Prepared for Blackwater Coal Mine (BWM)

Blackwater Coal Mine Underground Mining Surface Cracks and Sinkholes: Assessment of Impacts to Vegetation and Habitat



Final 20/11/2025

LYNGCO ENVIRONMENTAL CONSULTING

DOCUMENT VERSION HISTORY

Project Name	Blackwater Coal Mine Underground Mining Surface Cracks and Sinkholes: Assessment of Impacts to Vegetation and Habitat
Project Number	WHC028
Project Manager	Steve Lyngcoln
Report Authors	Laura Harms
Version - Date	Final – 20/11/2025

INTENDED USE: Lyngco Environmental Consulting (LEC) has prepared this report for Blackwater Coal Mine (BWM) to determine if surface cracks caused by subsidence have had a significant impact to vegetation and habitat in areas of historic underground mining. Information and recommendations contained herein are purpose and project specific and LEC accepts no liability for the use or interpretation of any information contained in this report for any other purposes other than intended.

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EXECUTIVE SUMMARY

The purpose of this Blackwater (BWM) underground mining surface cracks assessment is to provide a field-based technical assessment of the potential impacts to vegetation and habitat from surface cracks and sinkholes as a result of subsidence from historical underground mining on BWM in response to a request for more information (RFI) from the Department of the Environment, Tourism, Science and Innovation (DETSI).

The approach to the assessment included an initial desktop analysis followed by field surveys comparing the vegetation and habitat value of sites affected by subsidence surface cracks, and nearby reference sites in the same regional ecosystems. Vegetation and habitat value included vegetation structure and composition, remnant status of vegetation, and habitat suitability for fauna and flora, including species listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the *Nature Conservation Act 1992* (NC Act).

This assessment found no evidence of significant impacts to vegetation or fauna habitat due to subsidence cracking or sinkholes. One site (Crack 11) had evidence of minor canopy tree dieback that was potentially associated with the subsidence crack. A tertiary vegetation assessment (Cr11Ter) confirmed that any impact to tree canopy cover did not affect the remnant status of the vegetation (refer Table 15).

Bertya opponens (Vulnerable under the EPBC Act) was identified at most subsidence sites associated with remnant or high value regrowth (HVR) vegetation (refer Table 16). Potential habitat was also present at many sites (refer Table 16) for the following fauna:

- Squatter pigeon (*Geophaps scripta scripta,* Vulnerable under the EPBC and NC Acts)
- Yakka skink (*Egernia rugosa*, Vulnerable under the EPBC and NC Acts)
- Short-beaked echidna (*Tachyglossus aculeatus*, Special Least Concern under the NC Act).

Habitat suitability for these fauna was not affected by subsidence cracking or sinkholes.

From an ecological standpoint, amelioration of subsidence-caused cracking and sinkholes is not recommended. If BWM decides to undertake amelioration of cracks for geotechnical or safety reasons, a Significant Impact Assessment (SIA) would be required for all sites containing *Bertya opponens.* Refer to Table 16 for specific recommendations for each site.

DEFINITIONS AND ABBREVIATIONS

Acronym Term	Definition
BWM	Blackwater Coal Mine
DETSI	Department of Environment, Tourism, Science and Innovation
EDL	Ecologically Dominant Layer
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
HVR	High Value Regrowth
LEC	Lyngco Environmental Consulting
MNES	Matter of National Environmental Significance
MSES	Matter of State Environmental Significance
NC Act	*Nature Conservation Act 1992*
RE	Regional Ecosystem
RFI	Request For Information
SIA	Significant Impact Assessment

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1. Introduction and Purpose

The purpose of this Blackwater (BWM) underground mining surface cracks assessment is to provide a field-based technical assessment of the potential impacts on vegetation and habitat from surface cracks and sinkholes as a result of subsidence from historical underground mining on BWM in response to a request for more information (RFI) from the Department of the Environment, Tourism, Science and Innovation (DETSI).

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Table 1 summarises the surface crack sites, sinkhole sites and reference sites and their corresponding regional ecosystems. Note that the sinkhole site should be considered a potential sinkhole, however further geotechnical assessment would be required to discern if this site is a sinkhole or excavated pit. Figure 1 depicts the Survey area including the historic underground mining footprint.

Table 1: Summary of subsidence, reference and mapped subsidence sites and corresponding regional ecosystems.

Feature ID	Regional ecosystem and condition
Reference sites	
Reference Site 1	11.7.2 Remnant
Reference Site 2	11.7.6 Remnant
Field-verified subsidence crack or sinkhole	
Potential Sinkhole 1	11.7.2 High Value Regrowth
Crack 1	Non-remnant
Crack 2	Non-remnant
Crack 3	11.7.2 Remnant
Crack 4	Non-remnant
Crack 5	11.7.2 Remnant
Crack 6	11.7.2 Remnant
Crack 7	11.7.2 Remnant
Crack 8	11.7.2 Remnant
Crack 9	11.7.2 Remnant
Crack 10	11.7.2 Remnant
Crack 11	11.7.2 Remnant

Feature ID	Regional ecosystem and condition
Crack 12	Non-remnant
Crack 12b	11.7.2 High Value Regrowth
Crack 13	Non-remnant
Crack 14	11.7.6 Remnant
Crack 15	11.7.2 Remnant
Crack 16	11.7.2 Remnant
Crack 17	11.7.2 Remnant
Crack 18	11.7.6/11.7.2 Remnant
Crack 19	11.7.2 Remnant
Crack 20	11.7.2 Remnant
Crack 21	11.7.2 Remnant
Crack 22	11.7.2 High Value Regrowth
Crack 23	11.7.2 High Value Regrowth
Crack 24	11.7.2 High Value Regrowth
Crack 25	11.7.2 Remnant
No field evidence of subsidence crack or sinkhole	
Mapped Crack 1	11.7.2 High Value Regrowth
Mapped Crack 2	11.7.2 Remnant
Mapped Crack 3	11.7.2 Remnant
Mapped Crack 4	11.7.2 Remnant
Mapped Crack 5	11.7.2 Remnant
Mapped Crack 6	11.7.2 Remnant

Figure 1: Survey Area Overview.

685000

690000

7360000

7355000

7350000

ML 1862

ML 1762

ML 1792

ML 1812

ML 70091

ML 1773

ML 1771

ML 1772

ML 1767

ML 1860

ML 1829

GDA2020, MGA Zone 55

BLACKWATER MINE

Kenmare and Laleham Underground Subsidence Crack Monitoring

0 200 400 600 800 1,000

m

BWM Mining Lease

Area of Interest

Kenmare

Laleham

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Date:	10/09/2025

Figure 1

Overview

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2. Methods

2.1. Appropriately qualified persons

The desktop and field assessments were undertaken by two appropriately qualified persons (AQP) - Principal Ecologist Stephen Lyngcoln and Graduate Ecologist Laura Harms. Their experience and roles within the assessment are summarised below in Table 2.

Table 2: Appropriately qualified persons.

Ecologist and Role	Experience
• Steve Lyngcoln – Vegetation and flora field assessment – Report review	Steve has over 20 years' experience in environmental management in Queensland including experience specialising in terrestrial ecology. Steve specialises in vegetation ecology including survey and mapping of regional ecosystems and threatened ecological communities, threatened flora surveying and mapping, rehabilitation monitoring, revegetation planning and management, environmental offsets planning and management. Steve has over 15 years specific experience working in the coal mining industry for coal mining companies working on several coal mine environmental impact assessments, undertaking rehabilitation monitoring and has prepared a number of associated rehabilitation plans and offset strategies. He has formal postgraduate qualifications with a Master of Environmental Science from the University of New England (UNE) specialising in vegetation ecology and ecosystem rehabilitation.
• Laura Harms – Desktop assessment – Fauna field assessment – Report writing	Laura is a Graduate Ecologist. She holds a Bachelor of Advanced Science (First Class Honours) majoring in Ecology from the University of Queensland. Laura has a well-rounded base of experience in terrestrial ecology and has worked on projects ranging from Significant Impact Assessments and Rehabilitation Monitoring Reports for mining clients, to pre-clear habitat assessments for civil construction clients. Laura has experience with various flora and fauna monitoring methods, including BioCondition surveys, camera trapping, acoustic monitoring, live trapping and active searches.

2.2. Survey timing

The field assessment was undertaken in fine environmental conditions and weather on the 4th and 5th of September 2025. Due to the size and scope of the survey, habitat assessments and opportunistic fauna surveys were utilised in the field assessment. No fauna trapping, camera trapping or extended fauna survey techniques were employed during the field assessment.

2.3. Desktop assessment

Desktop assessments included searches of the following databases:

- EPBC Act Protected Matters Search Tool, to identify MNES relevant to the Proposed action within a search area extending 15 km from the Survey area (DCCEEW, 2025)
- MSES and Regional Ecosystems reports (DETSI, 2025)
- Queensland WildNet Database (DETSI, 2025)
- Atlas of Living Australia (ALA, 2025)
- Vegetation management Regional Ecosystem map (versions 11 and 12) to identify vegetation communities and fauna habitats that are likely to occur (DoR, 2024)
- Regional Ecosystem (Queensland Herbarium 2019) and Broad Vegetation Group (BVG) descriptions (Neldner, et al., 2023)

2.4. Field assessment

The field assessment comprised of:

- 32 Quaternary level vegetation assessment sites (Neldner, et al., 2023)
- 4 Tertiary level vegetation assessment sites – 2 reference sites and 2 subsidence sites (V.J. Neldner, 2022)
- 36 habitat assessments
- Opportunistic searches for Endangered, Vulnerable and Near Threatened (EVNT) flora and fauna species.

The reference sites were located on areas of BWM outside the footprint of underground mining, in corresponding regional ecosystems to those of the subsidence sites. Tertiary level vegetation assessments (Neldner, et al., 2023) were conducted at reference sites, as well as subsidence sites with evidence of tree dieback where a more comprehensive assessment was required to determine any effect on canopy cover and the remnant status of the vegetation. The survey effort undertaken within the Survey area is illustrated in Figure 2.

2.5. Ground-truthed regional ecosystem mapping

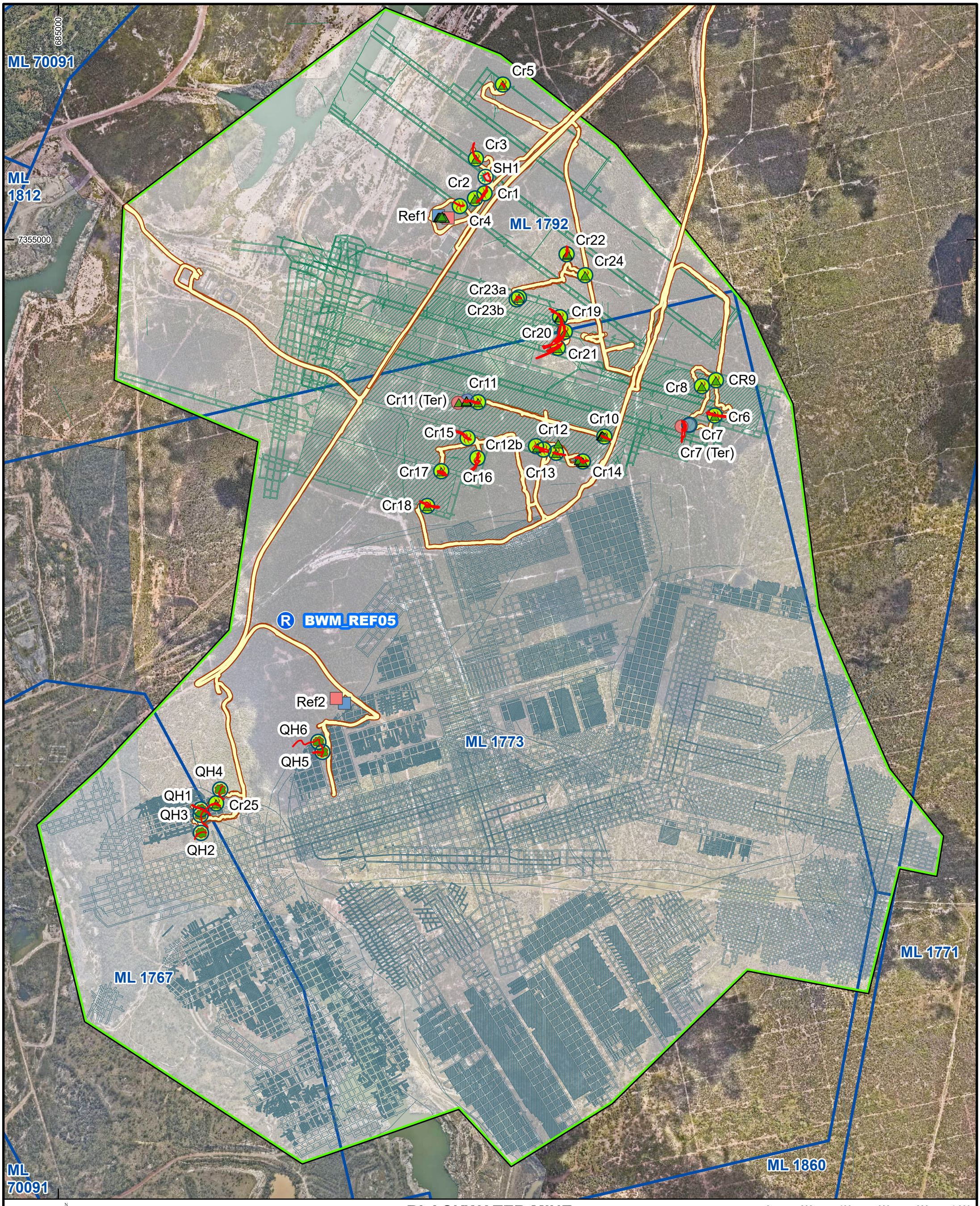
Ground-truthed regional ecosystem mapping was developed within the AOI using the following datasets and methods:

- Initial ground-truthed regional ecosystem was updated based on field survey results from Quaternary and Tertiary site data associated with sites that were cracking and adjacent areas not affected (refer Section 3.2)
- Non-remnant areas were defined using the latest BWM disturbance data
- The initial ground-truthed regional ecosystem mapping was intersected with the BWM disturbance layer to give one dataset where each area contains the BWM disturbance attributes and the ground-truthed regional ecosystem attributes.

- The ground-truthed regional ecosystem mapping condition was changed based on the Disturbance attribute.

It is important to note the ground-truthed regional ecosystem mapping was developed for the purpose of comparing areas impacted by cracking versus adjacent areas not affected by cracking. Additional survey effort and additional mapping using up-to-date imagery would be required to develop a more detailed ground-truthed regional ecosystem map for the entire AOI.

Figure 2: Survey Effort.



