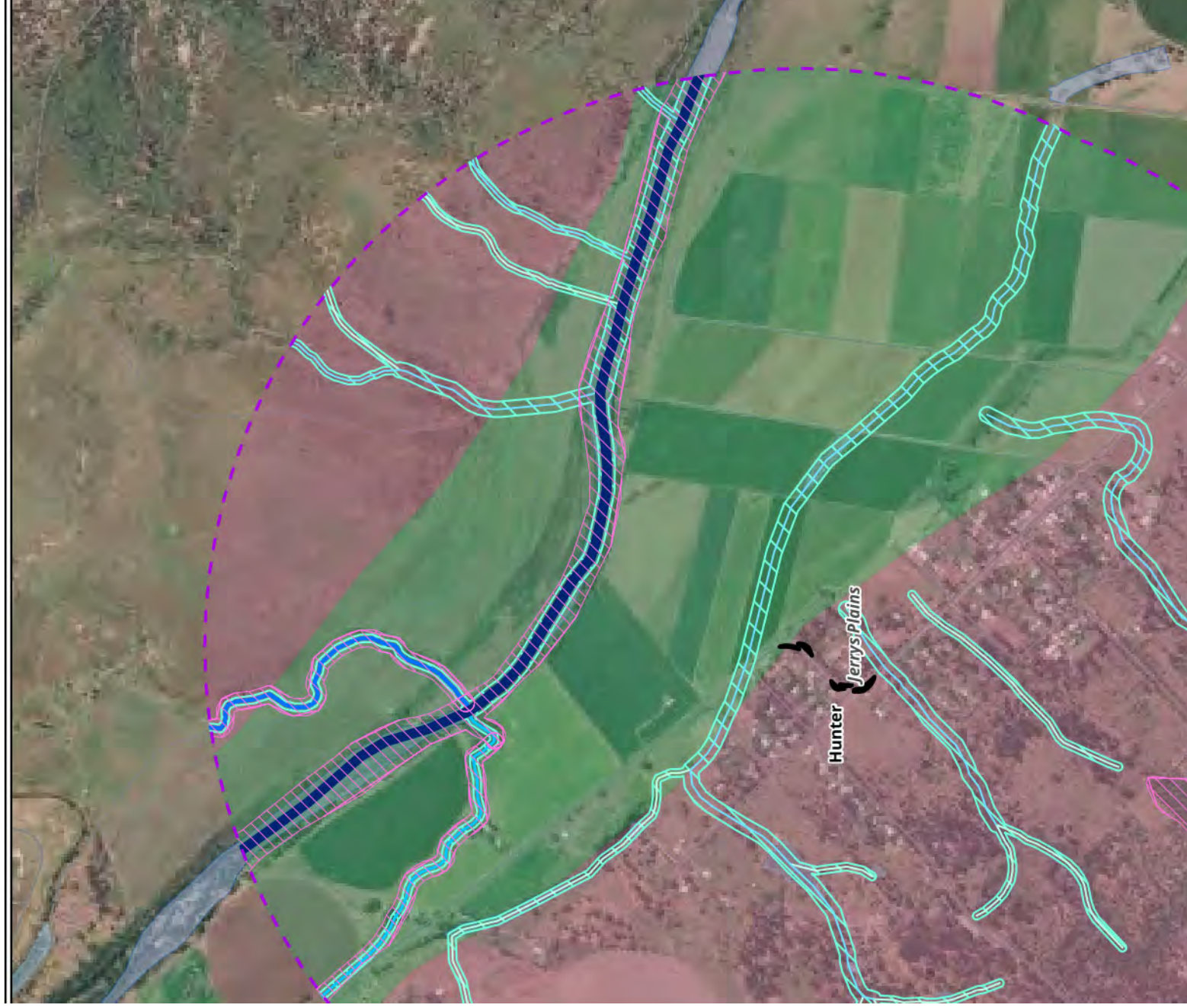




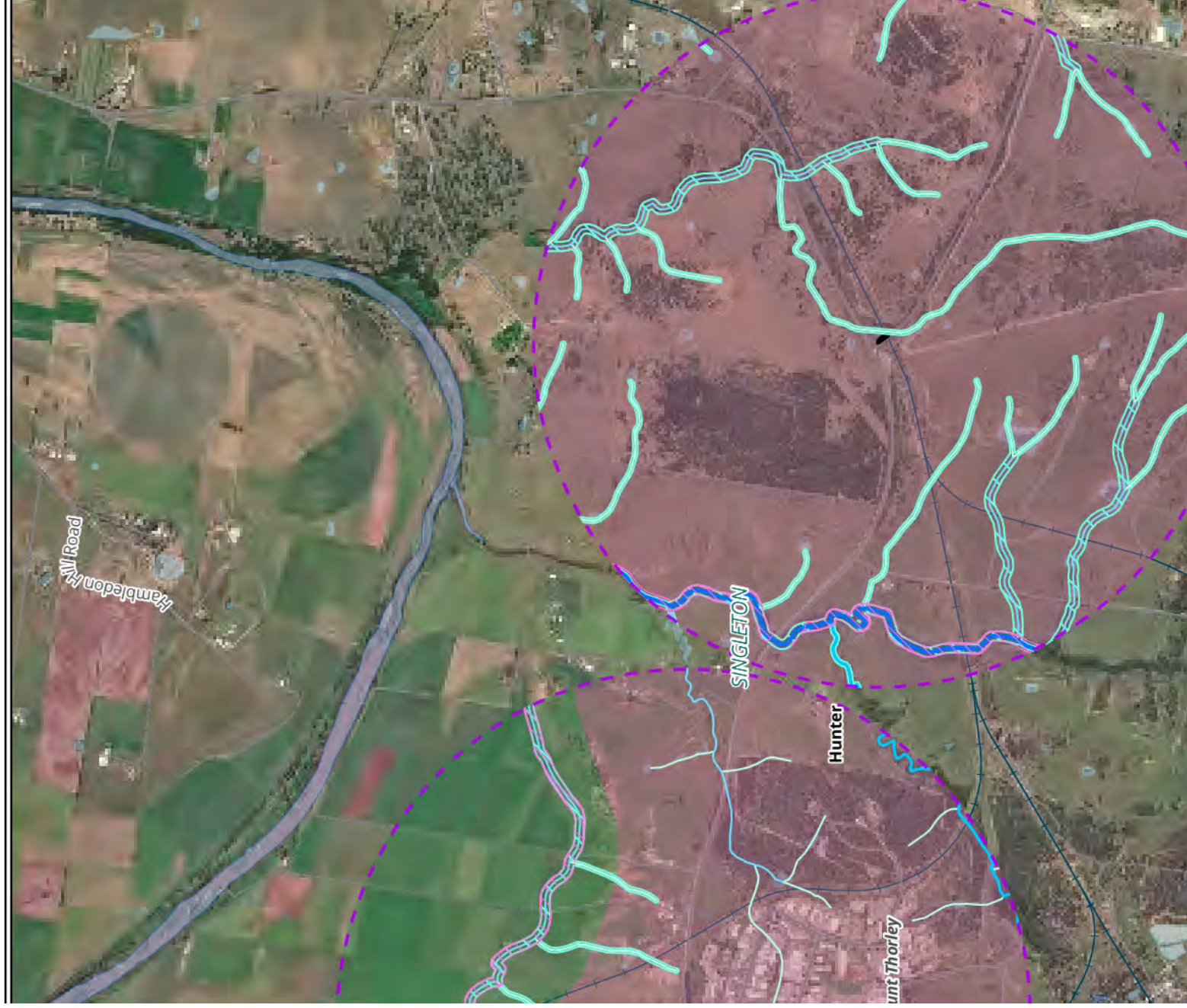




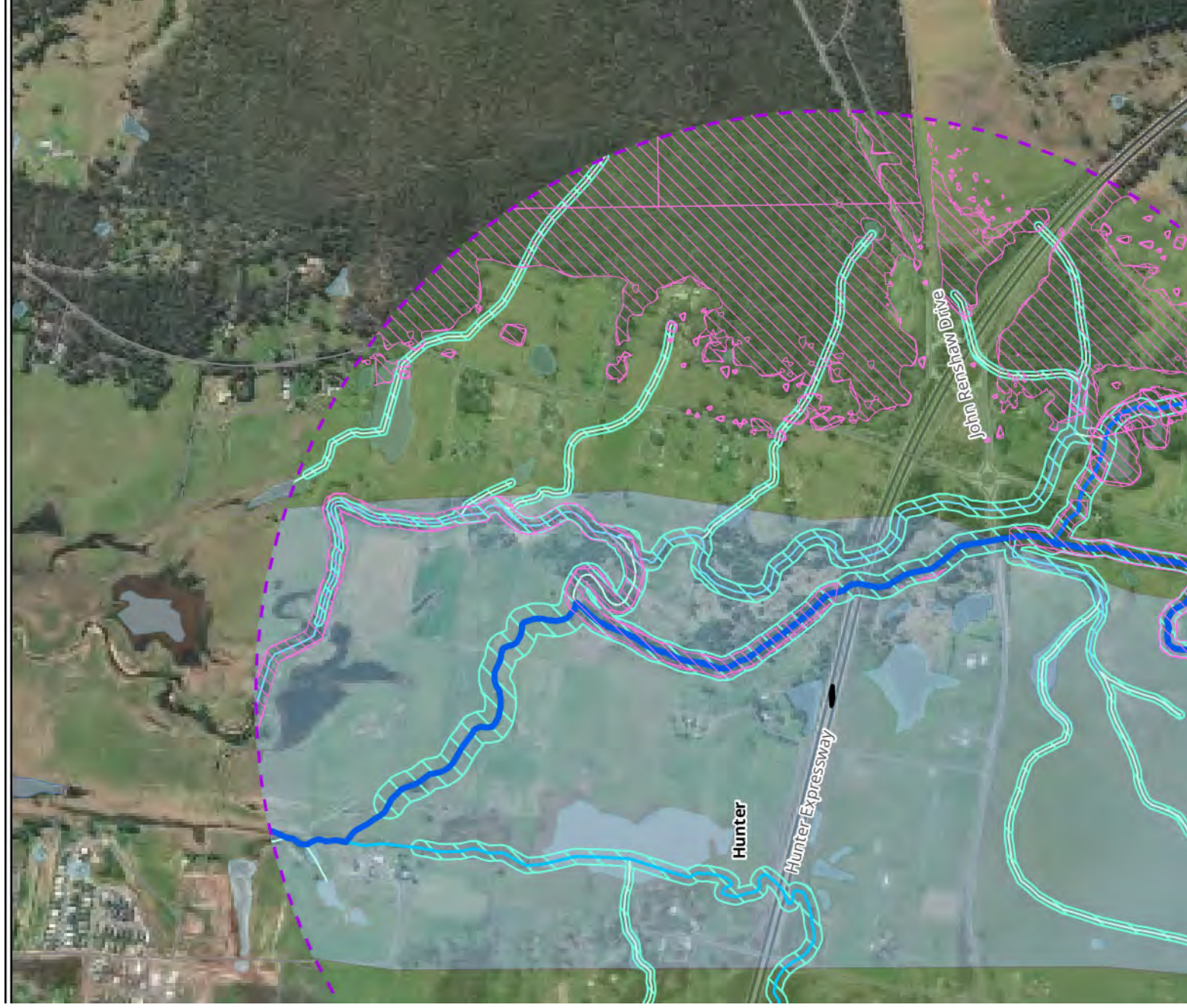


















## 3.2 Site context

Site context considerations include the assessment of native vegetation cover and patch size, in accordance with Section 3.2 and 4.3 of the BAM. These assessments were undertaken using the following existing vegetation mapping available for the region:

- Ground-truthed PCT map prepared for the wind farm infrastructure area and haul route sites.
- State Vegetation Type Map: Border Rivers Gwydir / Namoi Region Version 2.0. VIS\_ID 4467 (OEH, 2020a).
- State Vegetation Type Map: Upper Hunter Version 1.0. VIS\_ID 4894 (OEH, 2020b).
- Greater Hunter Native Vegetation Mapping Version 4.0. VIS\_ID 3855 (DPIE, 2015).
- OEH BioNet Vegetation Classification Database.