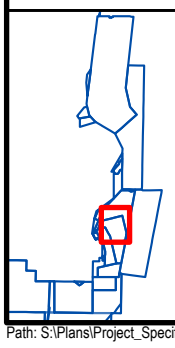
GDA2020, MGA Zone 55

BLACKWATER MINE

Kenmare and Laleham Underground Subsidence Crack Monitoring

0 200 400 600 800 1,000

m



- BWM Mining Lease
- Area of Interest
- Kenmare
- Laleham
- Recorded Track
- BWM Rehab. Monitoring Reference Site
- Crack / Sinkhole
- Fauna Habitat Assessment Site
- *Bertya opponens* sighting
- Quaternary Habitat - Cracks observed
- Quaternary Habitat - No cracks observed
- Quaternary Habitat - Sinkhole observed
- Reference Site - Start
- Reference Site - End
- Tertiary Site - Start
- Tertiary Site - End

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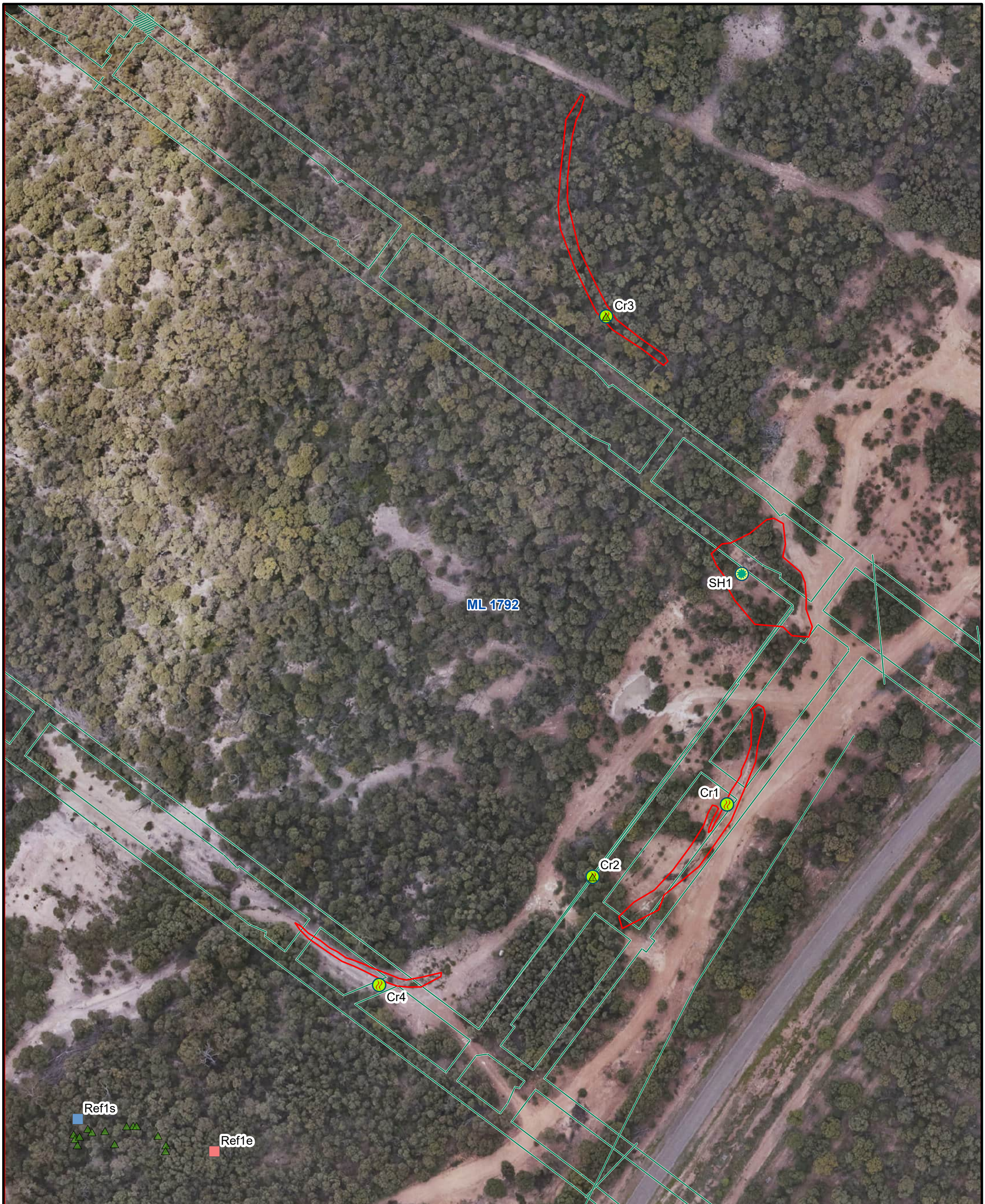
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Figure 2

Survey Effort

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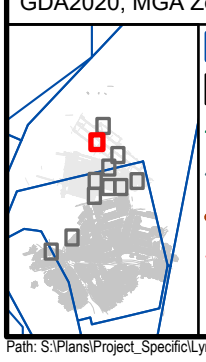


GDA2020, MGA Zone 55

BLACKWATER MINE

Kenmare and Laleham Underground Subsidence Crack Monitoring

0 10 20 30 40 50
m



- BWM Mining Lease
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Figure 2b

Survey Effort
Crack and Sinkhole Detail

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ML 1792

Cr5

GDA2020, MGA Zone 55

BLACKWATER MINE

Kenmare and Laleham Underground Subsidence Crack Monitoring

0 10 20 30 40 50

m

BWM Mining Lease
Area of Interest
Kenmare
Laleham
Recorded Track
Crack / Sinkhole

Fauna Habitat Assessment Site
Bertya opponens sighting
Quaternary Habitat - Cracks observed
Quaternary Habitat - No cracks observed
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Reference Site - Start

Reference Site - End
Tertiary Site - Start
Tertiary Site - End

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Figure 2b

Survey Effort
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CR9

Cr8

ML 1773

Cr6

Cr7s

Cr7s

Cr7e

GDA2020, MGA Zone 55

BLACKWATER MINE

Kenmare and Laleham Underground Subsidence Crack Monitoring

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ML 1773

Cr10

Cr14

GDA2020, MGA Zone 55

BLACKWATER MINE

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ML 1773

Cr12b

Cr12

Cr13

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GDA2020, MGA Zone 55

0 10 20 30 40 50
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ML 1792

Cr11s

Cr11

Cr11e

ML 1773

Cr15

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Cr17

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Cr18

GDA2020, MGA Zone 55

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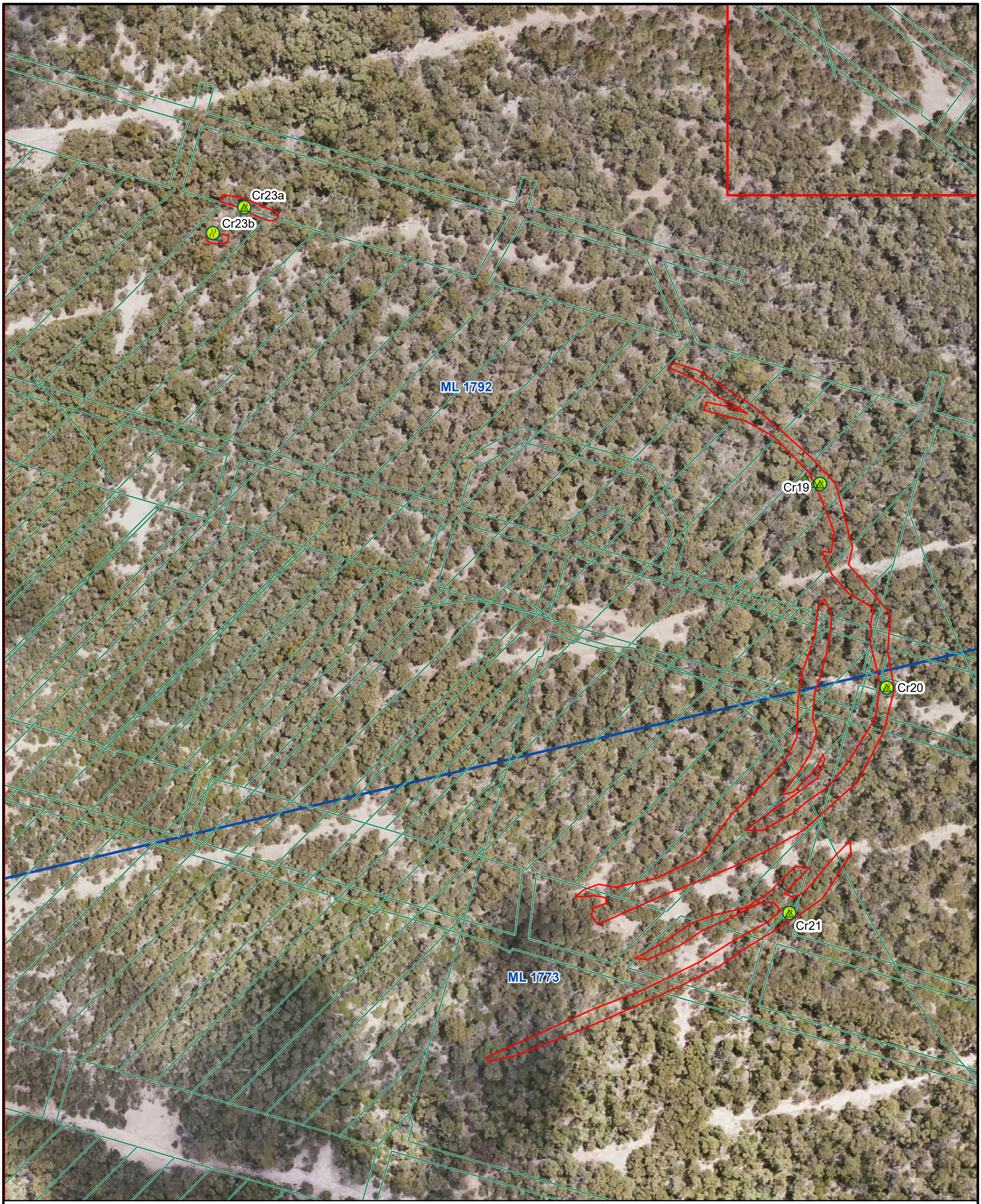
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Cr22

ML 1792

Cr24

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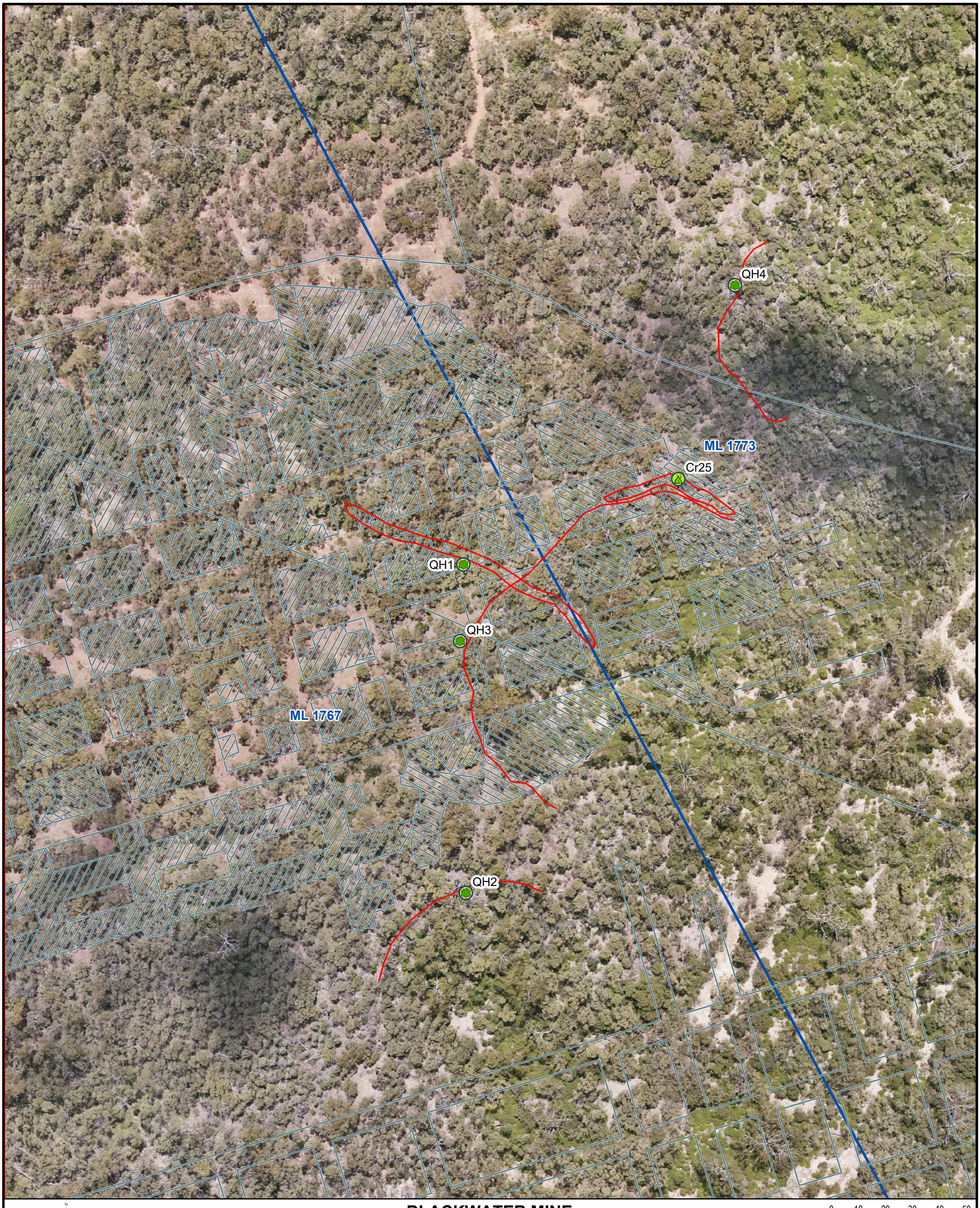
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Crack and Sinkhole Detail

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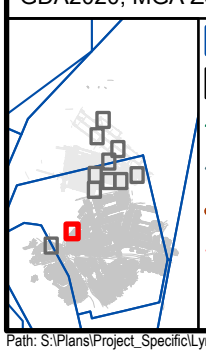
GDA2020, MGA Zone 55

BLACKWATER MINE

Kenmare and Laleham Underground Subsidence Crack Monitoring

0 10 20 30 40 50

m



- BWM Mining Lease
- Area of Interest
- Kenmare
- Laleham
- Recorded Track
- Crack / Sinkhole
- Fauna Habitat Assessment Site
- *Bertya opponens* sighting
- Quaternary Habitat - Cracks observed
- Quaternary Habitat - No cracks observed
- Quaternary Habitat - Sinkhole observed
- Reference Site - Start
- Reference Site - End
- Tertiary Site - Start
- Tertiary Site - End

LYNGCO ENVIRONMENTAL CONSULTING

Drawn By:	C Schlebusch
Requested by:	S Lyngcoln
Date:	20/11/2025

Figure 2b

Survey Effort
Crack and Sinkhole Detail

RTPL_LE_BMRM001_WHC028_MAP0006_A

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3. Results

3.1. Desktop results

Database searches returned the following MNES and MSES as having been previously recorded or having the potential to occur within 15 km of the Survey area (see Appendix A).

- 35 MNES threatened and/or migratory fauna species
- 1 MSES special least concern fauna species (*Tachyglossus aculeatus*, short-beaked echidna)
- 11 MNES threatened flora species
- 2 MSES threatened flora species
- 6 Threatened Ecological Communities (TECs), including:
  - Weeping Myall Woodlands
  - Natural Grasslands of the Queensland Central Highlands and northern Fitzroy Basin
  - Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions
  - Poplar Box Grassy Woodland on Alluvial Plains
  - Brigalow (*Acacia harpophylla* dominant and co-dominant)
  - Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions

Based on a desktop assessment of species records within the locality and vegetation mapped within the Survey area, a Likelihood of Occurrence assessment was conducted to categorise MNES and MSES species as 'unlikely to occur', 'potential to occur', 'likely to occur' or 'known to occur' within the Survey area. The criteria for the Likelihood of Occurrence assessment is summarised in Table 3.

Table 3: Likelihood of occurrence assessment criteria.

Likelihood of Occurrence	Criteria for Threatened Flora and Fauna	Criteria for Threatened Ecological Communities
Unlikely to occur	The Disturbance footprint does not comprise suitable habitat for the species or is outside of the species known distribution.	State mapped Regional Ecosystems within the Disturbance footprint do not correspond with the TEC.
Potential to occur	The Disturbance footprint is within the species known distribution and suitable habitat to support the species is present; however, the species has not previously been recorded within the desktop search extent; and/or suitable habitat is degraded or of limited extent, thereby reducing the likelihood of the species occurrence.	N/A
Likely to occur	Suitable habitat to support the species is present and the species has previously been recorded within 20 km of the Disturbance footprint (the desktop search extent).	State mapped Regional Ecosystems corresponding to the TEC have been identified by the desktop assessment within Disturbance footprint

Likelihood of Occurrence	Criteria for Threatened Flora and Fauna	Criteria for Threatened Ecological Communities
Known to occur	Has been recorded within the Disturbance footprint previously.	The TEC has been recorded within the Disturbance footprint previously.

Table 4 and Table 5 detail the results from the desktop Likelihood of Occurrence assessment, showing fauna and flora species with potential to occur and /or that are 'likely to occur' or 'known to occur'. The desktop assessment informed the MNES and MSES to be targeted during the field assessment. Five threatened or listed fauna species and five threatened flora species were determined as having the 'potential to occur' or being 'likely to occur' within the Survey area.

No TECs were determined as being 'likely to occur', as the Survey area did not contain any mapped remnant or high value regrowth vegetation corresponding to a TEC.

The full desktop Likelihood of Occurrence assessment is available in Appendix A.

Table 4: Desktop MNES and MSES fauna likelihood of occurrence assessment within the survey area.

Common Name	Scientific Name	Status		Habitat Description	Likelihood of Occurrence	Justification
		EPBC Act	NC Act			
Birds						
Squatter Pigeon (southern)	*Geophaps scripta scripta*	V	V	Occurs from the Burdekin-Lynd Divide in north Queensland to the Border Rivers in northern New South Wales and inland to Hughenden to Charleville. They are found in remnant, regrowth and modified open-forest and wooded communities dominated by Eucalyptus, Corymbia, Acacia or Callitris species and within 3 km of water bodies. They require patchy understory with tussocks where vegetation is generally below 33% on well-draining, gravelly, sandy, or loamy soils. Breeding occurs within 1km of a suitable, permanent waterbody (Department of Climate Change, Energy, the Environment and Water, 2023).	Potential	Whilst records are not within 15km, the survey area contains mapped potentially suitable habitat.
Mammals						
Greater Glider (southern and central)	*Petauroides volans*	E	E	Occurs from Proserpine in Queensland south through New South Wales to Blackwood in Victoria in Eucalypt forests and woodlands below 1200 m above sea level. Tall, montane and moist forests tend to be preferred, though they can be found in drier habitats, and they favour forests with a diversity of Eucalypt species with seasonal growth variation for year-round foraging. They require large, old trees with hollows for dens (Department of Climate Change, Energy, the Environment and Water, 2023).	Potential	Whilst records are not within 15 km, the survey area contains potentially suitable mapped habitat.
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory)	*Phascolarctos cinereus*	E	E	For the combined population considered here, occurs from the Wet Tropics in Queensland south to the New South Wales and Victoria border, and inland to up to approximately 600 km, including the Australian Capital Territory. The distribution is not continuous and isolated populations are often in low density. The species is restricted to Eucalypt sclerophyll forest and woodlands where preferred food trees occur (*Eucalyptus, Lophostemon, Melaleuca, Angophora, Corymbia sp*). They prefer habitats with higher tree species richness in proximity to creek lines (Department of Climate Change, Energy, the Environment and Water, 2023).	Potential	Whilst records are not within 15 km, the survey area contains potentially suitable mapped habitat.
Short-beaked Echidna	*Tachyglossus aculeatus*	-	SL	Occurs across most of Australia, except for inland Western Australia where there are fewer records. They are habitat generalists, found in forests, woodlands, shrublands and grasslands, rocky outcrops and agricultural lands where there are enough ants and/or termites for foraging (Atlas of Living Australia, 2023).	Potential	Whilst records are not within 15 km, the survey area contains potentially suitable mapped habitat.
Reptiles						
Yakka Skink	*Egernia rugosa*	V	V	The Yakka Skink is commonly found in cavities under and between partly buried rocks, logs or tree stumps, root cavities and abandoned animal burrows. The species often takes refuge in large hollow logs and has been known to excavate deep burrow systems, sometimes under dense ground vegetation. In cleared habitat, this species can persist where there are shelter sites such as raked log piles, deep gullies, tunnel erosion/sinkholes and rabbit warrens. The species has also been found sheltering under sheds and loading ramps. This species is not generally found in trees or rocky habitats (Department of Sustainability Environment Water Population and Communities 2011).	Potential	Records are not within 15 km however the survey area contains suitable mapped habitat.

Table Key: SL – Special Least Concern, LC – Least Concern, Ma – Marine, M – Migratory, V – Vulnerable, E – Endangered, CE – Critically Endangered

Table 5: Desktop MNES and MSES flora likelihood of occurrence assessment within the survey area.

Scientific Name	Common Name	Status		Habitat Description	Likelihood of Occurrence	Justification
		EPBC Act	NC Act			
Solanum dissectum	NA	E	E	*Solanum dissectum* has a restricted distribution in central Queensland. It has mainly been found in the area bounded by Banana, Dululu, Moura and Thangool but has also been recorded 40 km south of Blackwater. *Solanum dissectum* occurs in open forest and woodland of brigalow (*Acacia harpophylla*) or *Eucalyptus thozetiana* on solodic clay soils (Department of Environment and Science, 2012).	Potential	Records are within 15 km and the survey area contains limited suitable mapped habitat.
Solanum elachophyllum	NA	-	E	*Solanum elachophyllum* is endemic to Queensland and confined to the central subcoastal part of the state, from Middlemont to Theodore. The species occurs within Junee State Forest and Taunton National Park. *Solanum elachophyllum* grows on fertile cracking-clay soils in open forest of *Eucalyptus thozetiana, Acacia harpophylla*, with understorey of *Geijera parviflora, Casuarina cristata, Macropteranthes leichhardtii, Eucalyptus cambageana*, or woodland of *E. crebra* and *E. tenuipes* (Department of Environment and Science, 2012).	Potential	Records are within 15 km and the survey area contains limited suitable mapped habitat.
Cadellia pentastylis	Ooline	V	V	*Cadellia pentastylis* is now restricted in distribution from near Duaringa west of Rockhampton to the NSW border in Queensland, and on the western edge of the North West Slopes north of Gunnedah in northern New South Wales. It occurs in a range of vegetation types including semi-evergreen vine thicket, brigalow-belah, poplar box and bendee communities. Ooline often occurs on the edges of sandstone and basalt escarpments, 200 to 500 m above sea level. In most areas of its range, ooline grows on the moderately fertile soils preferred for agriculture and pasture development (Department of Environment and Science, 2009).	Potential	Records are within 15 km and the survey area contains limited suitable mapped habitat.
Bertya opponens	NA	V	LC	*Bertya opponens* has been recorded growing in a variety of community types including mixed shrubland, lancewood woodland, mallee woodland, eucalypt/Acacia open forest with shrubby understorey, eucalypt/Callitris open woodland and semi-evergreen vine-thicket. The soils are recorded as generally shallow sandy loams or red earths associated mostly with sandstone, but also with rhyolite, shale and metasediments (Department of Environment and Science, 2012)	Likely	Records are within 15 km and the survey area contains suitable mapped habitat.
***Cerbera* dumicola**	NA	-	NT	*Cerbera dumicola* occurs across a range of habitats in central and southern Queensland. Associated vegetation and species include: sandstone hills in open *E. umbra subsp. carnea*; on plateaus, in woodland of *Acacia shirleyi* with *Corymbia dolichocarpa*; acidic soils in mine rehabilitation area; woodland of *A. catenulata* and *A. shirleyi* with *E. thozetiana* on a slope of sand/clay soil; semi-deciduous notophyll-microphyll vine forest of *Brachychiton australis*, *Gyrocarpus americanus, Flindersia australis, Pleiogynium timorense, Drypetes deplanchei* and *Sterculia quadrifida* on rhyolite hillslopes; open-woodland of *E. melanophloia* with occasional *Acacia shirleyi, E. populnea* and *E. brownii*; semi-evergreen vine thicket with *Corymbia citriodora* and *Corymbia aureola* emergents; woodland of *A. rhodoxylon* on brown, sandy loam; and in *Corymbia tessellaris - Acacia aneura* open woodland (Department of Environment and Science, 2012).	Likely	Records are within 15 km and the survey area contains suitable mapped habitat.

Table Key: LC – Least Concern, NT – Near Threatened, V – Vulnerable, E – Endangered, CE – Critically Endangered

3.2. Field results

3.2.1. Overview of subsidence crack and sinkhole sites

Table 6 below provides a summary of results from all field sites, including:

- reference sites
- field-verified subsidence crack and sinkhole sites – including mapped and unmapped sites.
- mapped crack sites where no evidence of subsidence was observed in the field.

Refer to Figure 2 for the locations of all field sites. Crack 8, Crack 9 and Crack 24 were discovered whilst traversing the Survey area (i.e. were not identified via desktop mapping). Mapped Cracks 1-6 had no evidence of subsidence caused cracks or sinkholes. The topography of these areas appeared consistent with the natural landscape, including drainage lines and rocky slopes. Identification of subsidence or lack thereof was based on an ecological understanding of natural landscape topography, and does not substitute for a geotechnical assessment. Note that the sinkhole site should be considered a potential sinkhole, however further geotechnical assessment would be required to discern if this site is a sinkhole or excavated pit.

Table 6: Summary of field sites including regional ecosystem and condition, evidence of subsidence, maximum crack depth and width, and corresponding assessment sites.

Feature ID	Regional ecosystem and condition	Evidence of subsidence	Maximum depth (m)	Maximum width (m)	Relevant assessment sites*
Reference sites					
Reference Site 1	11.7.2 Remnant	NA	NA	NA	Ref1, HA5
Reference Site 2	11.7.6 Remnant	NA	NA	NA	Ref2, HA6
Field-verified subsidence crack or sinkhole					
Potential Sinkhole 1	11.7.2 High Value Regrowth	Yes	1.5	30	SH1, HA3
Crack 1	Non-remnant	Yes	1	1	Cr1, HA1
Crack 2	Non-remnant	Yes	3	1.5	Cr2, HA2
Crack 3	11.7.2 Remnant	Yes	0.5	0.75	Cr3, HA4
Crack 4	Non-remnant	Yes	0.6	0.5	Cr4, HA6
Crack 5	11.7.2 Remnant	Yes	3	2	Cr5, HA7
Crack 6	11.7.2 Remnant	Yes	1	2.5	Cr6, HA8
Crack 7	11.7.6 Remnant	Yes	1.5	0.6	Cr7Ter, HA9
Crack 8	11.7.2 Remnant	Yes	1	0.5	Cr8, HA10
Crack 9	11.7.2 Remnant	Yes	3	0.5	Cr9, HA11

Feature ID	Regional ecosystem and condition	Evidence of subsidence	Maximum depth (m)	Maximum width (m)	Relevant assessment sites*
Crack 10	11.7.2 Remnant	Yes	3.3	0.5	Cr10, HA12
Crack 11	11.7.2 Remnant	Yes	2	0.5	Cr11, Cr11Ter, HA13
Crack 12	Non-remnant	Yes	6	0.3	Cr12, HA15
Crack 12b	11.7.2 High Value Regrowth	Yes	0.9	0.3	Cr12b, HA16
Crack 13	Non-remnant	Yes	3.9	0.5	Cr13, HA17
Crack 14	11.7.6 Remnant	Yes	21	0.3	Cr14, HA18
Crack 15	11.7.2 Remnant	Yes	2.5	0.5	Cr15, HA19
Crack 16	11.7.2 Remnant	Yes	2	1	Cr16, HA20
Crack 17	11.7.2 Remnant	Yes	1.2	0.6	Cr17, HA21
Crack 18	11.7.6/11.7.2 Remnant	Yes	4.5	0.5	Cr18, HA22
Crack 19	11.7.2 Remnant	Yes	1	0.6	Cr19, HA23
Crack 20	11.7.2 Remnant	Yes	2	0.5	Cr20, HA24
Crack 21	11.7.2 Remnant	Yes	2	0.5	Cr21, HA25
Crack 22	11.7.2 High Value Regrowth	Yes	2.5	0.5	Cr22, HA26
Crack 23	11.7.2 High Value Regrowth	Yes	1.2	1	Cr23, HA27
Crack 24	11.7.2 High Value Regrowth	Yes	0.3	0.2	Cr24, HA28
Crack 25	11.7.2 Remnant	Yes	1.2	1.1	Cr25, HA32
No field evidence of subsidence crack or sinkhole					
Mapped Crack 1	11.7.2 High Value Regrowth	No	NA	NA	QH1, HA29
Mapped Crack 2	11.7.2 Remnant	No	NA	NA	QH2, HA30
Mapped Crack 3	11.7.2 Remnant	No	NA	NA	QH3, HA31
Mapped Crack 4	11.7.2 Remnant	No	NA	NA	QH4, HA33
Mapped Crack 5	11.7.2 Remnant	No	NA	NA	QH5, HA35
Mapped Crack 6	11.7.2 Remnant	No	NA	NA	QH6, HA36

*Table Key: Ref – Reference Site Tertiary Assessment, HA – Fauna Habitat Assessment site, Cr – Crack Quaternary Assessment, SH – Sinkhole Quaternary Assessment, Cr_Ter – Crack Tertiary Assessment, QH – Quaternary Assessment (no subsidence)

3.2.2. Reference site results – vegetation and habitat

Two reference sites were established as a part of this field assessment on areas on Blackwater Mine with no historic underground mining. These included Reference Site 1 in remnant vegetation analogous with Regional Ecosystem 11.7.2, and Reference Site 2 in remnant vegetation analogous with Regional Ecosystem 11.7.6. Existing reference site BWM_REF05 (LEC, 2025) is also included in this report as it provides an additional reference site in Regional Ecosystem 11.7.2. Table 7 to Table 9 summarise the results of the reference sites, including vegetation and relevant MNES and MSES flora and fauna species.

Table 7: Reference Site 1 Summary.

Reference Site 1: Regional Ecosystem 11.7.2.	
Vegetation Community Description:	*Acacia shirleyi* woodland on ironstone jump-ups.
Fauna habitat type	*Acacia* woodland on ironstone jump-ups.
Relevant MNES and MSES fauna species	Squatter pigeon (breeding) Yakka skink (breeding) Short-beaked echidna (breeding)
Relevant MNES and MSES flora species:	*Bertya opponens*
Remnant status:	Remnant
Vegetation structure:	Mid-high
Ecological Dominant Layer:	Tree 1
EDL height (range)	6-12 m
Tree canopy cover (%)	89.4
Geology	Ironstone jump-ups
Landform	Upper slope
Soil type	Loam
Fauna habitat type description	This fauna habitat type has the potential to provide foraging habitat for the squatter pigeon as it is comprised of woodland on suitable well-draining soil. Breeding habitat is present in areas <1 km from a waterbody. This habitat type may provide breeding habitat for the yakka skink as it is situated on a land zone known to provide yakka skink habitat as per the Conservation advice, and contains coarse woody debris including hollow logs. This habitat type may provide breeding habitat for the short-beaked echidna as it provides suitable woodland habitat with coarse woody debris and termite mounds. Generally, this habitat type provides habitat for reptiles, woodland birds, small mammals and macropods as it contains woodland with habitat and foraging features such as coarse woody debris, leaf litter, seeding grasses, and rocky areas.
RE short description:	*Acacia spp.* woodland on Cainozoic lateritic duricrust. Scarp retreat zone.
EPBC Act threatened ecological community type	NA.
Total exotic ground cover (%)	0%
Emergent layer dominant species	*Blakella citriodora* (D)
Tree 1 layer dominant species	*Acacia shirleyi (D), Alphitonia excelsa, Eucalyptus exserta*
Shrub layer	*Bertya opponens* (C), *Acacia shirleyi* (C), *Dodonaea oxyptera, Everistia vacciniifolia*, *Erythroxylon australe*
Ground layer dominant species	*Entolasia stricta* (D), *Lomandra confertifolia, Aristida caput-medusae, Cyperus sp., Aristida calycina, Eragrostis sp., Dinebra decipiens, Opuntia sp., Sida sp., Parsonsia straminea, Abutilon sp.*
Disturbance notes	None.