Figure 5 shows native vegetation cover and patch assignment relative to the estimated development footprint.

Parts of the assessment area were burnt by the summer 2019/2020 bushfires which burnt large tracks of the surrounding vegetation. Within a 20 kilometre buffer area of the assessment area approximately 32,000 hectares (25%) of native vegetation has been burnt, with the area estimated to support a total of approximately 116,500 hectares of native vegetation. Most (approximately 26,200 hectares or 82%) of this vegetation has been burnt to a medium or high degree of intensity, in accordance with the burnt area classes outlined in the GEEBAM (NSW Department of Planning, Industry and Environment 2020), meaning both the canopy and understorey have either been partially or completely burnt.

Within the vicinity of the wind farm, bushfire effected areas along the southern side of the central portion of the development footprint within and surrounding Ben Halls Gap Nature Reserve, nears turbines WP20 to WP45. Consideration of bushfire effects on vegetation, habitat and refugia within and surrounding the development site has been considered during this assessment.

### 3.2.1 Native vegetation cover

About 49% of the 42,316ha of the landscape assessment has been cleared of native vegetation. However, approximately 21,540ha (or 51% of the assessment area) consists of native vegetation which is classified as having a cover class of between >30-70% meaning that this is the percentage of native vegetation cover within the assessment area. This is summarised in Table 15.

The extent of native vegetation cover across all areas of the landscape context maps are provided in Figure 5.

**Table 15 Native vegetation cover**

Native vegetation extent (ha)	Assessment area (ha)	% landscape assessment area	Native vegetation cover class
21,540	42,316	51%	>30-70%

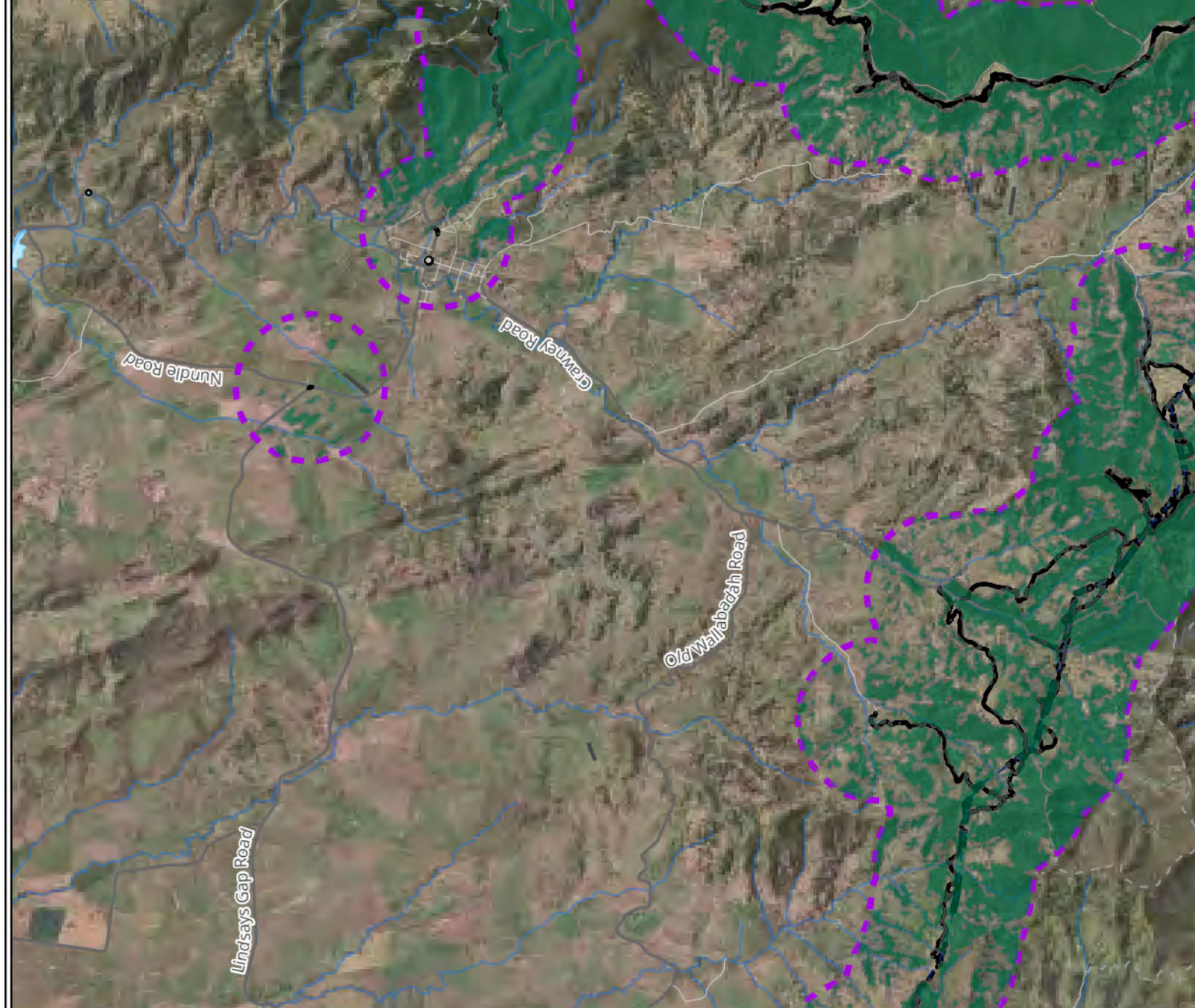
### 3.2.2 Patch size

Patch size for the native vegetation within the assessment area has been assessed in accordance with the requirements of Section 4.3.2 of the BAM. Each native vegetation zone in the development footprint was assessed and assigned to a required patch size class, being <5ha, 5-<25ha, 25-100ha or ≥100ha.

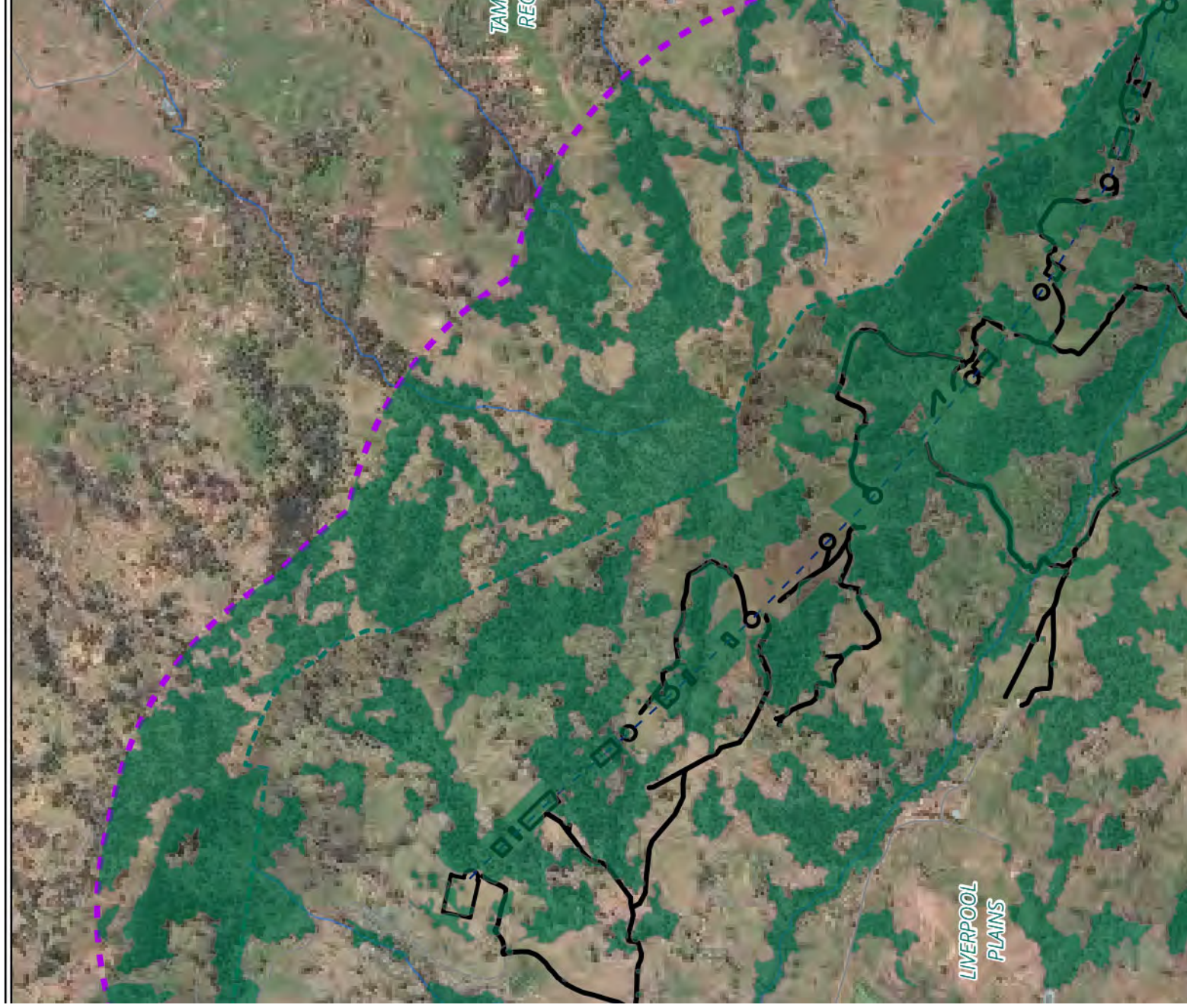
Patch size was assessed in accordance with the BAM using ArcGIS to select, measure and classify native vegetation patches. Within each NSW Landscape, all native vegetation not defined as low condition and

separated by a distance of less than 100 metres (woody vegetation types) and 30 metres (non-woody vegetation types) was mapped sequentially using the development footprint PCT mapping and desktop mapped data.

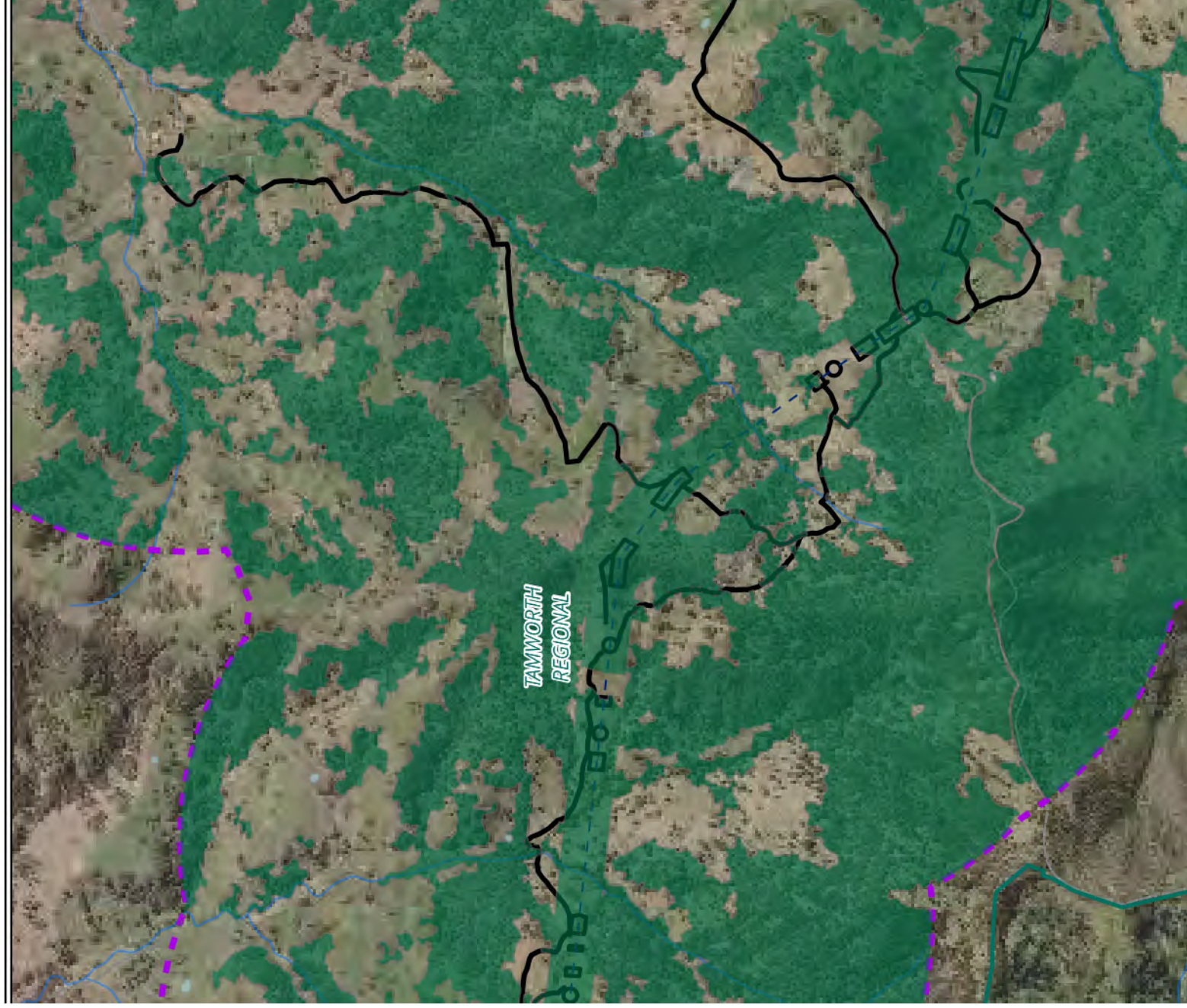
Vegetation patches and associated patch size classes were all classified in the greater than 100ha patch size class in accordance with Section 4.3.2 of the BAM. This is due to the vegetation zones within the development footprint occurring less than 100m apart and so being assigned to the same patch as under the BAM, the definition of a patch is an area of intact native vegetation that occurs within the development footprint and includes other areas of native vegetation that are within 100m of the patch.





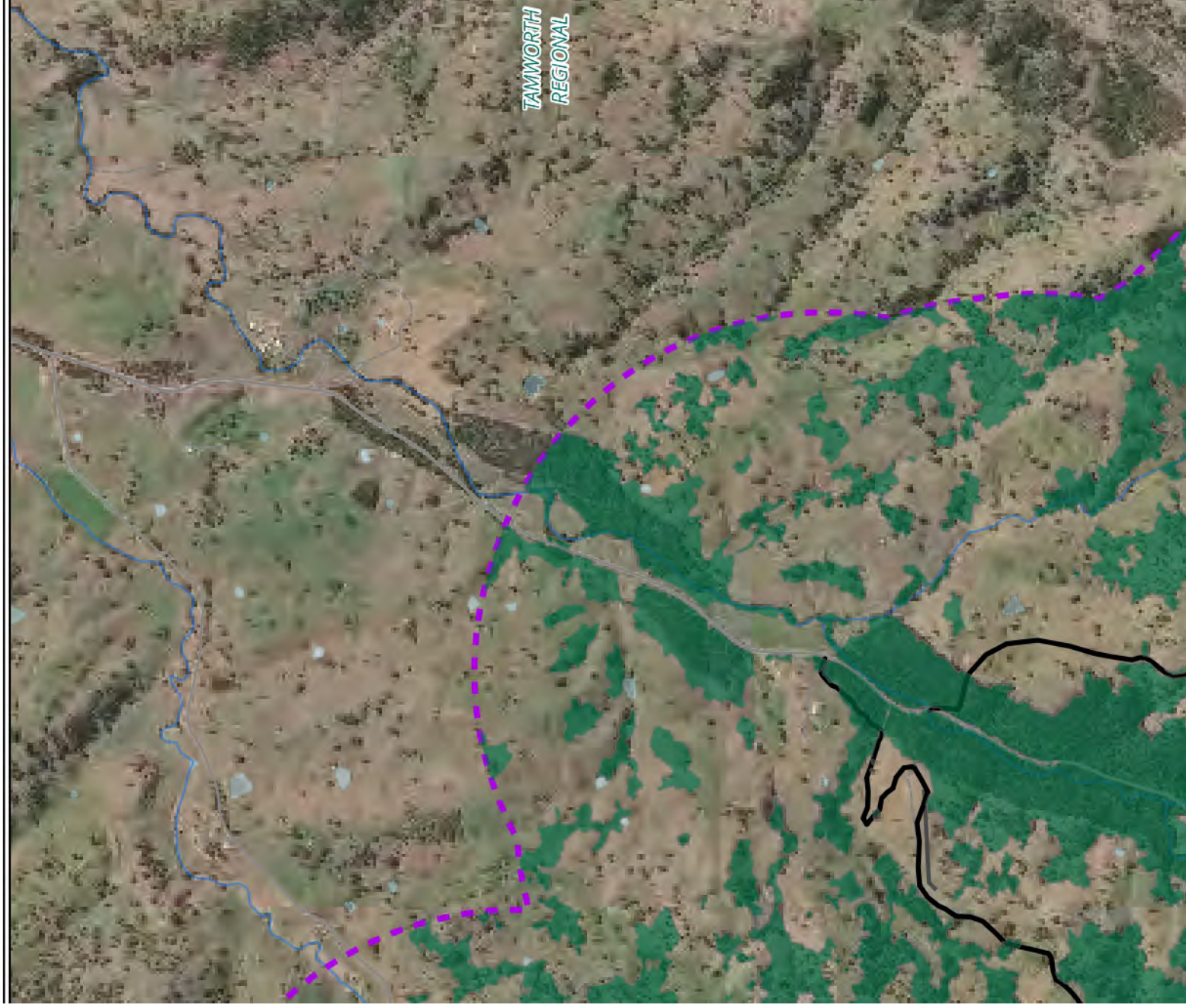




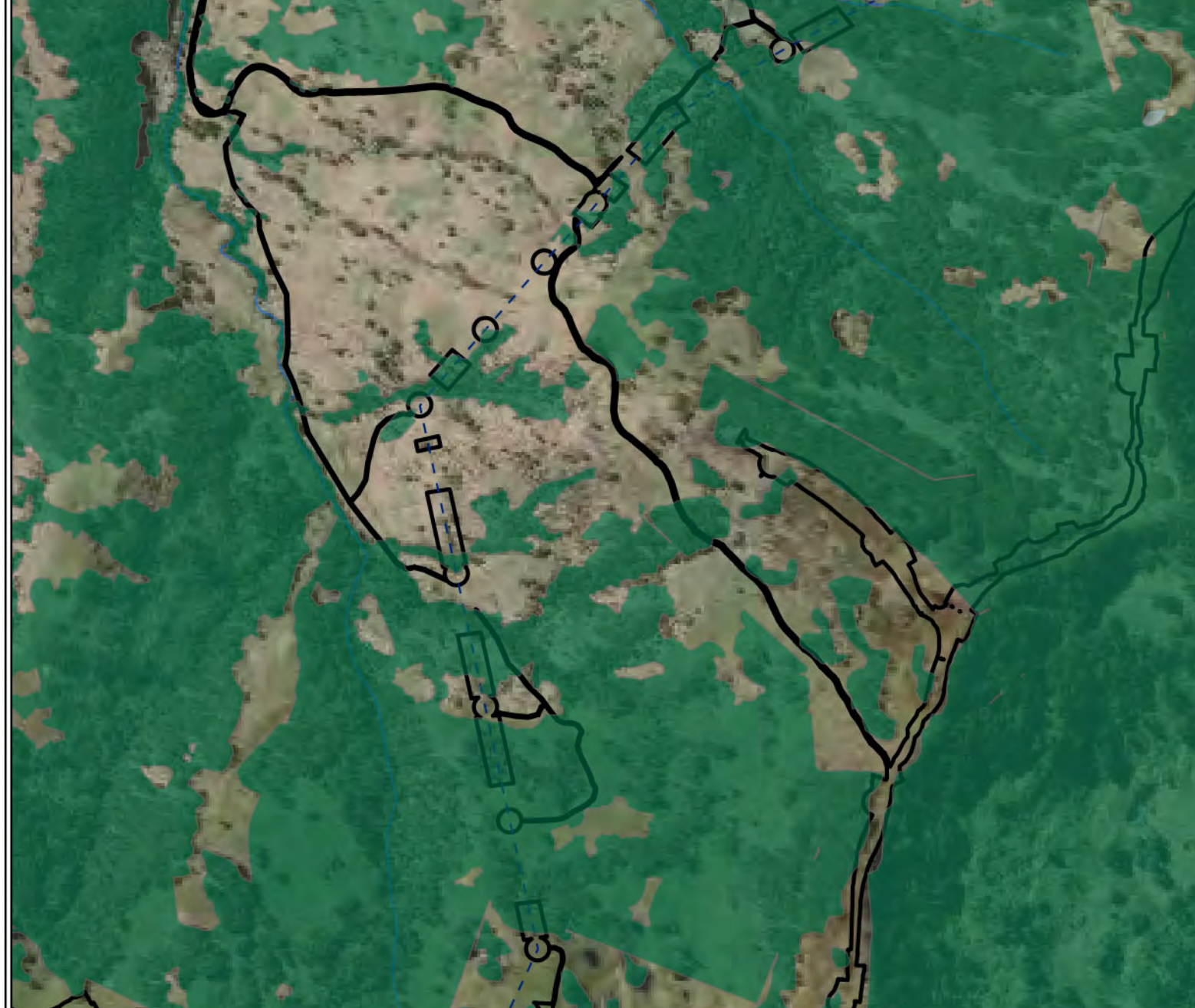




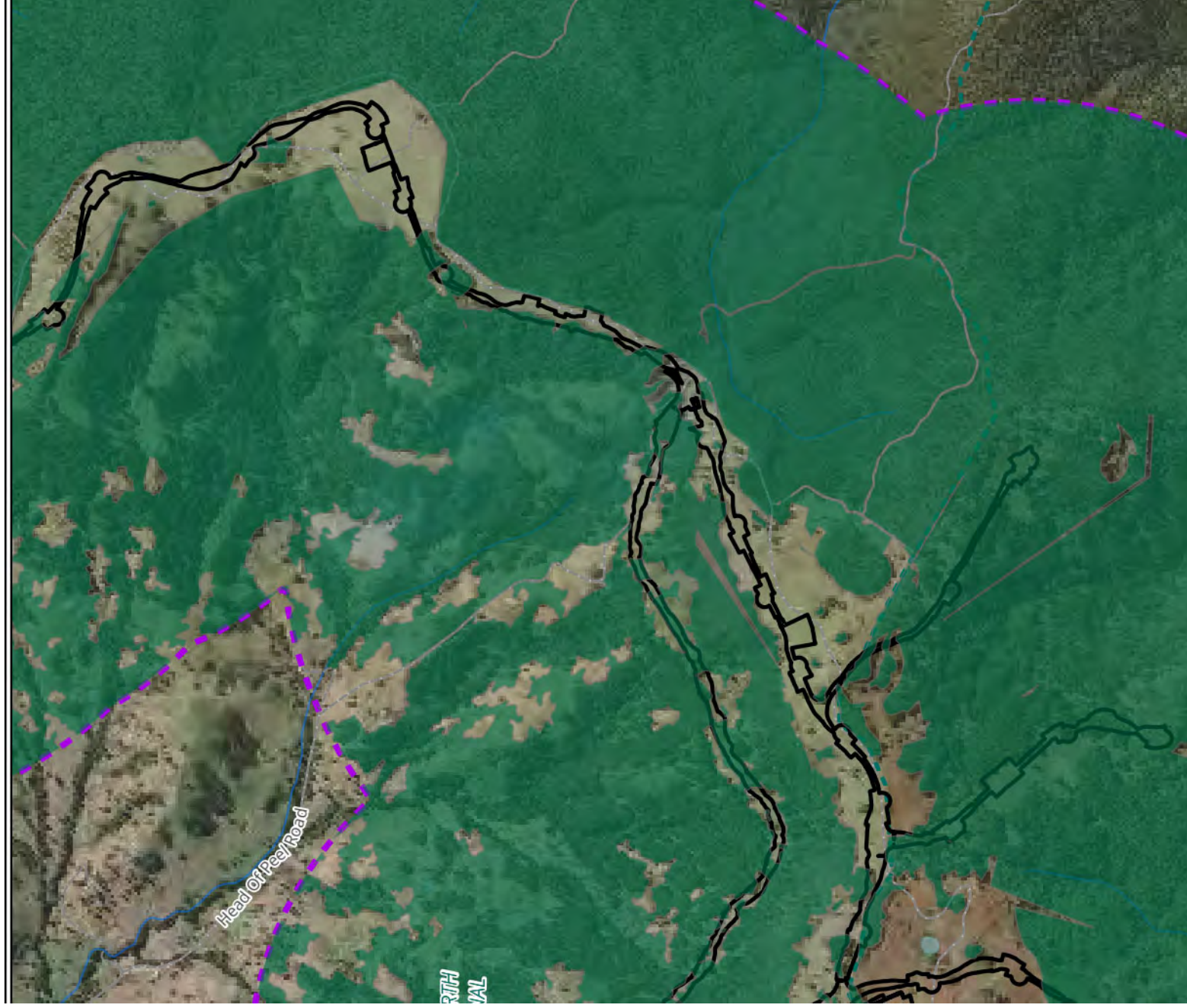
TAMWORTH  
REGIONAL



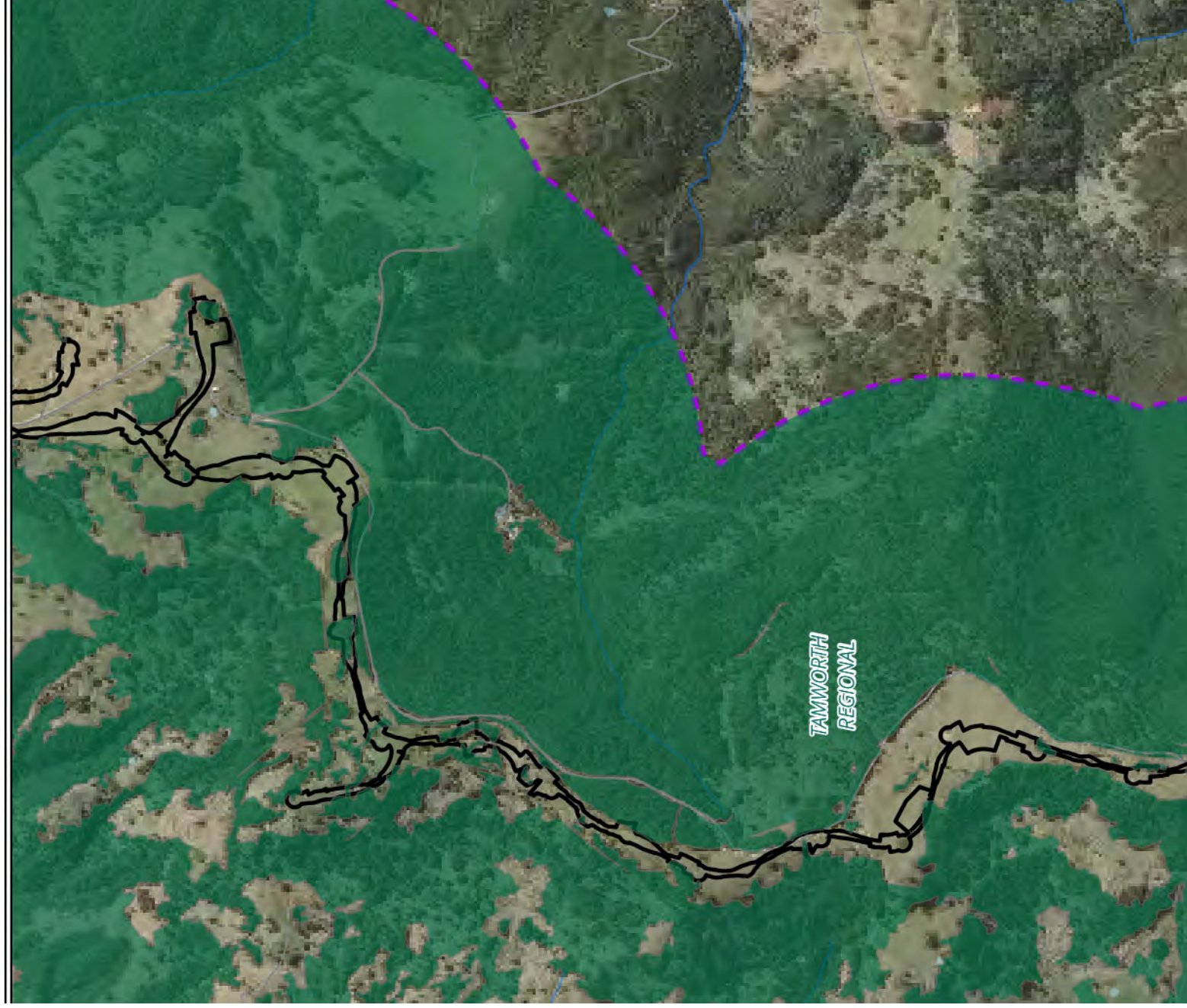




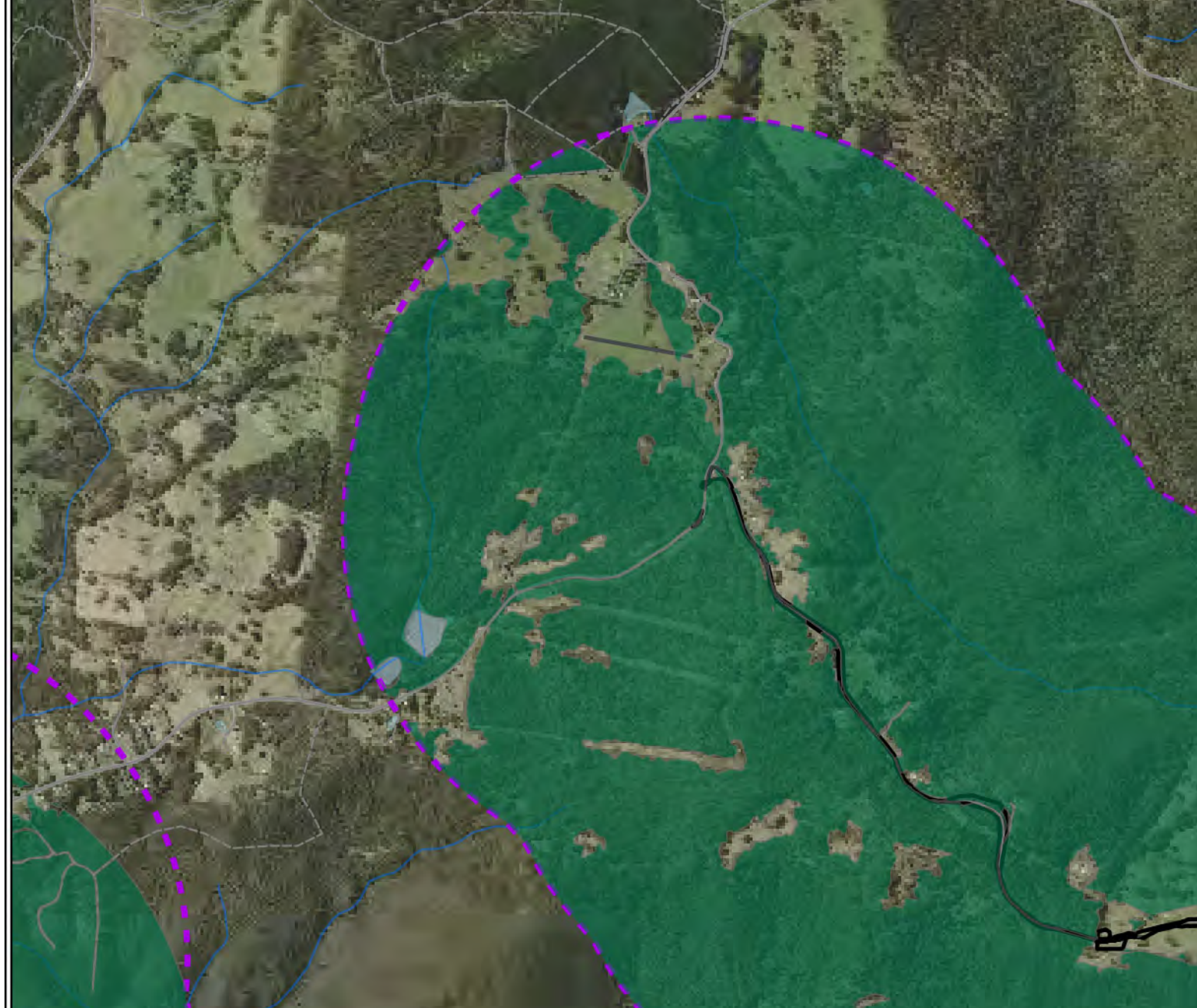




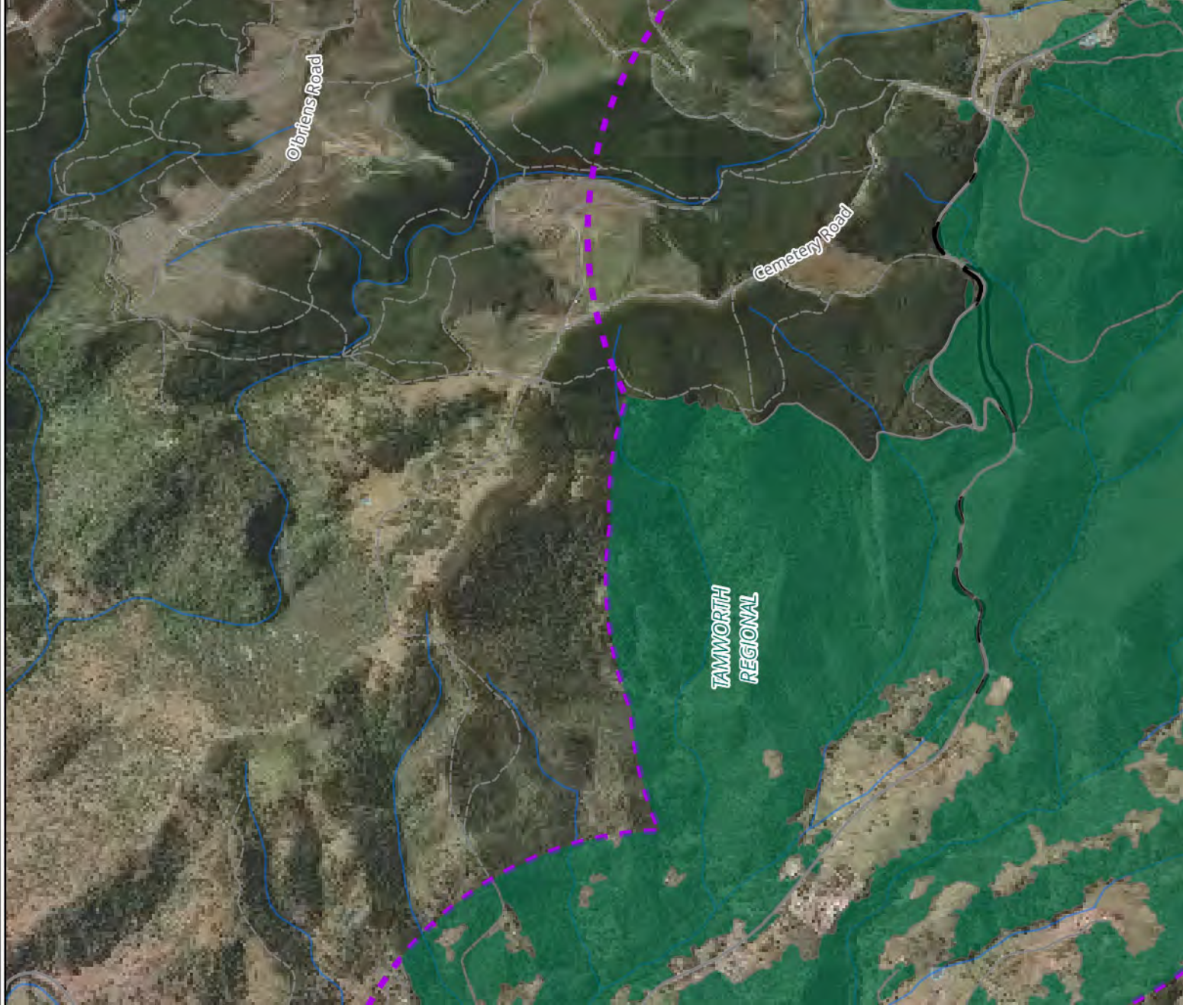




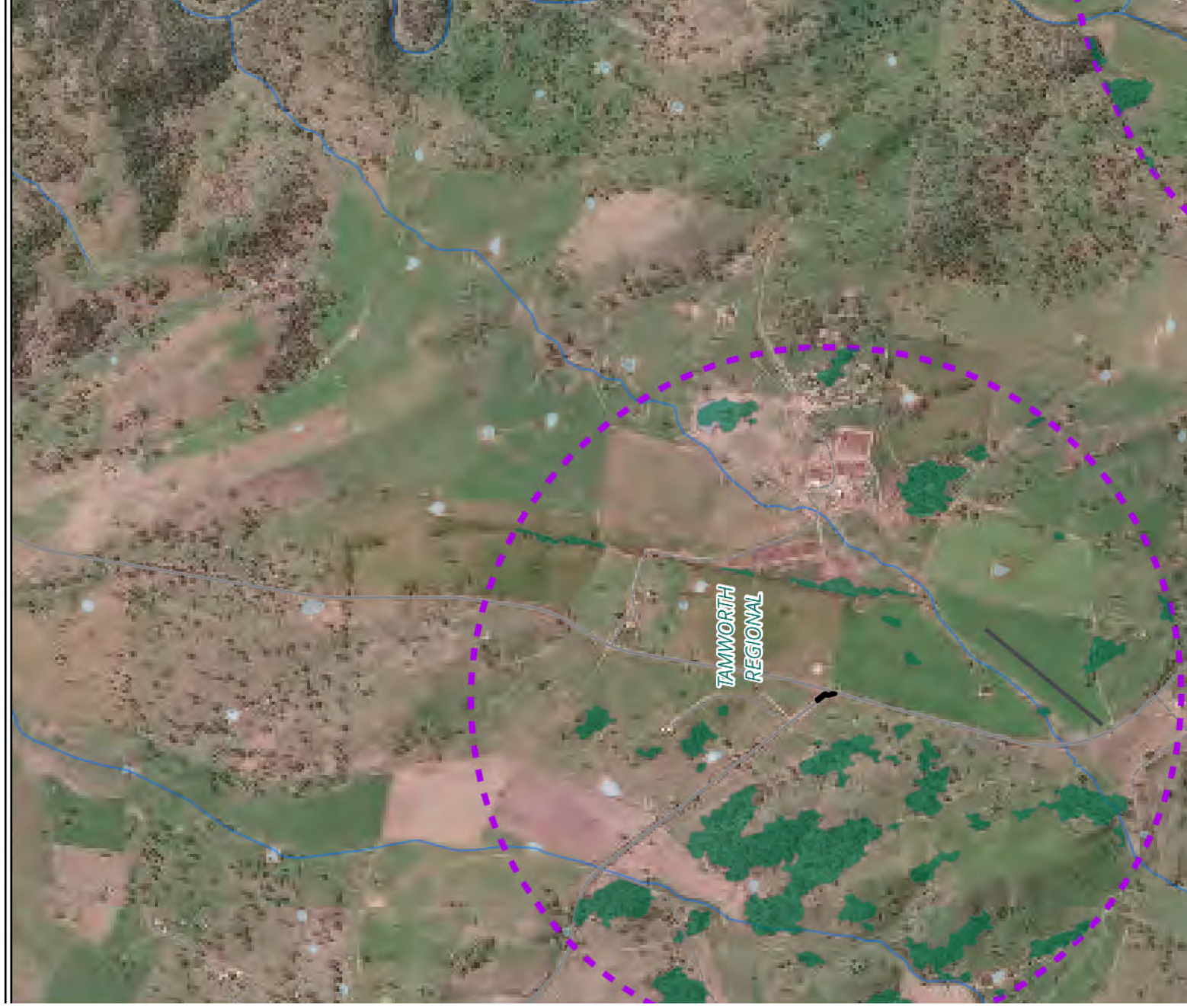




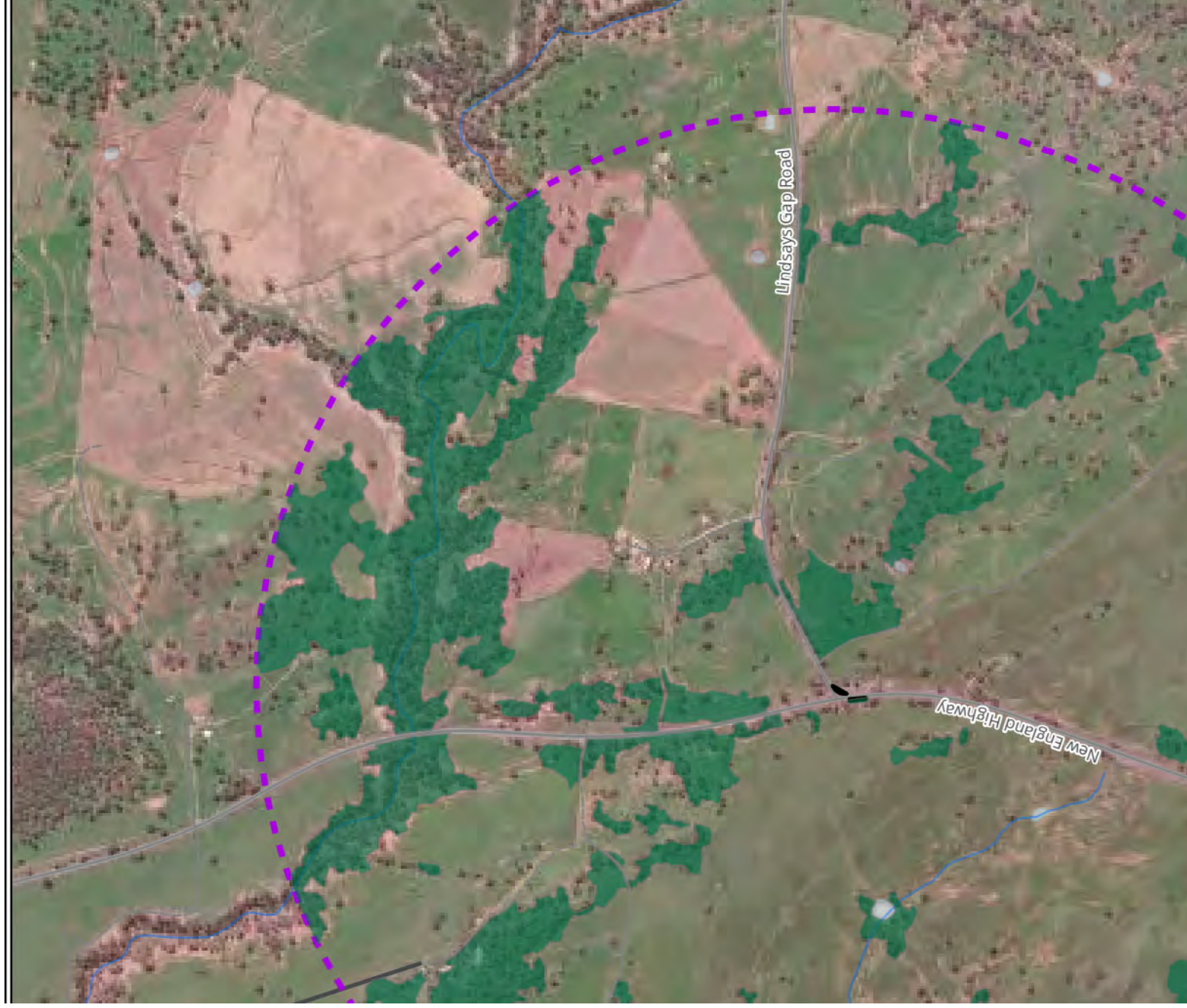




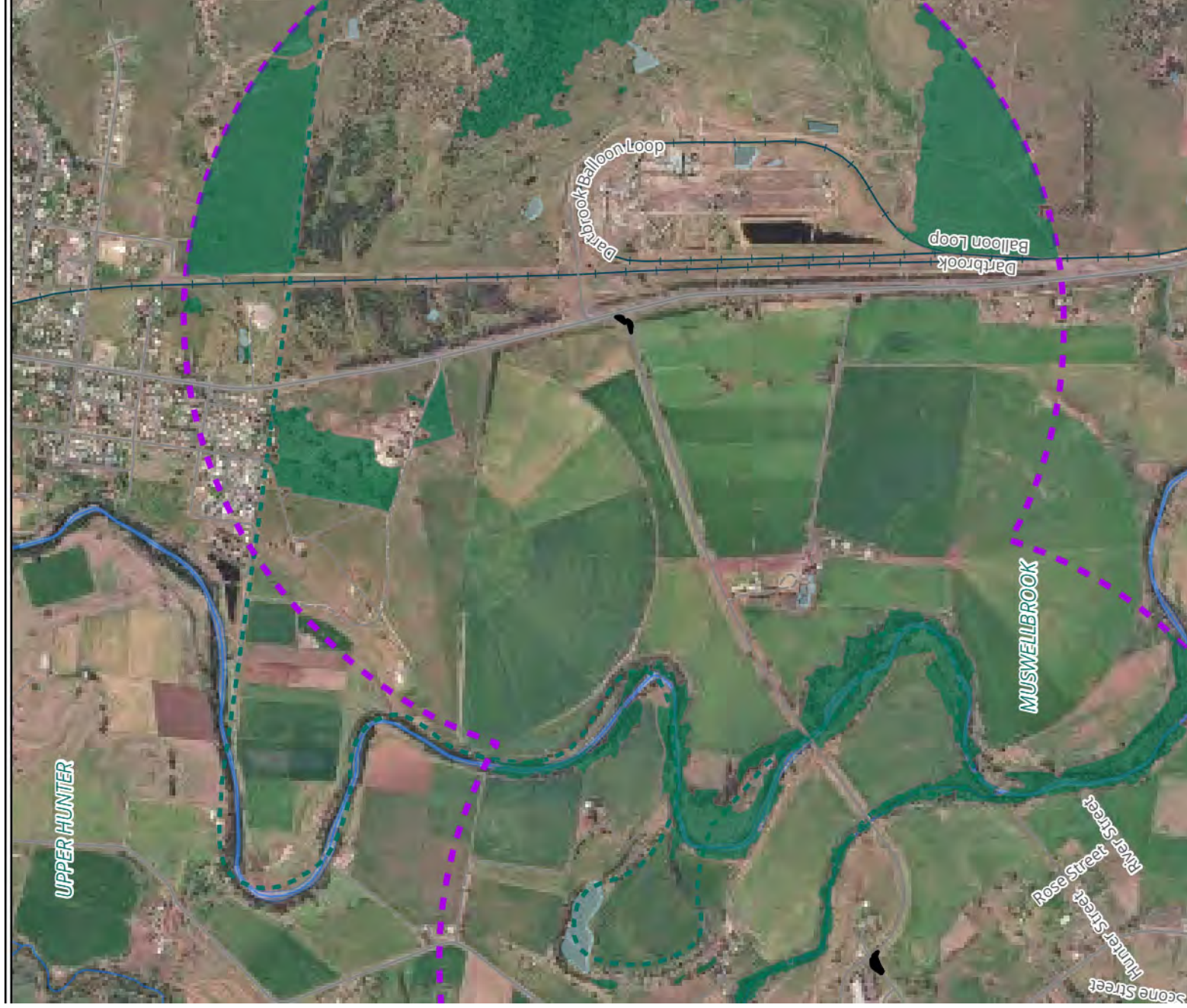


















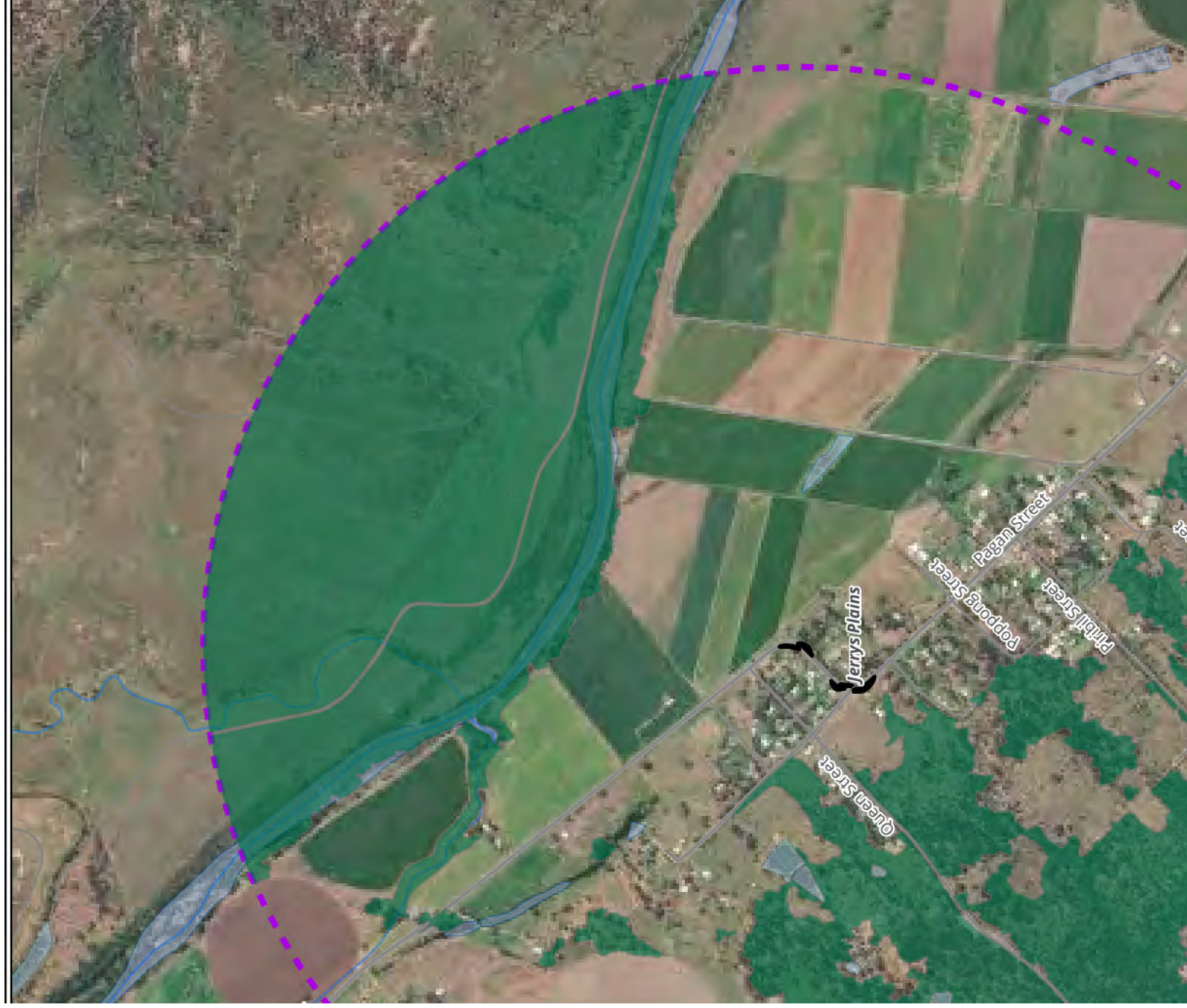








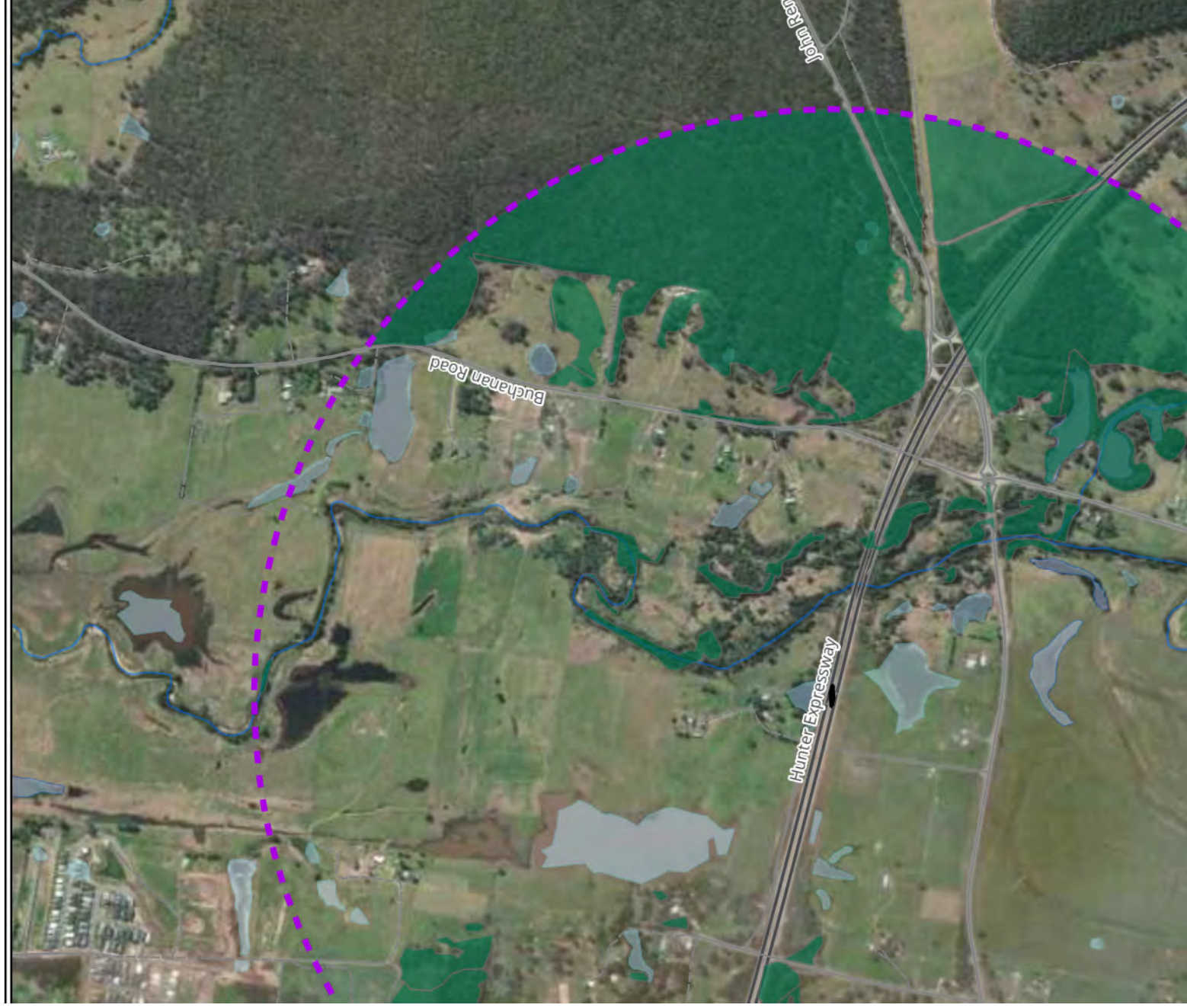


















## 4 Native vegetation

### 4.1 Methodology

#### 4.1.1 Data gathering

Existing spatial datasets and documentation relevant to terrestrial vegetation communities within the assessment area was gathered to inform plant community mapping and requirements for more targeted field surveys. Relevant information sources for the review are outlined in Section 1.8 of this document.

#### 4.1.2 Vegetation surveys and timing

Plant community delineation and mapping of vegetation zones involved review and field validation of OEH mapped vegetation communities over a number of field events over 21 days as follows:

- An initial survey of the wind farm development footprint from 12 November 2018 to 15 November 2018 by two ecologists totalling 60 person hours.