Table Key: D – Dominant, C – Co-dominant.

Table 8: Reference Site 2 Summary.

Reference Site 2: Regional Ecosystem 11.7.6.	
Vegetation Community Description:	*Blakella citriodora* woodland with *Eucalyptus crebra* on ironstone jump-ups.
Fauna habitat type	Lemon-scented gum woodland with scattered ironbarks on ironstone jump-ups.
Relevant MNES and MSES fauna species	Squatter pigeon (breeding) Yakka skink (breeding) Short-beaked echidna (breeding)
Relevant MNES and MSES flora species:	*Bertya opponens*
Remnant status:	Remnant
Vegetation structure:	Mid-high
Ecological Dominant Layer:	Tree 1
EDL height (range)	12-24 m
Tree canopy cover (%)	96.6
Geology	Ironstone jump-ups
Landform	Upper slope
Soil type	Loam
Fauna habitat type description	This fauna habitat type has the potential to provide foraging habitat for the squatter pigeon as it is comprised of woodland on suitable well-draining soil. Breeding habitat is present in areas <1 km from a waterbody. This habitat type may provide breeding habitat for the yakka skink as it is situated on a land zone known to provide yakka skink habitat as per the Conservation advice, and contains coarse woody debris including hollow logs. This habitat type may provide breeding habitat for the short-beaked echidna as it provides suitable woodland habitat with coarse woody debris and termite mounds. Generally, this habitat type provides habitat for reptiles, woodland birds, small mammals and macropods as it contains woodland with habitat and foraging features such as coarse woody debris, leaf litter, seeding grasses, and rocky areas.
RE short description:	*Blakella citriodora* or *Eucalyptus crebra* woodland on Cainozoic lateritic duricrust.
EPBC Act threatened ecological community type	NA.
Total exotic ground cover (%)	0%
Tree 1 layer dominant species	*Blakella citriodora* (D), *Eucalyptus crebra* (A)
Tree 2 layer dominant species	*Acacia shirleyi* (D), *Blakella citriodora, Eucalyptus crebra, Grevillea striata*
Shrub layer	*Hibiscus heterophyllus* (C), *Phebalium glandulosum subsp. glandulosum* (C), *Alstonia constricta, Psydrax odorata, Dodonaea oxyptera, Myoporum acuminatum*
Ground layer dominant species	*Aristida calycina* (C), *Cymbopogon refractus* (C), *Entolasia stricta, Aristida caput-medusae, Ancistrachne uncinata*
Disturbance notes	None.



Table Key: D – Dominant, C – Co-dominant, A – Associated.

Table 9: Reference Site BWM_REF05 Summary.

Reference Site BWM_REF05: Regional Ecosystem 11.7.2.	
Vegetation Community Description:	*Acacia shirleyi* woodland on ironstone jump-ups.
Fauna habitat type	*Acacia* woodland on ironstone jump-ups.
Relevant MNES and MSES fauna species	Squatter pigeon (breeding) Yakka skink (breeding) Short-beaked echidna (breeding)
Relevant MNES and MSES flora species:	*Bertya opponens*
Remnant status:	Remnant
Vegetation structure:	Mid-high
Ecological Dominant Layer:	Tree 1
EDL height (range)	6-12 m
Tree canopy cover (%)	52.2%
Geology	Ironstone jump-ups
Landform	Upper slope
Soil type	Loam



Fauna habitat type description	This fauna habitat type has the potential to provide foraging habitat for the squatter pigeon as it is comprised of woodland on suitable well-draining soil. Breeding habitat is present in areas <1 km from a waterbody. This habitat type may provide breeding habitat for the yakka skink as it is situated on a land zone known to provide yakka skink habitat as per the Conservation advice and contains coarse woody debris including hollow logs. This habitat type may provide breeding habitat for the short-beaked echidna as it provides suitable woodland habitat with coarse woody debris and termite mounds. Generally, this habitat type provides habitat for reptiles, woodland birds, small mammals and macropods as it contains woodland with habitat and foraging features such as coarse woody debris, leaf litter, seeding grasses, and rocky areas.
RE short description:	*Acacia spp.* woodland on Cainozoic lateritic duricrust. Scarp retreat zone.
EPBC Act threatened ecological community type	NA.
Tree 1 layer dominant species	*Acacia shirleyi* (D), *Blakella citriodora subsp. citriodora, Eucalyptus crebra*
Shrub layer	*Everistia vacciniifolia, Eucalyptus shirleyi, Psydrax oleifolia, Geijera parviflora, Bertya opponens, Croton phebalioides.*
Ground layer dominant species	*Aristida calycina, Digitaria sp, Aristida sp., Eragrostis sp., Aristida caput-medusae, Entolasia stricta, Ancistrachne uncinulata, Cenchrus ciliaris, Cenchrus pennisetiformis*
Disturbance notes	None.

Table Key: D – Dominant.

3.2.3. Subsidence crack and sinkhole sites – vegetation and flora

The results of the ecological assessment showed that the Survey area occurred across both remnant, high value regrowth (HVR) and non-remnant areas. There was evidence of minor canopy tree dieback potentially associated with Crack 11, which did not affect the remnant vegetation status of this site whereby when compared to reference site 1 for RE11.7.2 the vegetation maintained 70% of the height and at least 50% of the overall canopy cover. Scattered minor canopy tree dieback occurred at Crack 17 and Cracks 19, 20, 21 and 22, however this was widespread throughout the general area and therefore was determined to not be associated with the subsidence cracking. There was evidence of selective logging in some areas (refer to Appendix C for images). EPBC Act listed Vulnerable plant *Bertya opponens* occurred closely at many subsidence crack sites. Figure 4 shows *Bertya opponens* sightings and habitat within the Survey area. No other threatened flora species were identified during the field assessment.

A list of all flora species recorded in the Survey area has been provided in Appendix B.

Vegetation analogous with remnant and HVR regional ecosystems 11.7.2 and 11.7.6 was identified throughout the Survey area (refer Figure 3).

Table 10 - Table 13 summarise the results of the subsidence crack and sinkhole sites, including vegetation and relevant MNES and MSES flora and fauna species.

Figure 3: Ground-truthed regional ecosystems within the Survey area.

685000

7355000

ML 70091

ML 1812

ML 1792

ML 1773

ML 1767

ML 1771

ML 1860

ML 70091

BLACKWATER MINE

Kenmare and Laleham Underground Subsidence Crack Monitoring

GDA2020, MGA Zone 55

0 200 400 600 800 1,000

m

BWM Mining Lease
Area of Interest
Kenmare
Laleham
Crack / Sinkhole

11.7.2, Remnant
11.7.2, HVR
11.7.2, Non-remnant
11.7.2/11.7.6 (80%/20%), Remnant
11.7.2/11.7.6 (80%/20%), Regrowth
11.7.2/11.7.6 (80%/20%), Non-remnant
11.7.6, HVR
Non-remnant

LYNGCO ENVIRONMENTAL CONSULTING

Drawn By: C Schlebusch

Requested by: S Lyngcoln

Date: 14/10/2025

Figure 3

Ground-truthed Regional Ecosystems

RTPL_LE_BMRM001_WHC028_MAP0004_A

Path: S:\Plans\Project_Specific\LyngcoEnvironmental\BlackwaterMine\WHC028 Subsidence and Cracking\RTPL_LE_BMRM001_WHC028_MAP0004_A BWM Subsidence and Cracking Kenmare and Laleham GTRE.aprx

Figure 4: *Bertya opponens* habitat within the Survey area.

685000

7355000

ML 70091

ML 1812

ML 1792

ML 1773

ML 1771

ML 1767

ML 1860

ML 70091

BLACKWATER MINE

Kenmare and Laleham Underground Subsidence Crack Monitoring

GDA2020, MGA Zone 55

0 200 400 600 800 1,000

m

- BWM Mining Lease
- Area of Interest
- Kenmare
- Laleham
- Crack / Sinkhole
- *Bertya opponens* sighting
- *Bertya opponens* habitat

LYNGCO ENVIRONMENTAL CONSULTING

Drawn By:	C Schlebusch
Requested by:	S Lyngcoln
Date:	14/10/2025

Figure 4

***Bertya opponens* habitat**

RTPL_LE_BMRM001_WHC028_MAP0004_A

Path: S:\Plans\Project_Specific\LyngcoEnvironmental\BlackwaterMine\WHC028 Subsidence and Cracking\RTPL_LE_BMRM001_WHC028_MAP0005_A BWM Subsidence and Cracking Kenmare and Laleham Bertya opponens habitat.aprx

Table 10: Subsidence crack and sinkhole sites: Regional ecosystem 11.7.2 (Remnant).

Subsidence crack and sinkhole sites: Regional ecosystem 11.7.2 (Remnant).	
Vegetation Community Description:	*Acacia shirleyi* woodland on ironstone jump-ups.
Fauna habitat type	*Acacia* woodland on ironstone jump-ups.
Relevant MNES and MSES fauna species	Squatter pigeon (breeding) Yakka skink (breeding) Short-beaked echidna (breeding)
Relevant MNES and MSES flora species:	*Bertya opponens*
Remnant status:	Remnant
Vegetation structure:	Mid-high
Ecological Dominant Layer:	Tree 1
EDL height (range)	6-14 m
Tree canopy cover (%)	81
Geology	Ironstone jump-ups
Landform	Upper slope
Soil type	Loam
Fauna habitat type description	This fauna habitat type has the potential to provide foraging habitat for the squatter pigeon as it is comprised of woodland on suitable well-draining soil. Breeding habitat is present in areas <1 km from a waterbody. This habitat type may provide breeding habitat for the yakka skink as it is situated on a land zone known to provide yakka skink habitat as per the Conservation advice, and contains coarse woody debris including hollow logs. This habitat type may provide breeding habitat for the short-beaked echidna as it provides suitable woodland habitat with coarse woody debris and termite mounds. Generally, this habitat type provides habitat for reptiles, woodland birds, small mammals and macropods as it contains woodland with habitat and foraging features such as coarse woody debris, leaf litter, seeding grasses, and rocky areas.
RE short description:	*Acacia spp.* woodland on Cainozoic lateritic duricrust. Scarp retreat zone.
EPBC Act threatened ecological community type	NA.
Total exotic ground cover (%)	0%
Emergent layer dominant species	*Blakella citriodora* (D)
Tree 1 layer dominant species	*Acacia shirleyi (D), Eucalyptus exserta*
Shrub layer	*Everistia vacciniifolia* (C), *Croton insularis, Erythroxylon australe, Bertya opponens, Geijera parviflora, Acalypha eremorum*
Ground layer dominant species	*Entolasia stricta* (C), *Ancistrachne uncinata* (C), *Enteropogon ramosus, Parsonsia straminea*
Disturbance notes	Selective logging.
Relevant sites	Crack 3, Cracks 5 & 6, Cracks 8-11, Cracks 15-21*, Crack 25, Mapped Cracks 2-6.



Table Key: D – Dominant, C – Co-dominant.

*Crack 18 was associated with an ecotonal area of RE 11.7.6/11.7.2 vegetation.

Table 11: Subsidence crack and sinkhole sites: Regional ecosystem 11.7.2 (High Value Regrowth).

Subsidence crack and sinkhole sites: Regional ecosystem 11.7.2 (High Value Regrowth).	
Vegetation Community Description:	*Acacia shirleyi* woodland on ironstone jump-ups.
Fauna habitat type	*Acacia* woodland on ironstone jump-ups.
Relevant MNES and MSES fauna species	Squatter pigeon (breeding) Yakka skink (breeding) Short-beaked echidna (breeding)
Relevant MNES and MSES flora species:	*Bertya opponens*
Remnant status:	High Value Regrowth
Vegetation structure:	Low
Ecological Dominant Layer:	Tree 1
EDL height (range)	4-10 m
EDL cover density	Mid-dense (50-80%)
Geology	Ironstone jump-ups
Landform	Upper slope
Soil type	Loam
Fauna habitat type description	This fauna habitat type has the potential to provide foraging habitat for the squatter pigeon as it is comprised of woodland on suitable well-draining soil. Breeding habitat is present in areas <1 km from a waterbody. This habitat type may provide breeding habitat for the yakka skink as it is situated on a land zone known to provide yakka skink habitat as per the Conservation advice, and contains coarse woody debris including hollow logs. This habitat type may provide breeding habitat for the short-beaked echidna as it provides suitable woodland habitat with coarse woody debris and termite mounds. Generally, this habitat type provides habitat for reptiles, woodland birds, small mammals and macropods as it contains woodland with habitat and foraging features such as coarse woody debris, leaf litter, seeding grasses, and rocky areas.
RE short description:	*Acacia spp.* woodland on Cainozoic lateritic duricrust. Scarp retreat zone.
EPBC Act threatened ecological community type	NA.
Total exotic ground cover (%)	0%
Emergent layer dominant species	*Blakella citriodora* (D)
Tree 1 layer dominant species	*Acacia shirleyi (D), Eucalyptus exserta* (A)
Shrub layer	*Bertya opponens* (S), *Dodonaea oxyptera* (A), *Everistia vacciniifolia* (A)
Ground layer dominant species	*Entolasia stricta* (S), *Dinebra decipiens* (S), *Ancistrachne uncinata* (A)
Disturbance notes	None.
Relevant sites	Sinkhole 1, Crack 12b, Cracks 22-24, Mapped Crack 1.



Table Key: D – Dominant, S – Sub-dominant, C – Co-dominant, A – Associated.

Table 12: Subsidence crack and sinkhole sites: Regional Ecosystem 11.7.6 (Remnant).

Subsidence crack and sinkhole sites: Regional Ecosystem 11.7.6 (Remnant).	
Vegetation Community Description:	*Blakella citriodora* woodland on ironstone jump-ups.
Fauna habitat type	Lemon-scented gum woodland on ironstone jump-ups.
Relevant MNES and MSES fauna species	Squatter pigeon (breeding) Yakka skink (breeding) Short-beaked echidna (breeding)
Relevant MNES and MSES flora species:	*Bertya opponens*
Remnant status:	Remnant
Vegetation structure:	Mid-high
Ecological Dominant Layer:	Tree 1
EDL height (range)	12-24 m
Tree canopy cover (%)	52
Geology	Ironstone jump-ups
Landform	Upper slope
Soil type	Loam
Fauna habitat type description	This fauna habitat type has the potential to provide foraging habitat for the squatter pigeon as it is comprised of woodland on suitable well-draining soil. Breeding habitat is present in areas <1 km from a waterbody. This habitat type may provide breeding habitat for the yakka skink as it is situated on a land zone known to provide yakka skink habitat as per the Conservation advice, and contains coarse woody debris including hollow logs. This habitat type may provide breeding habitat for the short-beaked echidna as it provides suitable woodland habitat with coarse woody debris and termite mounds. Generally, this habitat type provides habitat for reptiles, woodland birds, small mammals and macropods as it contains woodland with habitat and foraging features such as coarse woody debris, leaf litter, seeding grasses, and rocky areas.
RE short description:	*Blakella citriodora* or *Eucalyptus crebra* woodland on Cainozoic lateritic duricrust.
EPBC Act threatened ecological community type	NA.
Total exotic ground cover (%)	4%
Tree 1 layer dominant species	*Blakella citriodora* (D), *Acacia shirleyi* (C)
Tree 2 layer dominant species	*Acacia shirleyi* (D), *Alphitonia excelsa* (S)
Shrub layer	*Acacia macradenia* (C), *Phebalium glandulosum subsp. glandulosum, Alstonia constricta, Cassia brewsteri, Geijera salicifolia*
Ground layer dominant species	*Enneapogon pallidus, Bothriochloa bladhii, Cenchrus ciliaris, Melinis repens, Cymbopogon refractus, Aristida calycina, Dinebra decipiens, Sida sp., Gossypium sturtianum*
Disturbance notes	Selective logging.
Relevant sites	Crack 7, Crack 14, Crack 18*



Table Key: D – Dominant, S – Sub-dominant, C – Co-dominant, A – Associated.