- Subsequent winter survey of the wind farm development footprint over 5 days in August 2019 by two ecologists totalling 80 person hours.
- Subsequent spring survey over 5 days in November 2019 for the proposed transmission line and wind farm development footprint by two ecologists totalling approximately 80 person hours.
- Subsequent summer survey over 5 days in February 2020 for the proposed transmission line and wind farm development footprint totalling approximately 50 person hours.
- Supplementary winter survey completed 17-21 August 2020 for the proposed access/transportation routes, adjusted transmission line corridor and within Ben Halls Gap Nature Reserve, extending 100m buffer from the development footprint, by two ecologists totalling 100 person hours.
- Additional surveys to collect BAM plot data in March 2021 by two botanists over 80 person hours and 24 additional plots. This included collection of detailed flora plot data within the sections of 'Devil's Elbow' proposed for re-alignment, as well as along Morrisons Gap Road.

Each field event incorporated the rapid survey of vegetation at locations where distinct PCTs could be observed within the development footprint, noting the extent and structure of existing vegetation and dominant species within each stratum. Signs of disturbance such as clearing, fire damage or weed invasion were also noted. Weather conditions (BOM, 2020) during the field surveys are provided in Table 16.

**Table 16 Weather observations during flora and vegetation surveys**

Survey date	Temperature (°C) <sup>1</sup>		Rainfall to 0900 hrs (mm) <sup>1</sup>
	Minimum	Maximum	
12 November 2018	10.0	26.3	0.0
13 November 2018	13.8	27.8	0.0
14 November 2018	17.3	22.4	0.0
15 November 2018	16.8	28.6	0.0
27 August 2019	8.3	19.3	0.0
28 August 2019	6.4	18.7	0.0

Survey date	Temperature (°C) <sup>1</sup>		Rainfall to 0900 hrs (mm) <sup>1</sup>
	Minimum	Maximum	
29 August 2019	6.2	15.5	0.0
30 August 2019	5.8	11.1	0.0
31 August 2019	6.3	12.0	0.0
18 November 2019	10.0	26.5	0.0
19 November 2019	16.3	32.5	0.0
20 November 2019	14.0	29.5	0.0
21 November 2019	11.9	32.1	0.0
25 February 2020	15.4	25.5	2.0
26 February 2020	17.9	25.9	5.2
27 February 2020	15.8	30.5	11.4
28 February 2020	13.9	22.1	0.2
29 February 2020	11.9	26.2	0.0
17 August 2020	4.1	11.9	0.2
18 August 2020	4.0	14.0	0.2
19 August 2020	6.2	15.6	0.0
20 August 2020	5.6	10.9	0.0
21 August 2020	3.3	11.6	0.4

<sup>1</sup> Recorded at Murrurundi Gap AWS, BOM station 061392

#### 4.1.3 PCT confirmation and condition classification

Vegetation confirmed within the site was classified using the BioNet Vegetation Classification application and stratified according to broad condition state to map vegetation zones across the development footprint. Each PCT and associated condition class was mapped for the development footprint as a separate vegetation zone based on vegetation structure and condition attributes. In accordance with Section 4.3.1 of the BAM, condition classes were assigned from recorded observations of tree, shrub and ground cover, grazing pressure and weed extent. The factors used to assign a condition class to each PCT are described in Table 17.

**Table 17 Criteria used to assign vegetation condition class**

Condition class	Criteria
<b>Non-native exotic grassland</b>	Ground layer dominated by exotics, no native overstorey present. If trees are present in the overstorey they are non-native or outside of known species range.
<b>Non-native planted/urban vegetation</b>	Clearly modified vegetation that is subject to regular maintenance, such as slashing. Vegetation species composition not composed of locally occurring species.
<b>Derived Native Grassland (DNG)</b>	Trees and shrubs absent to very sparse and ground layer dominated native grass (and/or other groundcover) species.



Condition class	Criteria
<b>Native vegetation – Low condition</b>	<p>Low canopy cover, young age class of trees (regrowth), moderate shrub and ground layer diversity.</p> <p>No old growth canopy trees.</p> <p>Grazing pressure moderate to high.</p> <p>Moderate to high presence of exotic species.</p>
<b>Native vegetation – moderate condition</b>	<p>Generally intact canopy cover, advanced tree age class, moderate to high shrub and ground layer diversity.</p> <p>Limited old growth canopy trees with hollows</p> <p>Grazing pressure low.</p> <p>Low cover of exotic species.</p>
<b>Native vegetation – High condition</b>	<p>High structural and floristic diversity.</p> <p>Old growth canopy trees with hollows present.</p> <p>Grazing pressure very low to absent.</p>

Preliminary mapping of native and non-native vegetation communities was conducted in the field using tablet computers (Samsung Galaxy Tab 3) running the ArcGIS Collector application in the field, with spatial data collection on the boundaries of each PCT and attribute data collected on dominant flora species and vegetation condition. A PCT and vegetation zone maps was prepared using the data collection from the field verification surveys and aerial photograph interpretation. The mapping process involved using ArcMap to draw vegetation polygons around areas of vegetation using aerial photograph interpretation, then assigning each polygon a PCT and condition class. Aerial photographs utilised included a high resolution photograph captured by drone.

Areas of native vegetation for which a PCT could validly be assigned were identified and delineated in the field, and their condition determined. Identification of PCTs within the assessment area was confirmed with reference to the community profile descriptors held within the OEH (2012) mapping Project and the NSW the BioNet Vegetation Classification).

General classification of native vegetation in NSW used in this report is based on the classification system in Keith (2004) which uses three groupings of vegetation: vegetation formation, vegetation class and vegetation type (PCT), with vegetation type the finest grouping. The grouping referred to in this report is PCT.

#### 4.1.4 Vegetation condition plots

Vegetation zones and minimum plot requirements are detailed in Table 18, based on the development footprints.

In consideration of this, a total of 49 vegetation integrity plots carried out in accordance with the BAM (Figure 6), including 24 additional vegetation integrity plots were completed in March 2021, to support the improved PCT and vegetation zone mapping in this Updated BDAR. This additional data was used to improve the assignment of PCTs to vegetation zones and to provide a more accurate dataset on the vegetation integrity score of the vegetation zones within the development footprint.

Where minimum plot requirements have not been met under the BAM, benchmark condition has been assumed for the required plots and for relevant PCTs that were not mapped as derived native grasslands. Where derived native grasslands were mapped and not plot data existing, the required vegetation condition scores were amended so that benchmark values for grasses were used, but no shrub or canopy trees were recorded in the plot data.

This approach assumes the best possible vegetation integrity score is allocated to vegetation zones that do not have sufficient plot data. By including benchmark data where there are insufficient BAM plots, the vegetation condition scores obtained in the BAM Calculator reflect the highest possible condition value.

The assessment of plot requirements summarised in Table 18 is only calculated on the area of impact within the development footprint to those vegetation communities that can be allocated to a PCT. It does not include vegetation communities that have been mapped as excluded from the BAM assessment.

**Table 18 Vegetation zones and BAM plot requirements**

Vegetation Zones (PCT and condition class)	Vegetation zone impact area (ha)	Minimum plot requirements	No. plots surveyed
433 - Moderate	0.01	1	0
434 - Low	0.01	1	0
486 - High	0.52	1	0
486 - Moderate	1.47	1	0
486 - Low	0.06	1	0
486 - DNG	0.07	1	0
490 - Low	1.84	1	0
492 - High	2.60	2	3
492 - Moderate	0.55	1	2
492 - Low	0.58	1	1
492 - DNG	0.89	1	0
507 - Moderate	0.09	1	1
526 - High	0.43	1	0
526 - Moderate	0.69	1	0
540 - High	10.01	3	3
540 - Moderate	21.19	4	4
540 - Low	5.34	3	1
540 - DNG	4.10	2	1
541 - High	3.45	2	4
541 - Moderate	3.35	2	2
541 - Low	2.51	2	2
541 - DNG	2.06	2	0
586 - Low	2.56	2	3
599 - High	0.36	1	0



Vegetation Zones (PCT and condition class)	Vegetation zone impact area (ha)	Minimum plot requirements	No. plots surveyed
599 - Moderate	0.09	1	0
599 - Low	0.98	1	0
931 - High	1.10	1	1
931 - Moderate	1.89	1	3
931 - Low	0.22	1	1
934 - High	5.59	3	2
934 - Moderate	0.29	1	0
934 - Low	0.40	1	0
934 - DNG	16.53	3	2
954 - High	1.23	1	0
1194 - High	12.62	3	6
1194 - Moderate	16.56	3	3
1194 - Low	4.70	2	3
1194 - DNG	5.42	3	2
1604 - Low	0.02	1	0
1691 - Low	0.04	1	0

During the planning and implementation of the field survey, BAM plots have been located as much as possible within the development footprint. Due to the multiple revisions to the development footprint, there are some instances where plots are no longer located within the final development footprint assessed in this Updated BDAR (Figure 6). Where BAM plots have not been located within the development footprint, they have been located within a contiguous and/or representative patch of vegetation suitable for collection of data commensurate with the impacted vegetation zone. This allows the vegetation integrity scores to be included in the BAM-Calculator to be consistent with the area impacted in the development footprint.

#### 4.1.5 Plant identification and nomenclature

All vascular flora recorded during vegetation surveys were identified to species level where possible. Species that could not be identified in the field were recorded to the nearest possible family or genus and collected for later identification. Where they could not be identified confidently, specimens were lodged with the NSW Herbarium for identification.

Nomenclature, including common names, follows Harden (1990-1993, and revised editions 2000-2002). Recent taxonomic revisions were identified using the PlantNET website, developed by the Royal Botanic Gardens (n.d.).

## 4.2 Vegetation communities

### 4.2.1 Exotic vegetation

Section 6.8(3) of the *Biodiversity Conservation Act 2016* (BC Act) provides that the Biodiversity Assessment Method (BAM) is to exclude the assessment of the impacts of clearing of native vegetation on Category 1-Exempt Land (within the meaning of Part 5A of the *Local Land Services Act 2013*).

- **BC Act s6.8(3):** The biodiversity assessment method is to exclude the assessment of the impacts of any clearing of native vegetation and loss of habitat on Category 1-Exempt Land (within the meaning of Part 5A of the LLS Act), other than any impacts prescribed by the regulations under section 6.3;
- **BAM cl1.5 (BAM2020):** Biodiversity values not assessed under the BAM include: (d) biodiversity values associated with the assessment of the impacts of any clearing of native vegetation and loss of habitat on category 1-Exempt Land (within the meaning of Part 5A of the LLS Act), other than the additional biodiversity impacts in accordance with clause 6.1 of the BC regulation; (that being prescribed impacts).

Boundaries mapping Category 1-Exempt Land on the NVR Map are not yet publicly available. During the current transitional period, or until the maps are publicly released, accredited assessors may establish the categorisation of land for the agency head or consent authority to consider, following the method utilised to develop the NVR Map as far as practicable. Due to the complexities of the development, and in conjunction with multiple field investigations, Table 19 demonstrates the overall methods used to determine potential land categories and to further determine and map areas of exotic vegetation.

**Table 19 Summary of methods utilised to determine land categories and exotic vegetation**

Data Sources	Category 1 – Exempt Land	Category 2 – Regulated Land	Excluded Land
<b>2017 Land Use Dataset</b>	Land use identified as; <ul style="list-style-type: none"> <li>• Grazing modified pastures (excluding woody vegetation) where clear evidence of significant groundcover modification has occurred post 1990</li> <li>• Grazing native vegetation where clear evidence of significant groundcover modification has occurred post 1990 and dominated by exotic species as evidenced by field data</li> <li>• Cropping</li> <li>• Grazing irrigated modified pasture</li> <li>• Intensive animal production</li> <li>• Irrigated perennial horticulture</li> <li>• Manufacturing and industrial</li> </ul>	Land use identified as; <ul style="list-style-type: none"> <li>• Managed resource protection</li> <li>• Other minimal use</li> <li>• Grazing native vegetation</li> <li>• Grazing modified pastures where evidence of significant groundcover modification is absent (precautionary principle applied)</li> <li>• Transport and communication</li> <li>• Rivers</li> </ul>	N/A



Data Sources	Category 1 – Exempt Land	Category 2 – Regulated Land	Excluded Land
	<ul style="list-style-type: none"> <li>Residential and farm infrastructure</li> <li>Services</li> <li>Mining</li> <li>Reservoir/dam</li> <li>Exotic areas &gt;90% areas identified as vulnerable regulated land in relation to slope</li> <li>Areas observed (or assumed) to be recently cleared under rural allowable activities</li> </ul>		
<b>NSW Woody vegetation extent</b>	Areas of woody vegetation regrowth that has occurred post 1990 following previous clearing events	Woody vegetation present as at 1990 in conjunction with historic aerial imagery	N/A
<b>Native regulatory map</b> <b>Sensitive regulated land</b> <b>Vulnerable regulated land</b> <b>Excluded land</b>	N/A	Native dominated areas identified as vulnerable regulated land All areas identified as sensitive regulated land	Areas identified as excluded on the native regulatory maps such, National Parks, as well as nature conservation and production native forestry land use

Exotic grassland vegetation was mapped where it was considered to meet the criteria for Category 1 – Exempt Land in accordance with the table above, and in areas where non-native species were clearly dominant in the ground layer. This includes paddocks that have undergone a long history of moderate to high intensity grazing leading to a dominance of non-native species, nutrification and compaction, further reducing the resilience and regeneration potential of native grass species. Large areas of exotic grassland were found to be present along the top of the ridge line, which has been subject to vegetation clearing followed by use for ongoing access and grazing over the recent past. Areas away from retained trees hold little natural resilience and are dominated by exotic species such as Prairie Grass *Bromus catharticus*, Cocksfoot *Dactylis glomerata*, Ryegrass *Lolium spp*, Sweet Vernal Grass *Anthoxanthum odoratum*, White Clover *Trifolium repens*, Broad-leaved Carpet Grass *Axonopus compressus*, Squirrel Tail Fescue *Vulpia bromoides*, Red-flowered Mallow *Modiola caroliniana* and Lamb's Tongues *Plantago lanceolata*. Where native grasses and other groundcover species made up more than a minor/negligible component of the vegetation cover, the vegetation was mapped as a Low, or Derived Native Grassland (DNG) condition PCT.

#### 4.2.2 Development footprint

Within the total combined development footprint, a total of 297.15 hectares of vegetation was mapped, which includes vegetation communities classified as native vegetation, exotic grassland and planted/urban vegetation.

The majority (55.5% or 164.72 ha) of the mapped vegetation within the development footprint is composed of exotic grassland or planted/urban vegetation, with 44.5% of the mapped vegetation being classified as native (Table 20). As outlined below, the Project has been designed and optimised to ensure Project infrastructure is located predominately within non-native vegetation, with Project elements being located outside of native vegetation where practicable.

The 132.43 ha of mapped native vegetation within the development footprint, occurs across 17 separate PCTs with varying levels of disturbance and condition, stratified into 43 vegetation zones.

The native vegetation within the development footprint comprises isolated patches of vegetation in a predominantly agricultural land-use matrix. While isolated, patches were generally within 100m of other patches of native vegetation and in some locations directly connected to areas of larger, contiguous areas of native vegetation.

The condition of these patches of native vegetation ranges from low, with heavy weed infestation (especially Blackberry, *Rubus* spp.) supporting little native species richness or diversity, to high condition areas with high native species floristic and structural diversity and low weed infestation. Zones in lower condition also show high levels of modification and fragmentation.