*Crack 18 was associated with an ecotonal area of RE 11.7.6/11.7.2 vegetation.

Table 13: Subsidence crack and sinkhole sites: non-remnant areas.

Subsidence crack and sinkhole sites: non-remnant areas.	
Vegetation Community Description:	Cleared or young regrowth non-remnant areas.
Fauna habitat type	Cleared or young regrowth non-remnant areas.
Relevant MNES and MSES fauna species	None.
Relevant MNES and MSES flora species:	*Bertya opponens* at Crack 2.
Remnant status:	Non-remnant
Vegetation structure:	NA.
Ecological Dominant Layer:	NA.
EDL height (range)	NA.
EDL canopy cover (%)	NA.
Geology	Ironstone jump-ups
Landform	Upper slope
Soil type	Loam/Gravel
Fauna habitat type description	This fauna habitat type consists of cleared and/or young regrowth vegetation. This habitat type does not provide any foraging or breeding habitat for relevant MNES or MSES fauna species.
RE short description:	NA.
EPBC Act threatened ecological community type	NA.
Total exotic ground cover (%)	NA.
Tree 1 layer dominant species	*Acacia shirleyi* (D)
Shrub layer	*Bertya opponens**
Ground layer dominant species	*Paspalidium caespitosum* (D)
Relevant sites	Cracks 1, 2, 4, 12 and 13.



Table Key: D – Dominant, C – Co-dominant, A – Associated.

**Bertya opponens* present at non-remnant site Crack 2.

3.2.4. Subsidence cracks and sinkholes – fauna

The field assessment recorded a total of 12 native fauna species including 11 bird species and 1 mammal species. No threatened fauna species were detected during the field survey. A complete fauna list is presented in Appendix B.

Table 14 below summarises the fauna habitats present in the Survey area. Refer to Table 10 - Table 13 for detailed descriptions of each fauna habitat type.

Table 14: Summary of fauna habitat types within the Survey area.

Fauna Habitat Type	Regional Ecosystem and Condition	Vegetation Survey Sites	Habitat Assessment Sites	Relevant threatened or listed fauna species
Acacia woodland on ironstone jump-ups.	11.7.2 Remnant and HVR	SH1, Cr3, Cr5, Cr6, Cr8-11, Cr12b, Cr15-25*, QH1-6.	HA3, HA4, HA7, HA8, HA10-13, HA16, HA19-36.	Squatter pigeon Yakka skink Short-beaked echidna
Lemon-scented gum woodland on ironstone jump-ups.	11.7.6 Remnant	Cr7Ter, Cr14, Cr18*.	HA9, HA18, HA22.	Squatter pigeon Yakka skink Short-beaked echidna
Cleared or young regrowth non-remnant areas.	Cleared or young regrowth non-remnant areas	Cr1, Cr2, Cr4, Cr12, Cr13.	HA1, HA2, HA6, HA15, HA17.	None

Table Key: HA – Fauna Habitat Assessment site, Cr – Crack Quaternary Assessment, SH – Sinkhole Quaternary Assessment, Cr_Ter – Crack Tertiary Assessment, QH – Quaternary Assessment (no subsidence).
*Crack 18 was associated with an ecotonal area of RE 11.7.6/11.7.2 vegetation.

Potential habitat was present for the following MNES and MSES fauna species within the survey area:

- Squatter pigeon (*Geophaps scripta scripta,* listed as Vulnerable under the EPBC and NC Acts)
- Yakka skink (*Egernia rugosa*)
- Short-beaked echidna (*Tachyglossus aculeatus,* listed as Special Least Concern under the NC Act)

There was no habitat for the following threatened species within the survey area:

- Koala (*Phascolarctos cinereus*)
- Greater glider (*Petauroides volans*)

There was no koala habitat within the survey area as there were no suitable vegetation communities dominated or co-dominated by locally important koala tree species (LIKT) for the Brigalow Belt as per *A review of koala habitat assessment criteria and methods* (Youngentob, Marsh, & Skewes, 2021).
There was no greater glider habitat within the survey area, as whilst feed trees were present (*Blakella citriodora*), there were insufficient tree hollows to support the shelter and breeding requirements of the species (Kerswell, Kaveney, Evans, & Appleby, 2020).

3.3. Impact Analysis

This assessment found no evidence of significant impacts to vegetation or fauna habitat due to subsidence cracking or sinkholes.

Five subsidence cracking sites were in non-remnant areas and hence cracking did not impact any protected vegetation. Twenty sites had no evidence of any impact to vegetation growth or structure caused by subsidence cracking or sinkholes. One site (Crack 11) had evidence of minor canopy tree dieback that was potentially associated with the subsidence crack. A tertiary vegetation assessment (Cr11Ter) confirmed that any impact to tree canopy cover did not affect the remnant status of the vegetation (refer Table 15). The tree canopy cover for Crack 11 was >100% of the BioCondition benchmark for RE 11.7.2 and was > 50% of the canopy cover value for Reference Site 1. The T1 tree canopy height for Crack 11 was >85% of the BioCondition benchmark and greater than the tree height of Reference Site 1.

Non-native species cover was also not notably different between the reference sites and the subsidence sites, with tertiary sites recording between 0 and 4% non-native cover (refer Table 15). Native species richness was similar between the reference sites and tertiary subsidence sites. For RE 11.7.6, both Reference Site 1 and Crack 7 recorded a total native species richness of 15 tree, shrub, grass and forb species. For RE 11.7.2, the Crack 11 site featured 70% of the total native species richness of corresponding Reference Site 2, and a similar number to BWM_REF05 (refer Table 15).

Table 15: Comparison of representative subsidence sites with reference sites – canopy cover, non-native species cover and native species richness.

Site ID	Regional ecosystem and status	Tree Canopy Cover (%)	Tree Canopy Cover (%) - BioCondition Benchmark	T1 Canopy Height (m)	T1 Canopy Height – BioCondition Benchmark	Non-native species cover (%)	Native species richness (trees, shrubs, grasses and forbs)
Crack 11	11.7.2 Remnant	81	60	12	14	0	13
Reference Site 1	11.7.2 Remnant	89.4	60	11	14	0	19
Reference Site BWM_REF05	11.7.2 Remnant	52.2	60	NA	14	NA	13
Crack 7	11.7.6 Remnant	52	47	19	25	4	15
Reference Site 2	11.7.6 Remnant	96.6	47	22	25	0	15

Habitat suitability for fauna was also not significantly affected by subsidence cracks or sinkholes. The subsidence cracks and sinkholes did not affect key components of squatter pigeon habitat. These include a

suitable waterbody for drinking water within 3 km, suitable well-draining soil, and areas of patchy ground cover including bare ground for dust-bathing (Kerswell, Kaveney, Evans, & Appleby, 2020). Suitable grasses for foraging were present at both the reference and subsidence sites.

Yakka skink habitat is broadly defined in the Conservation advice (DoE, 2014), and hence the species may not occur in many areas defined as potential yakka skink habitat. Nonetheless, habitat suitability for the yakka skink was similar in both the reference sites and subsidence sites. Coarse woody debris for shelter was present across all sites. Subsidence cracking may provide additional habitat amenity for the yakka skink, as the species is known to use rock crevices and tunnel erosion for shelter (Kerswell, Kaveney, Evans, & Appleby, 2020).

Subsidence did not affect habitat suitability for the short-beaked echidna. Habitat features including coarse woody debris and termite nests were present across both reference and subsidence sites.

In general, the subsidence cracks may pose minor movement barriers to terrestrial fauna. In some cases, cracks had steep sides which may impede escape for any fauna that enter the crack. However, depth varied within each crack (refer to photos in Appendix C), providing shallower areas where fauna could more easily escape. There was no evidence of trapped fauna in the surveyed cracks.

From an ecological perspective, amelioration of subsidence-caused cracking and sinkholes is not recommended. Table 16 outlines each subsidence-caused crack or sinkhole, the ecological constraints associated with each (including *Bertya opponens* presence and fauna habitat), and subsequent recommendations.

Table 16: Summary of subsidence crack and sinkhole sites, including impact to vegetation or fauna, presence of *Bertya opponens* and MNES and MSES fauna habitat, and subsequent recommendations.

Subsidence site	Regional ecosystem and condition	Subsidence impact on vegetation and/or fauna	*Bertya opponens* presence	Relevant MNES or MSES fauna habitat	Recommendations
Potential Sinkhole 1	11.7.2 High Value Regrowth	No significant impact	Yes	Squatter pigeon, Yakka skink, Short-beaked echidna.	Monitor. SIA required if disturbed due to *Bertya opponens* presence.
Crack 1	Non-remnant	No significant impact	No	None.	No constraints, fill crack if necessary.
Crack 2	Non-remnant	No significant impact	Yes		Monitor. SIA required if disturbed due to *Bertya opponens* presence.
Crack 3	11.7.2 Remnant	No significant impact	Yes	Squatter pigeon, Yakka skink, Short-beaked echidna.	Monitor. SIA required if disturbed due to *Bertya opponens* presence.
Crack 4	Non-remnant	No significant impact	No	None.	No constraints, fill crack if necessary.
Crack 5	11.7.2 Remnant	No significant impact	Yes	Squatter pigeon, Yakka skink, Short-beaked echidna.	Monitor. SIA required if disturbed due to *Bertya opponens* presence.
Crack 6	11.7.2 Remnant	No significant impact	Yes		Monitor. SIA required if disturbed due to *Bertya opponens* presence.
Crack 7	11.7.2 Remnant	No significant impact	No		Monitor. Remnant RE.
Crack 8	11.7.2 Remnant	No significant impact	Yes		Monitor. SIA required if disturbed due to *Bertya opponens* presence.
Crack 9	11.7.2 Remnant	No significant impact	Yes		Monitor. SIA required if disturbed due to *Bertya opponens* presence.
Crack 10	11.7.2 Remnant	No significant impact	Adjacent		Monitor. Avoid adjacent *Bertya opponens* and remnant vegetation if filling crack.

Subsidence site	Regional ecosystem and condition	Subsidence impact on vegetation and/or fauna	*Bertya opponens* presence	Relevant MNES or MSES fauna habitat	Recommendations
Crack 11	11.7.2 Remnant	No significant impact	Yes		Monitor. SIA required if disturbed due to *Bertya opponens* presence.
Crack 12	Non-remnant	No significant impact	Adjacent	None.	No constraints in cleared non-remnant area. Fill crack if required. Adjacent area of HVR 11.7.2 contains *Bertya opponens*.
Crack 12b	11.7.2 High Value Regrowth	No significant impact	Yes	Squatter pigeon, Yakka skink, Short-beaked echidna.	Monitor. SIA required if disturbed due to *Bertya opponens* presence.
Crack 13	Non-remnant	No significant impact	No	None.	No constraints in cleared non-remnant area. Fill crack if required. Adjacent area of HVR 11.7.2 contains *Bertya opponens*.
Crack 14	11.7.6 Remnant	No significant impact	Yes	Squatter pigeon, Yakka skink, Short-beaked echidna.	Monitor. Fill accessible areas that avoid impact to *Bertya opponens* or undertake SIA.
Crack 15	11.7.2 Remnant	No significant impact	No		Monitor. Remnant RE 11.7.2 recommend do not disturb.
Crack 16	11.7.2 Remnant	No significant impact	No		Monitor. Remnant RE 11.7.2 recommend do not disturb.
Crack 17	11.7.2 Remnant	No significant impact	Yes		Monitor. SIA required if disturbed due to *Bertya opponens* presence.
Crack 18	11.7.6/11.7.2 Remnant	No significant impact	Yes		Monitor. SIA required if disturbed due to *Bertya opponens* presence.
Crack 19	11.7.2 Remnant	No significant impact	Yes		Monitor. SIA required if disturbed due to *Bertya opponens* presence.

Subsidence site	Regional ecosystem and condition	Subsidence impact on vegetation and/or fauna	*Bertya opponens* presence	Relevant MNES or MSES fauna habitat	Recommendations
Crack 20	11.7.2 Remnant	No significant impact	Yes		Monitor. SIA required if disturbed due to *Bertya opponens* presence.
Crack 21	11.7.2 Remnant	No significant impact	Yes		Monitor. SIA required if disturbed due to *Bertya opponens* presence.
Crack 22	11.7.2 High Value Regrowth	No significant impact	Yes		Monitor. SIA required if disturbed due to *Bertya opponens* presence.
Crack 23	11.7.2 High Value Regrowth	No significant impact	Yes		Monitor. SIA required if disturbed due to *Bertya opponens* presence.
Crack 24	11.7.2 High Value Regrowth	No significant impact	Yes		Monitor. SIA required if disturbed due to *Bertya opponens* presence.
Crack 25	11.7.2 Remnant	No significant impact	Yes		Monitor. SIA required if disturbed due to *Bertya opponens* presence.

Table Key: SIA – Significant Impact Assessment

4. Recommendations and Conclusions

The purpose of this BWM underground mining surface cracks assessment was to provide a field-based technical assessment of the potential impacts to vegetation and habitat from surface cracks and sinkholes as a result of subsidence from historical underground mining on BWM in response to a request for more information (RFI) from the Department of the Environment, Tourism, Science and Innovation (DETSI).

This assessment found no evidence of significant impacts to vegetation or fauna habitat due to subsidence cracking or sinkholes. One site (Crack 11) had evidence of minor canopy tree dieback that was potentially associated with the subsidence crack. A tertiary vegetation assessment (Cr11Ter) confirmed that any impact to tree canopy cover did not affect the remnant status of the vegetation (refer Table 15).

Bertya opponens (Vulnerable under the EPBC Act) was identified at most subsidence sites associated with remnant or HVR vegetation (refer Table 16). Potential habitat was also present at many sites (refer Table 16) for the following fauna:

- Squatter pigeon (*Geophaps scripta scripta,* Vulnerable under the EPBC and NC Acts)
- Yakka skink (*Egernia rugosa*, Vulnerable under the EPBC and NC Acts)
- Short-beaked echidna (*Tachyglossus aculeatus*, Special Least Concern under the NC Act).

Habitat suitability for these fauna was not affected by subsidence cracking or sinkholes.

From an ecological standpoint, amelioration of subsidence-caused cracking and sinkholes is not recommended. If BWM decides to undertake amelioration of cracks for geotechnical or safety reasons, a Significant Impact Assessment would be required at all sites containing *Bertya opponens.* Refer to Table 16 for specific recommendations for each site.

Finally, if BWM consider to ameliorate surface cracks in areas of cleared non-remnant vegetation it is recommended that adjacent areas of remnant and/or HVR vegetation and areas mapped as habitat for *Bertya opponens* (Figure 4) are demarcated and avoided. No ecological constraints were otherwise recorded in non-remnant vegetation (Figure 3).

Appendix A Desktop Assessment

Table 1: Desktop Threatened Fauna Likelihood of Occurrence assessment within the Survey area.

Common Name	Scientific Name	Status		Habitat Description	Likelihood of Occurrence	Justification
		EPBC Act	NC Act			
Birds						
Curlew Sandpiper	*Calidris ferruginea*	CE, M, Ma	CE	Occurs around the coasts of Australia and is widespread inland in smaller numbers. In Queensland there are scattered records occurring in the Gulf of Carpentaria, with widespread records along the coast south of Cairns. Habitat generally consists of intertidal mudflats in sheltered coastal areas, though is known to occur around non-tidal swamps, lakes, and ephemeral water bodies. They roost on beaches, sandspits, islets and occasionally dunes. The species spends the non-breeding season (spring and summer) in Australia (Department of Climate Change, Energy, the Environment and Water, 2023).	Unlikely	The survey area does not contain any mapped wetland habitat.
Australian Painted Snipe	*Rostratula australis*	E	E	Occurs across Australia though is more common in eastern Australia. They inhabit permanent and ephemeral wetlands, preferably freshwater though occasionally brackish, that typically have emergent, fringing vegetation. They will sometimes use areas lined with trees. Required breeding habitat is shallow freshwater wetlands (often islands within wetlands) with wet mud, dense low cover, and upper and canopy cover nearby (Department of Climate Change, Energy, the Environment and Water, 2023).	Unlikely	The survey area does not contain any mapped wetland habitat.
Red Goshawk	*Erythrotriorchis radiatus*	E	E	Occurs from the Kimberly in Western Australia to the Cape York Peninsula in Queensland, with records in south-east Queensland becoming increasingly scant since 2010. The species inhabits open forests, woodlands, wooded riparian zones that transect tropical savannas, and rainforest ecotones along coastal and sub-coastal regions. They prefer intact environments with a mosaic of vegetation types and permanent water. They require trees over 20 m tall with an open limb and canopy structure for nesting (Department of Climate Change, Energy, the Environment and Water, 2023).	Unlikely	Records are not within 15 km and the survey area does not contain mapped suitable habitat.
Southern Black-throated Finch	*Poephila cincta cincta*	E	E	Occurs in grassy woodland dominated by eucalypts, paperbarks or acacias where there are seeding grasses and water. Nests in tree hollows or builds domed nests in trees (Garnett, 2000).	Unlikely	The survey area is not within the current known distribution of the species (DCCEEW, 2025).
Star Finch (eastern), Star Finch (southern)	*Neochmia ruficauda ruficauda*	E	E	The Star Finch occurs mainly in grasslands and grassy woodlands that are located close to bodies of fresh water. It also occurs in cleared or suburban areas such as along roadsides and in towns (Ausgrid 2011).	Unlikely	This species is likely extinct.
Diamond Firetail	*Stagonopleura guttata*	V	V	Occurs from very southern Queensland to the Eyre Peninsula, South Australia, and up to 300km inland. They inhabit woodlands, open forests and other lightly timbered habitats dominated by Eucalypts, Acacias and/or Casuarinas. They exhibit a preference for high grass coverage, low tree density and low coarse woody debris and litter (Department of Climate Change, Energy, the Environment and Water, 2023).	Unlikely	Records are not within 15 km and the survey area does not contain mapped suitable habitat.
Latham's Snipe	*Gallinago hardwickii*	V, M, Ma	V	Occurs from the Cape York Peninsula in Queensland south to South Australia, and inland west of the Great Dividing Range. They inhabit various wetlands, permanent and ephemeral, of varying salinity, though they prefer freshwater with low, dense vegetation. The species spends the non-breeding season (spring and summer) in Australia (Department of Climate Change, Energy, the Environment and Water, 2023).	Unlikely	Records are not within 15 km and the survey area does not contain mapped suitable habitat.

Common Name	Scientific Name	Status		Habitat Description	Likelihood of Occurrence	Justification
		EPBC Act	NC Act			
Squatter Pigeon (southern)	*Geophaps scripta scripta*	V	V	Occurs from the Burdekin-Lynd Divide in north Queensland to the Border Rivers in northern New South Wales and inland to Hughenden to Charleville. They are found in remnant, regrowth and modified open-forest and wooded communities dominated by Eucalyptus, Corymbia, Acacia or Callitris species and within 3 km of water bodies. They require patchy understory with tussocks where vegetation is generally below 33% on well-draining, gravelly, sandy, or loamy soils. Breeding occurs within 1km of a suitable, permanent waterbody (Department of Climate Change, Energy, the Environment and Water, 2023).	Potential	Whilst records are not within 15km, the survey area contains mapped potentially suitable habitat.
Black-breasted Button-quail	*Turnix melanogaster*	V	V	Occurs in the coastal and subcoastal from Byfield in Queensland to the New South Wales tablelands. The species is predominantly found in rainforests and forests with a dense understorey and fertile soil, where annual rainfall is between 770-1200 mm. They can occasionally be found in low, dense acacia thickets and in vegetation behind sand dunes, and rarely in Eucalypt forests (Department of Climate Change, Energy, the Environment and Water, 2023).	Unlikely	The survey area does not contain mapped suitable habitat.
Painted Honeyeater	*Grantiella picta*	V	V	Occurs sporadically from south-eastern Australia to north-western Queensland and across to eastern Northern Territory. They are found in Eucalypt, Melaleuca, Acacia and Casuarina forests and woodlands that have an abundance of mature trees with mistletoes present, which is their primary food source. They prefer larger sections of intact habitat over strips of remnant vegetation (such as road reserve) though exceptions have been recorded when mistletoes are present in particularly high abundance. Nesting also occurs where mistletoes are abundant (Department of Climate Change, Energy, the Environment and Water, 2023).	Unlikely	The survey area does not contain mapped suitable habitat.
Grey Falcon	*Falco hypoleucos*	V	V	Occurs in inland Australia in arid and semi-arid conditions, including Murray-Darling Basin, Eyre Basin, central Australia, and Western Australia where annual rainfall is below 500 mm. It appears to be absent east of the Great Dividing Range. They are found in lightly wooded plains with a preference for Acacia woodlands with vegetated watercourses. They require abandoned nests in tall trees for nesting (Department of Climate Change, Energy, the Environment and Water, 2023).	Unlikely	The survey area does not contain mapped suitable habitat.
White-throated Needletail	*Hirundapus caudacutus*	V, M, Ma	V	Occurs from northern Queensland through to south-eastern Australia and inland to the west of the Great Dividing Range, and in Tasmania. The species is nearly exclusively aerial. They are found above a variety of ecosystems, though there appears to be preference for open forests, rainforest, and heathlands, and less often over woodland and treeless areas. The species spends the non-breeding season (spring and summer) in Australia (Department of Climate Change, Energy, the Environment and Water, 2023).	Unlikely	This species is nearly exclusively aerial.
Sharp-tailed Sandpiper	*Calidris acuminata*	V, M, Ma	V	Occurs along the coastline of Queensland, New South Wales, and Victoria, with scattered records inland and in other states. The species occurs in freshwater/brackish wetlands that have muddy edges with sedges, grass, saltmarsh, or other low vegetation. They can be attracted to aquatic vegetation such as algae mats and water weeds. The species spends the non-breeding season (spring and summer) in Australia (Department of Climate Change, Energy, the Environment and Water, 2023).	Unlikely	The survey area does not contain mapped suitable wetland habitat.
Oriental Cuckoo	*Cuculus optatus*	M	SL	Occurs along the coastline of Northern Territory, Queensland, and New South Wales. The species often inhabits rainforest, vine thickets, wet sclerophyll forest and open woodlands. The species spends the non-breeding season (spring and summer) in Australia (iNaturalist, 2023).	Unlikely	The survey area does not contain mapped suitable habitat.
Fork-tailed Swift	*Apus pacificus*	M, Ma	SL	Occurs across all Australia, though the species is nearly exclusively aerial. The species generally occur over inland plains, sometimes coastal areas. The species spends the non-breeding season	Unlikely	This species is nearly exclusively aerial.

Common Name	Scientific Name	Status		Habitat Description	Likelihood of Occurrence	Justification
		EPBC Act	NC Act			
				(spring and summer) in Australia (Department of Climate Change, Energy, the Environment and Water, 2023).		
Pectoral Sandpiper	*Calidris melanotos*	M, Ma	SL	Occurs around the Cairns region in Queensland, widespread in New South Wales, and in southern Victoria, with isolated records throughout the rest of Australia. The species prefers shallow fresh or saline wetlands, generally coastal or near coastal, with muddy edges and low, fringing, or emergent vegetation. The species spends the non-breeding season (spring and summer) in Australia (Department of Climate Change, Energy, the Environment and Water, 2023).	Unlikely	The survey area does not contain mapped suitable wetland habitat.
Osprey	*Pandion haliaetus*	M, Ma	SL	Generally a coastal species, occurring in estuaries, bays, inlets, islands and surrounding waters, coral atolls, reefs, lagoons, rock cliffs and stacks. Sometimes ascends larger rivers to far inland. Builds nests high in tree, on pylon or on ground on islands. Feeds on fish (Pizzey and Knight 2007).	Unlikely	The survey area does not contain suitable mapped coastal or riverine habitat.
Common Sandpiper	*Actitis hypoleucos*	M, Ma	SL	Occurs along all coastlines of Australia and found in many inland areas where freshwater or saltwater wetlands are present. The species exhibits a preference for mangroves, muddy margins and or rocky shores, and is rarely found on mudflats. They have been recorded in estuaries, deltas, banks, lakes, reservoirs, dams, and occasionally piers and jetties. Roosting habitat is generally rocks or roots/branches of vegetation, particularly mangroves. The species spends the non-breeding season (spring and summer) in Australia (Department of Climate Change, Energy, the Environment and Water, 2023).	Unlikely	The survey area does not contain mapped suitable wetland habitat.
Yellow Wagtail	*Motacilla flava*	M, Ma	SL	This species occurs in a range of habitats including estuarine habitats such as sand dunes, mangrove forests and coastal saltmarshes. This species also occurs in open grassy areas including disturbed sites such as sports grounds and has been recorded on the edges of wetlands, swamps, lakes and farm dams. This species migrates from Asia to Australia in spring-summer. It has been recorded in the estuarine areas of the Hunter River in Newcastle NSW and in QLD and the north of NT and WA (Birds Australia, 2007).	Unlikely	The species is rare and the survey area does not contain suitable estuarine habitat.
Mammals						
Greater Glider (southern and central)	*Petauroides volans*	E	E	Occurs from Proserpine in Queensland south through New South Wales to Blackwood in Victoria in Eucalypt forests and woodlands below 1200 m above sea level. Tall, montane and moist forests tend to be preferred, though they can be found in drier habitats, and they favour forests with a diversity of Eucalypt species with seasonal growth variation for year-round foraging. They require large, old trees with hollows for dens (Department of Climate Change, Energy, the Environment and Water, 2023).	Potential	Whilst records are not within 15 km, the survey area contains potentially suitable mapped habitat.
Northern Quoll	*Dasyurus hallucatus*	E	LC	Occurs from Mt Morgan to Weipa inland towards Carnarvon Gorge in Queensland, with some records south to Sunshine Coast hinterland. In Northern Territory they are restricted to the Top End. In Western Australia they are within the Pilbara, on a number of islands, and scattered from Derby to Wyndham. The species is found in a variety of habitats ranging from rocky areas, Eucalypt forests, woodlands, rainforests, beaches, shrublands, grasslands and desert. They favour high-relief areas with shallow soils, high boulder cover and low fire frequency close to permanent water. Dens are often in rocky areas with surrounding vegetation and can be crevices, tree holes or termite mounds (Department of Climate Change, Energy, the Environment and Water, 2023).	Unlikely	No records within 15 km, the species is rare within the surrounding areas, and no suitably connected mapped habitat is present.

Common Name	Scientific Name	Status		Habitat Description	Likelihood of Occurrence	Justification
		EPBC Act	NC Act			
Large-eared Pied Bat	*Chalinolobus dwyeri*	E	E	Occurs sporadically from Shoalwater Bay in Queensland south to Ulladulla in New South Wales and up to 400 km inland, with most records occurring in New South Wales. They are predominantly found within several kilometres of cliff lines or rocky terrain, particularly sandstone cliffs near fertile woodland valleys. They prefer woodlands that are dominated by box gums with a riparian corridor present. Roosting occurs in abandoned mine shafts, caves, and overhangs, and has been recorded using abandoned nests, and potentially tree hollows (Department of Climate Change, Energy, the Environment and Water, 2023).	Unlikely	The survey area does not contain mapped suitable habitat.
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory)	*Phascolarctos cinereus*	E	E	For the combined population considered here, occurs from the Wet Tropics in Queensalnd south to the New South Wales and Victoria border, and inland to up to approximately 600 km, including the Australian Capital Territory. The distribution is not continuous and isolated populations are often in low density. The species is restricted to Eucalypt sclerophyll forest and woodlands where preferred food trees occur (*Eucalyptus, Lophostemon, Melaleuca, Angophora, Corymbia sp*). They prefer habitats with higher tree species richness in proximity to creek lines (Department of Climate Change, Energy, the Environment and Water, 2023).	Potential	Whilst records are not within 15 km, the survey area contains potentially suitable mapped habitat.
Corben's Long-eared Bat	*Nyctophilus corbeni*	V	V	Inhabits a variety of vegetation types, including mallee, bulloke (*Allocasuarina leuhmanni*) and box eucalypt dominated communities, but it is distinctly more common in box/ironbark/cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains of NSW and southern Queensland. (Department of Environment and Heritage Protection 2020)	Unlikely	The survey area does not contain mapped suitable habitat.
Yellow-bellied Glider (south-eastern)	*Petaurus australis australis*	V	V	Occurs disjunctly from Mackay in Queensland through New South Wales and to far south-eastern South Australia. The species is generally along the coastline, with some isolated populations inland along the western slopes of the Great Dividing Range in parts of New South Wales and Queensland. The species is found in woodlands and wet and dry sclerophyll forests dominated by Eucalypts, with a preference for old growth forests that have seasonal growth variation for year-round foraging and an abundance of winter-flowering and smooth-barked Eucalypts. They require large hollows, generally over one metre wide, in old trees for dens (Department of Climate Change, Energy, the Environment and Water, 2023).	Unlikely	The survey area does not contain mapped suitable habitat.
Short-beaked Echidna	*Tachyglossus aculeatus*	-	SL	Occurs across most of Australia, except for inland Western Australia where there are fewer records. They are habitat generalists, found in forests, woodlands, shrublands and grasslands, rocky outcrops and agricultural lands where there are enough ants and/or termites for foraging (Atlas of Living Australia, 2023).	Potential	Whilst records are not within 15 km, the survey area contains potentially suitable mapped habitat.
Reptiles						
Southern Snapping Turtle	*Elseya albagula*	CE	CE	The white-throated snapping turtle is only found in the Burnett, Fitzroy, Raglan and Mary river drainages of south-east Queensland. It prefers permanent flowing water habitats where there are suitable shelters and refuges (e.g. fallen trees). (Department of Environment and Heritage Protection 2014)	Unlikely	The survey area does not contain suitable mapped habitat.
Grey Snake	*Hemiaspis damelii*	E	E	Occurs from the coastal areas of Rockhampton in Queensland down to the eastern then central interior of New South Wales to the southern state border. The species has a fragmented range, and the core area is the Brigalow Belt between Dalby and Glenmorgan. The species floodplains and ephemeral wetlands with *Acacia harpophylla* (Brigalow) and *Casuarina cristata* (Belah) woodlands with logs and rocks. Grasslands over alluvial plains with cracking soil can also be utilised and cracking soils are required for foraging (Department of Climate Change, Energy, the Environment and Water, 2023).	Unlikely	The survey area does not contain mapped suitable habitat.