Poor condition vegetation zones are characterised by a canopy of mature and semi mature native trees over an understorey dominated by exotic pasture grasses. Resilience in the understorey in these zones was seen to be low, with a low cover and abundance of native species. Higher condition vegetation condition zones are characterised by complex vegetation structure with a high diversity and abundance of native species within each strata.

**Table 20 Vegetation condition class within combined development footprint**

<b>Vegetation condition class</b>	<b>2020 BDAR Area (ha)</b>	<b>Updated BDAR Area (ha)</b>	<b>% Reduction</b>	<b>% of mapped vegetation</b>
<b>Planted or urban vegetation</b>	7.39	0.24	97	0.08
<b>Exotic grassland</b>	272.36	164.48	40	55.35
<b>Derived Native Grasslands</b>	30.91	29.06	6	9.78
<b>Native vegetation – Low condition</b>	37.11	19.28	48	6.49
<b>Native vegetation – Moderate condition</b>	73.8	46.18	37	15.54
<b>Native vegetation – High condition</b>	64.88	37.92	42	12.76
<b>Total</b>	<b>486.45</b>	<b>297.15</b>	<b>39</b>	<b>100%</b>

#### 4.2.3 Vegetation communities and infrastructure type

There is also substantial variation in the composition of the vegetation communities within the infrastructure types that compose the development footprint. To show the contribution that each infrastructure element has to the overall impacts within the development footprint, a breakdown of the area of each condition class of vegetation is provided in Table 21.

This summary shows that the majority of the impacts associated with the wind turbines (74%), internal roads (61%) and transmission line access tracks (69%), are to non-native vegetation, with exotic grassland being the most common vegetation community mapped in these areas. This reflects both the ongoing efforts made to design the Project to avoid areas of native vegetation to the extent practicable and the history of disturbance on the ridgeline from the historical and ongoing use as a grazing property. The concept alignment for the

transmission line access tracks have also followed existing farm tracks and trails as much as practicable to minimise impacts on native vegetation.

Within the transmission line corridor, most of the vegetation (63%) has been mapped and classified as native vegetation. This is due to the requirement for the transmission line to traverse steeper areas of terrain where open eucalypt forest and woodland has been retained. The original concept design had proposed complete clearing of the required 60m corridor along the transmission line, however this has been revised during ongoing detailed design and clearing limited where practicable and where required operational and safety clearances to the wires can be achieved.

In particular, the expected ability to avoid impact along stretches of the transmission line that have adequate separation to avoid impacts to native vegetation from the proposed line and removal of two turbines has been assessed, as well as other design refinements to access tracks to minimise impacts. This has resulted in an overall material reduction in the extent of clearing required of 70.43 hectares of native vegetation.

There is also a majority of native vegetation mapped within the road upgrade works proposed on the transport route component of the development footprint. Most of these impacts are associated with works required on Morrisons Gap Road and Barry Road, where curve realignments are necessary to address safety risks and transport the turbine infrastructure up the existing steep roads.

Table 21 below provides a summary of vegetation impacts broken down by infrastructure type. It can be seen that five of the seven different infrastructure types will impact more on exotic vegetation than native, with only the transmission line and transport route upgrades predominantly impacting native vegetation. This is largely due to the nature of the footprint along the transmission line, where impacts are generally associated more with areas of native vegetation that requires removal, with areas of exotic grassland not required to be cleared. Furthermore the nature of the transport route upgrades relate to predominantly vegetated areas adjacent to existing roads, and the need to bypass steep curves along Barry Road.



**Table 21 Summary of vegetation and condition type for each infrastructure type**

Vegetation condition class	Infrastructure element vegetation extent (ha and percentage within each infrastructure type)						
	Temporary construction footprint	Wind turbine infrastructure	Internal roads	Transmission line	Transmission line access tracks	Transport route upgrades	Ancillary
<b>Planted or urban vegetation</b>	-	-	-	-	-	0.23 (3%)	-
<b>Exotic grassland</b>	62.68 (68%)	32.14 (68%)	27.68 (58%)	16.93 (27%)	14.44 (69%)	1.18 (17%)	9.44 (52%)
<b>Derived Native Grasslands</b>	7.44 (8%)	5.69 (12%)	1.67 (3%)	4.43 (7%)	1.56 (7%)	0.5 (7%)	7.76 (43%)
<b>Native vegetation – Low condition</b>	1.88 (2%)	1.2 (3%)	4.78 (10%)	9.35 (15%)	1.76 (8%)	0.2 (4%)	0.1 (1%)
<b>Native vegetation – Moderate condition</b>	11.45 (12%)	3.37 (7%)	11.28 (24%)	16.21 (25%)	2.15 (10%)	0.96 14%)	0.75 (4%)
<b>Native vegetation – High condition</b>	8.66 (9%)	4.79 (10%)	2.57 (5%)	16.91 (26%)	1.07 (5%)	3.91 (56%)	0.01 (<1%)
<b>Total native vegetation (ha)</b>	<b>29.43 (32%)</b>	<b>15.05 (32%)</b>	<b>20.29 (42%)</b>	<b>46.9 (73%)</b>	<b>6.55 (31%)</b>	<b>5.58 (80%)</b>	<b>8.62 (48%)</b>
<b>Total area planted or exotic (ha)</b>	<b>62.68 (68%)</b>	<b>32.14 (68%)</b>	<b>27.68 (58%)</b>	<b>16.93 (27%)</b>	<b>14.44 (69%)</b>	<b>1.42 (20%)</b>	<b>9.44 (52%)</b>

#### **4.2.4 Combined development footprint**

Table 22 provides a detailed summary of the PCTs, vegetation zones, condition, extent, vegetation integrity score and associated TECs for the total combined development footprint, which has been used in assessing the impacts of the project. This information was used as the basis for a combined native vegetation map for the entire development footprint (Figure 6).

PCT descriptions, justifications, characteristic species and photographs are provided in Appendix B.

**Table 22 Vegetation communities within the development footprint**

PCT	TEC	Vegetation Zones (PCT and condition)	VI score	Vegetation zone impact area (ha)	Change since 2020 BDAR
<b>433 - White Box grassy woodland to open woodland on basalt flats and rises in the Liverpool Plains sub-region, BBS Bioregion</b>	White Box Yellow Box Blakely's Red Gum Woodland	433 - Moderate	99.9	0.01	
		<b>Total</b>		<b>0.01</b>	<b>-0.07</b>
<b>434 - White Box grass shrub hill woodland on clay to loam soils on volcanic and sedimentary hills in the southern Brigalow Belt South Bioregion</b>	White Box Yellow Box Blakely's Red Gum Woodland	434 - Low	99.9	0.01	
		<b>Total</b>		<b>0.01</b>	<b>-0.01</b>
<b>486 - River Oak moist riparian tall open forest of the upper Hunter Valley, including Liverpool Range</b>		486 - High	99.1	0.52	
		486 - Moderate	99.1	1.47	
		486 - Low	99.1	0.06	
		486 - DNG	69.2	0.07	
		<b>Total</b>		<b>2.12</b>	<b>-5.43</b>
<b>490 - Silvertop Stringybark - Forest Ribbon Gum very tall moist open forest on basalt plateau on the Liverpool Range, Brigalow Belt South Bioregion</b>		490 - Low	98.3	1.84	
		<b>Total</b>		<b>1.84</b>	<b>-1.26</b>
<b>492 - Silvertop Stringybark - Yellow Box - Apple Box - Rough-barked Apple shrub grass open forest mainly on southern slopes of the Liverpool Range, Brigalow Belt South Bioregion</b>	White Box Yellow Box Blakely's Red Gum Woodland	492 - High	93	2.60	
		492 - Moderate	93	0.55	
		492 - Low	60.3	0.58	
		492 - DNG	59.9	0.89	
		<b>Total</b>		<b>4.62</b>	<b>-5.19</b>



PCT	TEC	Vegetation Zones (PCT and condition)	VI score	Vegetation zone impact area (ha)	Change since 2020 BDAR
507 - Black Sallee - Snow Gum grassy woodland of the New England Tableland Bioregion		507 - Moderate	60	0.09	
		<b>Total</b>		<b>0.09</b>	<b>-0.06</b>
526 - Mountain Ribbon Gum - Messmate - Broad-leaved Stringybark open forest on granitic soils of the New England Tableland Bioregion		526 - High	99	0.43	
		526 - Moderate	99	0.69	
		<b>Total</b>		<b>1.12</b>	<b>0.62</b>
540 - Silvertop Stringybark - Ribbon Gum - Rough-barked Apple open forest on basalt hills of southern Nandewar Bioregion, southern New England Tableland Bioregion and NSW North Coast Bioregion	Ribbon Gum—Mountain Gum—Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion*	540 - High	80.3	10.01	
		540 - Moderate	86.1	21.19	
		540 - Low	95.9	5.34	
		540 - DNG	45.9	4.10	
		<b>Total</b>		<b>40.64</b>	<b>-28.96</b>
541 - Silvertop Stringybark - Rough-barked Apple grassy open forest of southern Nandewar Bioregion, southern New England Tableland Bioregion and NSW North Coast Bioregion		541 - High	88.7	3.45	
		541 - Moderate	83.6	3.35	
		541 - Low	69.4	2.51	
		541 - DNG	54.7	2.06	
		<b>Total</b>		<b>11.37</b>	<b>-18.63</b>
586 - Snow Grass - Swamp Foxtail tussock grassland sedgeland of cold air drainage valleys of the New England Tableland Bioregion		586 - Low	59.6	2.56	2.56
		<b>Total</b>		<b>2.56</b>	<b>2.56</b>

PCT	TEC	Vegetation Zones (PCT and condition)	VI score	Vegetation zone impact area (ha)	Change since 2020 BDAR
<b>599 - Blakelys Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion</b>	White Box Yellow Box Blakely's Red Gum Woodland	599 - High	99.9	0.36	
		599 - Moderate	99.9	0.09	
		599 - Low	99.9	0.98	
		<b>Total</b>		<b>1.43</b>	<b>-1.92</b>
<b>931 - Messmate - Mountain Gum tall moist forest of the far southern New England Tableland Bioregion</b>		931 - High	45.1	1.10	
		931 - Moderate	53.3	1.89	
		931 - Low	27	0.22	
		<b>Total</b>		<b>3.21</b>	<b>-2.41</b>
<b>934 - Messmate open forest of the tableland edge of the NSW North Coast Bioregion and New England Tableland Bioregion</b>		934 - High	97.6	5.59	
		934 - Moderate	99.3	0.29	
		934 - Low	99.3	0.40	
		934 - DNG	21.2	16.53	
		<b>Total</b>		<b>22.82</b>	<b>7.30</b>
<b>954 - Mountain Ribbon Gum - Messmate open forest of escarpment ranges of the NSW North Coast Bioregion and New England Tableland Bioregion</b>		954 - High	99.6	1.23	
		<b>Total</b>		<b>1.23</b>	<b>-0.17</b>

PCT	TEC	Vegetation Zones (PCT and condition)	VI score	Vegetation zone impact area (ha)	Change since 2020 BDAR
<b>1194 - Snow Gum - Mountain Gum - Mountain Ribbon Gum open forest on ranges of the NSW North Coast Bioregion and eastern New England Tableland Bioregion</b>	Ribbon Gum—Mountain Gum—Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion*	1194 - High	73.6	12.62	
		1194 - Moderate	76.4	16.56	
		1194 - Low	41.9	4.70	
		1194 - DNG	8.9	5.42	
		<b>Total</b>		<b>39.29</b>	<b>-17.21</b>
<b>1604 - Narrow-leaved Ironbark - Grey Box - Spotted Gum shrub - grass woodland of the central and lower Hunter</b>		1604 - Low	99.7	0.02	
		<b>Total</b>		<b>0.02</b>	<b>-0.01</b>
<b>1691 - Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter</b>		1691 - Low	99.7	0.04	
		<b>Total</b>		<b>0.04</b>	<b>0.01</b>

\*Note: PCT 540 and PCT1194 represent the Ribbon Gum—Mountain Gum—Snow Gum Grassy Forest TEC only when the PCT is present within, or as part of a patch contiguous with, the New England Tableland IBRA Bioregion. Refer Section 4.3.1 for more detail.