Common Name	Scientific Name	Status		Habitat Description	Likelihood of Occurrence	Justification
		EPBC Act	NC Act			
Fitzroy River Turtle	*Rheodytes leukops*	E	E	The Fitzroy River Turtle is found in rivers with large deep pools with rocky, gravelly or sandy substrates, connected by shallow riffles. Preferred areas have high water clarity, and are often associated with Ribbonweed (*Vallisneria sp.*) beds (Cogger et al. 1993). Common riparian vegetation associated with the Fitzroy River Turtle includes Blue Gums (*Eucalyptus tereticornis*), River Oaks (*Casuarina cunninghamiana*), Weeping Bottlebrushes (*Callistemon viminalis*) and Paperbarks (*Melaleuca linariifolia*) (Tucker et al. 2001).	Unlikely	The survey area does not contain suitable mapped habitat.
Adorned Delma, Collared Delma	*Delma torquata*	V	V	Occurs sporadically in Queensland with known locations including Bunya Mountains, Blackdown Tablelands National Park, Expedition National Park, Western Creek, Toowoomba Ranges, and the western suburbs of Brisbane. The species inhabits Eucalypt-dominated woodlands and open forests on Land Zones 3, 9 and 10, and is associated with RE's 11.3.2, 11.9.10, 11.10.1, and 11.10.4. The species requires rocks, coarse woody debris, bark and leaf litter (generally 30–100 mm thick) (Department of Climate Change, Energy, the Environment and Water, 2023).	Unlikely	The survey area does not contain mapped suitable habitat.
Ornamental Snake	*Denisonia maculata*	V	V	The species is known only from the Brigalow Belt North and parts of the Brigalow Belt South biogeographical regions. The core of the species' distribution occurs within the drainage system of the Fitzroy and Dawson Rivers. The Ornamental Snake's preferred habitat is within, or close to, habitat that is favoured by its prey - frogs. The species is known to occur in RE 11.4.3, 11.4.6, 11.4.8, 11.4.9, 11.3.3, and 11.5.16 (Department of the Environment 2020).	Unlikely	The survey area does not contain mapped suitable habitat.
Yakka Skink	*Egernia rugosa*	V	V	The Yakka Skink is commonly found in cavities under and between partly buried rocks, logs or tree stumps, root cavities and abandoned animal burrows. The species often takes refuge in large hollow logs and has been known to excavate deep burrow systems, sometimes under dense ground vegetation. In cleared habitat, this species can persist where there are shelter sites such as raked log piles, deep gullies, tunnel erosion/sinkholes and rabbit warrens. The species has also been found sheltering under sheds and loading ramps. This species is not generally found in trees or rocky habitats (Department of Sustainability Environment Water Population and Communities 2011).	Potential	Records are not within 15 km however the survey area contains suitable mapped habitat.

Table Key: SL – Special Least Concern, LC – Least Concern, Ma – Marine, M – Migratory, V – Vulnerable, E – Endangered, CE – Critically Endangered

Table 2: Desktop Threatened Flora Likelihood of Occurrence assessment within the Survey area.

Scientific Name	Common Name	Status		Habitat Description	Likelihood of Occurrence	Justification
		EPBC Act	NC Act			
Homoranthus decumbens	NA	E	V	*Homoranthus decumbens* is endemic to Queensland, where it is known from two areas: Blackdown Tableland and Barakula State Forest (Queensland Herbarium, 2009). The extent of occurrence is 3 km2 and area of occupancy is estimated to be less that 1 km2 (Queensland Herbarium 2009). The species is found in tall shrubland or heath up to 800 m in altitude	Unlikely	The survey area does not contain suitable mapped habitat.
Solanum dissectum	NA	E	E	*Solanum dissectum* has a restricted distribution in central Queensland. It has mainly been found in the area bounded by Banana, Dululu, Moura and Thangool but has also been recorded 40 km south of Blackwater. Solanum dissectum occurs in open forest and woodland of brigalow (*Acacia harpophylla*) or *Eucalyptus thozetiana* on solodic clay soils (Department of Environment and Science, 2012).	Potential	Records are within 15 km and the survey area contains limited suitable mapped habitat.
Solanum elachophyllum	NA	-	E	*Solanum elachophyllum* is endemic to Queensland and confined to the central subcoastal part of the state, from Middlemont to Theodore. The species occurs within Junee State Forest and Taunton National Park. *Solanum elachophyllum* grows on fertile cracking-clay soils in open forest of *Eucalyptus thozetiana, Acacia harpophylla*, with understorey of *Geijera parviflora, Casuarina cristata, Macropteranthes leichhardtii, Eucalyptus cambageana*, or woodland of *E. crebra* and *E. tenuipes* (Department of Environment and Science, 2012).	Potential	Records are within 15 km and the survey area contains limited suitable mapped habitat.
Macrozamia platyrhachis	cycad	E	E	*Macrozamia platyrhachis* is scattered and locally abundant in eucalypt woodland or open forest at altitudes between 300-780m above sea level. The mid- and under-stories of the vegetation may be quite dense, but this is variable depending on fire history. The species grows on deep sandy soils, derived from sandstone (Department of Environment and Science, 2009).	Unlikely	The survey area does not contain suitable mapped habitat.
Cadellia pentastylis	Ooline	V	V	*Cadellia pentastylis* is now restricted in distribution from near Duaringa west of Rockhampton to the NSW border in Queensland, and on the western edge of the North West Slopes north of Gunnedah in northern New South Wales. It occurs in a range of vegetation types including semi-evergreen vine thicket, brigalow-belah, poplar box and bendee communities. Ooline often occurs on the edges of sandstone and basalt escarpments, 200 to 500 m above sea level. In most areas of its range, ooline grows on the moderately fertile soils preferred for agriculture and pasture development (Department of Environment and Science, 2009).	Potential	Records are within 15 km and the survey area contains limited suitable mapped habitat.
Daviesia discolor	NA	V	V	*Daviesia discolor* is known from three widely disjunct localities in Queensland, near Blackwater on the Blackdown Tableland, in the Mount Walsh area near Biggenden (Crisp, 1991) and north of Mount Playfair within Carnarvon National Park (Queensland Herbarium specimen records). On the Blackdown Tableland, *D. discolor* occurs on sandy soil derived from sandstone and on lateritic clay, at altitudes of 600 to 900 m, in open eucalypt forest dominated by species such as Blackdown Stringybark (*Eucalyptus sphaerocarpa*) and Black Stringybark (*Eucalyptus nigra*) (Crisp, 1991). In the Mount Walsh area, *D. discolor* grows in very tall open forests of Bloodwood (*Corymbia trachyphloia*) and White Mahogany (*Eucalyptus acmenoides*) on hillcrests and slopes at 500 to 580 m altitude on well-drained, shallow sandy loam to sandy clays (Halford, 1998). The population in Carnarvon National Park occurs on brown sandy loam of creek banks, in mixed shrubland with scattered *Triodia sp.* hummocks and *Angophora sp.* trees (CANB collection details, 1993).	Unlikely	The survey area does not contain suitable mapped habitat.
Polianthion minutiflorum	NA	V	V	*Polianthion minutiflorum* is known from five areas in east Queensland, from Redcliffe Vale, about 110 km west of Mackay, south to Kingaroy, covering a distance of approximately 800 km (BRI collection records, n.d.). It grows in forest and woodland on sandstone slopes and gullies	Unlikely	The survey area does not contain suitable mapped habitat.

Scientific Name	Common Name	Status		Habitat Description	Likelihood of Occurrence	Justification
		EPBC Act	NC Act			
				with skeletal soil, or deeper soils adjacent to deeply weathered laterite (Kellermann et al., 2006).		
Arthraxon hispidus	Hairy-joint Grass	V	V	Occurs north from Gibraltar Range where it grows on the edges of rainforest and in wet sclerophyll forest. It prefers moist shady sites and is often found near creeks or swamps (Harden, 1993; NSW National Parks and Wildlife Service, 2002)	Unlikely	The survey area does not contain suitable mapped habitat.
Dichanthium setosum	bluegrass	V	LC	Occurs from southern New South Wales to northern Queensland, often on black soil and red-brown loamy soil. The species has a wide, disjunct distribution and can be locally common. Habitat can include woodlands or open woodlands dominated by Acacia and/or Eucalypt species, grasslands and previously cleared areas such as road reserve and pasture (Office of Environment and Heritage, 2023).	Unlikely	The survey area does not contain suitable mapped habitat.
Dichanthium queenslandicum	King Blue-grass	E	V	*Dichanthium queenslandicum* occurs from near Dalby north to about 90 km north of Hughenden and west as far as Clermont. The main concentration of populations in central Queensland in the Emerald region. *Dichanthium queenslandicum* occurs on black cracking clay in tussock grasslands on undulating plains mainly in association with other species of blue grasses *(Dichanthium spp.* and *Bothriochloa spp.*) but also with other grasses restricted to this soil type (Department of Environment and Science, 2012).	Unlikely	The survey area does not contain suitable mapped habitat.
Bertya opponens	NA	V	LC	*Bertya opponens* has been recorded growing in a variety of community types including mixed shrubland, lancewood woodland, mallee woodland, eucalypt/Acacia open forest with shrubby understorey, eucalypt/Callitris open woodland and semi-evergreen vine-thicket. The soils are recorded as generally shallow sandy loams or red earths associated mostly with sandstone, but also with rhyolite, shale and metasediments (Department of Environment and Science, 2012)	Likely	Records are within 15 km and the survey area contains suitable mapped habitat.
Aristida annua	NA	V	V	*Aristida annua* is restricted to central Queensland in the Emerald and Springsure districts (BRI, undated.; Simon, 1984; 1992). The species is very poorly understood, there is no information on the population size of *Aristida annua* and there appears to be no survey data. *Aristida annua* occurs in eucalypt woodland (BRI collection records, n.d.; Simon, 1984; 1992). It is restricted to black clay soils (Simon, 1984), basalt soils and possibly disturbed sites.	Unlikely	The survey area does not contain suitable mapped habitat.
Cerbera dumicola	NA	-	NT	Cerbera dumicola occurs across a range of habitats in central and southern Queensland. Associated vegetation and species include: sandstone hills in open *E. umbra subsp. carnea*; on plateaus, in woodland of *Acacia shirleyi* with *Corymbia dolichocarpa*; acidic soils in mine rehabilitation area; woodland of *A. catenulata* and *A. shirleyi* with *E. thozetiana* on a slope of sand/clay soil; semi-deciduous notophyll-microphyll vine forest of *Brachychiton australis*, *Gyrocarpus americanus, Flindersia australis, Pleiogynium timorense, Drypetes deplanchei* and *Sterculia quadrifida* on rhyolite hillslopes; open-woodland of *E. melanophloia* with occasional *Acacia shirleyi, E. populnea* and *E. brownii*; semi-evergreen vine thicket with *Corymbia citriodora* and *Corymbia aureola* emergents; woodland of *A. rhodoxylon* on brown, sandy loam; and in *Corymbia tessellaris - Acacia aneura* open woodland (Department of Environment and Science, 2012).	Likely	Records are within 15 km and the survey area contains suitable mapped habitat.

Table Key: LC – Least Concern, NT – Near Threatened, V – Vulnerable, E – Endangered, CE – Critically Endangered

Table 3: Desktop Threatened Ecological Communities Likelihood of Occurrence assessment within the Survey area.

Threatened Ecological Community	EPBC Act Status	Description	Likelihood of Occurrence	Justification
Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	Endangered	Semi-arid to humid subtropical woodland where coolibah (*Eucalyptus coolibah subsp. coolibah*) and/or black box (*Eucalyptus largiflorens*) are the dominant canopy species and where the understorey tends to be grassy. The ecological community is associated with the floodplains and drainage areas.	Unlikely	The survey area does not contain any mapped regional ecosystems which correspond with this TEC.
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	Endangered	Ten of 15 types of SEVT community described for the Brigalow Belt (North and South) Bioregion (Sattler and Williams 1999) are included in the EPBC Act listed SEVT EC - RE 11.2.3, 11.3.11, 11.4.1, 11.5.15, 11.8.3, 11.8.6, 11.8.13, 11.9.4, 11.9.8, 11.11.18.	Unlikely	The survey area does not contain any mapped regional ecosystems which correspond with this TEC.
Poplar Box Grassy Woodland on Alluvial Plains	Endangered	This TEC is located west of the Great Dividing Range, and is typically associated with the Brigalow Belt bioregions. In South East Queensland, it coincides with one Regional Ecosystem, RE 12.3.10.	Unlikely	The survey area does not contain any mapped regional ecosystems which correspond with this TEC.
Brigalow (*Acacia harpophylla* dominant and co-dominant)	Endangered	In Queensland, the ecological community coincides with 16 Regional Ecosystems: 11.2.1, 11.4.3, 11.4.7, 11.4.8, 11.4.9, 11.4.10, 11.5.16, 11.9.1, 11.9.5, 11.9.6, 11.11.14, 11.12.21, 12.8.23, 12.9-10.6, 12.12.26, 6.4.2. All 16 REs are listed as endangered under the VM Act 1999 as at Oct 2013.	Unlikely	The survey area does not contain any mapped regional ecosystems which correspond with this TEC.
Natural Grasslands of the Queensland Central Highlands and northern Fitzroy Basin	Endangered	Corresponds closest to these Regional Ecosystems in Queensland: 11.3.21, 11.4.4, 11.4.11, 11.8.11, 11.9.3, 11.9.12, 11.11.17.	Unlikely	The survey area does not contain any mapped regional ecosystems which correspond with this TEC.
Weeping Myall Woodlands	Endangered	This TEC occurs on the inland alluvial plains west of the Great Dividing Range. The Weeping Myall Woodlands occurs within RE 11.3.2 and 11.3.28. The proportion of these regional ecosystems that comprose Weeping Myall Woodlands is at most 5%.	Unlikely	The survey area does not contain any mapped regional ecosystems which correspond with this TEC.

Australian Government

Department of Climate Change, Energy, the Environment and Water

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 19-Sep-2025

Summary

Details

- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat

Acknowledgements

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	6
Listed Threatened Species:	36
Listed Migratory Species:	10

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	18
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	2
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	11
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text	Buffer Status
Brigalow (Acacia harpophylla dominant and co-dominant)	Endangered	Community known to occur within area	In feature area
Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	Endangered	Community may occur within area	In buffer area only
Natural Grasslands of the Queensland Central Highlands and northern Fitzroy Basin	Endangered	Community likely to occur within area	In feature area
Poplar Box Grassy Woodland on Alluvial Plains	Endangered	Community likely to occur within area	In feature area
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	Endangered	Community likely to occur within area	In feature area
Weeping Myall Woodlands	Endangered	Community likely to occur within area	In feature area

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Erythrotriorchis radiatus Red Goshawk [942]	Endangered	Species or species habitat likely to occur within area	In feature area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area	In feature area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat may occur within area	In feature area
Geophaps scripta scripta Squatter Pigeon (southern) [64440]	Vulnerable	Species or species habitat known to occur within area	In feature area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Neochmia ruficauda ruficauda Star Finch (eastern), Star Finch (southern) [26027]	Endangered	Species or species habitat likely to occur within area	In feature area
Poephila cincta cincta Southern Black-throated Finch [64447]	Endangered	Species or species habitat may occur within area	In feature area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area	In feature area
Stagonopleura guttata Diamond Firetail [59398]	Vulnerable	Species or species habitat may occur within area	In feature area
Turnix melanogaster Black-breasted Button-quail [923]	Vulnerable	Species or species habitat may occur within area	In buffer area only
MAMMAL			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Endangered	Species or species habitat may occur within area	In buffer area only
Dasyurus hallucatus Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat likely to occur within area	In feature area
Nyctophilus corbeni Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat may occur within area	In feature area
Petauroides volans Greater Glider (southern and central) [254]	Endangered	Species or species habitat likely to occur within area	In feature area
Petaurus australis australis Yellow-bellied Glider (south-eastern) [87600]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Endangered	Species or species habitat likely to occur within area	In feature area
PLANT			
Aristida annua [17906]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Arthraxon hispidus Hairy-joint Grass [9338]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Bertya opponens [13792]	Vulnerable	Species or species habitat known to occur within area	In feature area
Cadellia pentastylis Ooline [9828]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Daviesia discolor [3567]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Dichanthium queenslandicum King Blue-grass [5481]	Endangered	Species or species habitat may occur within area	In feature area
Dichanthium setosum bluegrass [14159]	Vulnerable	Species or species habitat may occur within area	In feature area
Homoranthus decumbens a shrub [55186]	Endangered	Species or species habitat may occur within area	In buffer area only
Macrozamia platyrhachis cycad [3412]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Polianthion minutiflorum [82772]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Solanum dissectum [75720]	Endangered	Species or species habitat known to occur within area	In feature area
REPTILE			
Delma torquata Adorned Delma, Collared Delma [1656]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Denisonia maculata Ornamental Snake [1193]	Vulnerable	Species or species habitat known to occur within area	In feature area
Egernia rugosa Yakka Skink [1420]	Vulnerable	Species or species habitat may occur within area	In feature area
Elseya albagula Southern Snapping Turtle, White-throated Snapping Turtle [81648]	Critically Endangered	Species or species habitat may occur within area	In feature area
Hemiaspis damelii Grey Snake [1179]	Endangered	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Rheodytes leukops			
Fitzroy River Turtle, Fitzroy Tortoise, Fitzroy Turtle, White-eyed River Diver [1761]	Endangered	Species or species habitat likely to occur within area	In feature area

Listed Migratory Species [Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Apus pacificus			
Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Migratory Terrestrial Species			
Cuculus optatus			
Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area	In feature area
Hirundapus caudacutus			
White-throated Needletail [682]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Motacilla flava			
Yellow Wagtail [644]		Species or species habitat may occur within area	In feature area
Migratory Wetlands Species			
Actitis hypoleucos			
Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Calidris acuminata			
Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris ferruginea			
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Calidris melanotos			
Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area
Gallinago hardwickii			
Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Pandion haliaetus](#) Osprey [952]		Species or species habitat may occur within area	In feature area

Other Matters Protected by the EPBC Act

Listed Marine Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
[Actitis hypoleucos](#) Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
[Anseranas semipalmata](#) Magpie Goose [978]		Species or species habitat may occur within area overfly marine area	In feature area
[Apus pacificus](#) Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
[Bubulcus ibis as Ardea ibis](#) Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
[Calidris acuminata](#) Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area	In feature area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area	In feature area
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat likely to occur within area overfly marine area	In feature area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat may occur within area overfly marine area	In feature area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area	In feature area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat may occur within area overfly marine area	In buffer area only
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat likely to occur within area overfly marine area	In buffer area only
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area	In feature area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat may occur within area overfly marine area	In feature area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Rhipidura rufifrons			
Rufous Fantail [592]		Species or species habitat may occur within area overfly marine area	In buffer area only
Rostratula australis as Rostratula benghalensis (sensu lato)			
Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area

Extra Information

State and Territory Reserves			[Resource Information]
Protected Area Name	Reserve Type	State	Buffer Status
Blackdown Tableland	National Park	QLD	In buffer area only
Kenmare	Nature Refuge	QLD	In buffer area only

EPBC Act Referrals				[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Blackwater Mine ? North Extension Project	2023/09723		Assessment	In buffer area only
Blackwater Mine South Coking Coal Project	2022/09279		Assessment	In buffer area only
Coal Seam Gas Field Development for Natural Gas Liquefaction Park, Curtis Island	2008/4059		Post-Approval	In buffer area only
Comet Ridge Mahalo North Coal Seam Gas Project	2023/09689		Assessment	In buffer area only
rail track to link the proposed MIM Rolleston coal mine to existing rail network	2002/637		Post-Approval	In feature area
Controlled action				
Future Gas Supply Area Project	2012/6357	Controlled Action	Completed	In buffer area only
Norwich Park & Blackwater CSG Fields & supporting infrastructure Bowen Basin	2011/6032	Controlled Action	Completed	In buffer area only
Santos GLNG Gas Field Development Project, QLD	2012/6615	Controlled Action	Post-Approval	In buffer area only

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Controlled action				
ZeroGen Integrated Gasification Combined Cycle Power Plant and CO2 Capture, Transport and Storage	2009/5195	Controlled Action	Completed	In feature area
Not controlled action				
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
Not controlled action (particular manner)				
Blackwater to Rolleston 132 kV transmission line	2002/880	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data is available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance on the contents of this report.

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions when time permits.

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded breeding sites; and
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact us page.

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WN Taxon ID	Kingdom	Class	Family	Scientific name	Common name	NCA status	EPBC status	Superseded	Conservation significant	Establishment	Sensitive species	Sighting records	Specimen records	Sighting summary
8936	Plantae	Equisetopsida	Apocynaceae	Cerbera dumicola		NT		No	Yes	NTQ	No	2	2	2
36488	Plantae	Equisetopsida	Campanulaceae	Wahlenbergia capillaris		SL		No	Yes	NTQ	No	1	0	1
11323	Plantae	Equisetopsida	Euphorbiaceae	Bertya opponens		C	V	No	Yes	NTQ	No	2	2	2
6198	Plantae	Equisetopsida	Solanaceae	Solanum dissectum		E	E	No	Yes	NTQ	No	3	3	3
13541	Plantae	Equisetopsida	Solanaceae	Solanum elachophyllum		E		No	Yes	NTQ	No	1	1	1
17796	Plantae	Equisetopsida	Sterculiaceae	Brachychiton australis	broad-leaved bottle tree	SL		No	Yes	NTQ	No	1	0	1
13670	Plantae	Equisetopsida	Surianaceae	Cadellia pentastylis	ooline	V	V	No	Yes	NTQ	No	2	2	2

Queensland Government

Department of the Environment, Tourism, Science and Innovation

Environmental Reports

Matters of State Environmental Significance

For the selected area of interest

Longitude: 148.8385853576 Latitude: -23.91220309238 with 2 kilometre radius

Environmental Reports - General Information

The Environmental Reports portal provides for the assessment of selected matters of interest relevant to a user specified location, or area of interest (AOI). All area and derivative figures are relevant to the extent of matters of interest contained within the AOI unless otherwise stated. Please note, if a user selects an AOI via the "central coordinates" option, the resulting assessment area encompasses an area extending for a 2km radius from the point of interest.

All area and area derived figures included in this report have been calculated via reprojecting relevant spatial features to Albers equal-area conic projection (central meridian = 146, datum Geocentric Datum of Australia 2020). As a result, area figures may differ slightly if calculated for the same features using a different co-ordinate system.

Figures in tables may be affected by rounding.

The matters of interest reported on in this document are based upon available state mapped datasets. Where the report indicates that a matter of interest is not present within the AOI (e.g. where area related calculations are equal to zero, or no values are listed), this may be due either to the fact that state mapping has not been undertaken for the AOI, that state mapping is incomplete for the AOI, or that no values have been identified within the site.

The information presented in this report should be considered as a guide only and a field survey may be required to validate values on the ground.

Please direct queries about these reports to: Planning.Support@detsi.qld.gov.au

Disclaimer

Whilst every care is taken to ensure the accuracy of the information provided in this report, the Queensland Government makes no representations or warranties about its accuracy, reliability, completeness, or suitability, for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which the user may incur as a consequence of the information being inaccurate or incomplete in any way and for any reason.



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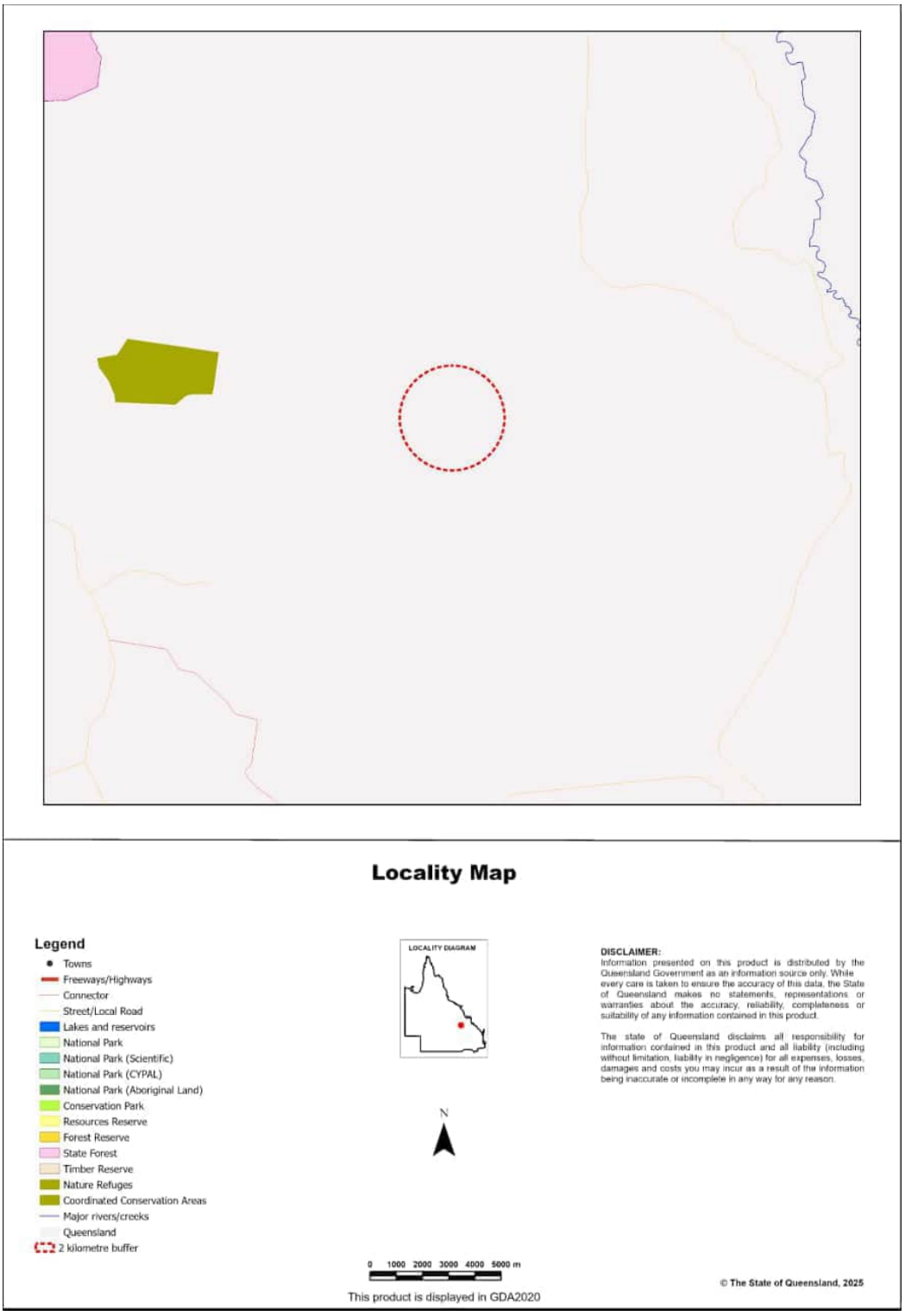
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Assessment Area Details

The following table provides an overview of the area of interest (AOI) with respect to selected topographic and environmental values.

Table 1: Summary table, details for AOI: Longitude: 148.8385853576 Latitude: -23.91220309238 with 2 kilometre radius, with area 1256.64 ha

Local Government(s)	Catchment(s)	Bioregion(s)	Subregion(s)
Central Highlands Regional	Fitzroy	Brigalow Belt	Isaac - Comet Downs



Matters of State Environmental Significance (MSES)

MSES Categories

Queensland's State Planning Policy (SPP) includes a biodiversity State interest that states:

'The sustainable, long-term conservation of biodiversity is supported. Significant impacts on matters of national or state environmental significance are avoided, or where this cannot be reasonably achieved; impacts are minimised and residual impacts offset.'

The MSES mapping product is a guide to assist implementation of the SPP biodiversity policy. While it supports the SPP, the mapping does not replace the regulatory mapping or environmental values specifically called up under other laws or regulations.

The SPP defines matters of state environmental significance as:

- Protected areas (including all classes of protected area except coordinated conservation areas) under the *Nature Conservation Act 1992;*

- Marine parks and land within a 'marine national park', 'conservation park', 'scientific research', 'preservation' or 'buffer' zone under the Marine Parks Act 2004 ;

- Areas within declared fish habitat areas that are management A areas or management B areas under the Fisheries Regulation 2008;

- *Threatened wildlife under the Nature Conservation Act 1992* and special least concern animals under the Nature Conservation (Wildlife) Regulation 2006;

- Regulated vegetation under the *Vegetation Management Act 1999* that is:

  - Category B areas on the regulated vegetation management map, that are 'endangered' or 'of concern' regional ecosystems;
  - Category C areas on the regulated vegetation management map that are 'endangered' or 'of concern' regional ecosystems;
  - Category R areas on the regulated vegetation management map;
  - Regional ecosystems that intersect with watercourses identified on the vegetation management watercourse and drainage feature map;
  - Regional ecosystems that intersect with wetlands identified on the vegetation management wetlands map;

- Strategic Environmental Areas under the *Regional Planning Interests Act 2014* ;

- Wetlands in a wetland protection area of wetlands of high ecological significance shown on the Map of Queensland Wetland Environmental Values under the Environment Protection Regulation 2019;

- Wetlands and watercourses in high ecological value waters defined in the Environmental Protection (Water) Policy 2009, schedule 2;
- Legally secured offset areas.

MSES Values Present

The MSES values that are present in the area of interest are summarised in the table below:

Table 2: Summary of MSES present within the AOI

1a Protected Areas- estates	0 ha	0.0%
1b Protected Areas- nature refuges	0 ha	0.0%
1c Protected Areas- special wildlife reserves	0 ha	0.0%
2 State Marine Parks- highly protected zones	0 ha	0.0%
3 Fish habitat areas (A and B areas)	0 ha	0.0%
4 Strategic Environmental Areas (SEA)	0 ha	0.0%
5 High Ecological Significance wetlands on the Map of Queensland Wetland Environmental Values	0 ha	0.0%
6a High Ecological Value (HEV) wetlands	0 ha	
6b High Ecological Value (HEV) waterways	0 km	Not applicable
7a Threatened (endangered or vulnerable) wildlife	259.23 ha	20.6%
7b Special least concern animals	0 ha	0.0%
7c i Koala habitat area - core (SEQ)	0 ha	0.0%
7c ii Koala habitat area - locally refined (SEQ)	0 ha	0.0%
7d Sea turtle nesting areas	0 km	Not applicable
8a Regulated Vegetation - Endangered/Of concern in Category B (remnant)	258.97 ha	20.6%
8b Regulated Vegetation - Endangered/Of concern in Category C (regrowth)	0 ha	0.0%
8c Regulated Vegetation - Category R (GBR riverine regrowth)	2.95 ha	0.2%
8d Regulated Vegetation - Essential habitat	298.76 ha	23.8%
8e Regulated Vegetation - intersecting a watercourse	9.2 km	Not applicable
8f Regulated Vegetation - within 100m of a Vegetation Management Wetland	0 ha	0.0%
9a Legally secured offset areas- offset register areas	0 ha	0.0%
9b Legally secured offset areas- vegetation offsets through a Property Map of Assessable Vegetation	0 ha	0.0%

Additional Information with Respect to MSES Values Present

MSES - State Conservation Areas

1a. Protected Areas - estates

(No results)

1b. Protected Areas - nature refuges

(No results)

1c. Protected Areas - special wildlife reserves

(No results)

2. State Marine Parks - highly protected zones

(No results)

3. Fish habitat areas (A and B areas)

(No results)

Refer to **Map 1 - MSES - State Conservation Areas** for an overview of the relevant MSES.

MSES - Wetlands and Waterways

4. Strategic Environmental Areas (SEA)

(No results)

5. High Ecological Significance wetlands on the Map of Queensland Wetland Environmental Values

(no results)

6a. Wetlands in High Ecological Value (HEV) waters

(no results)

6b. Waterways in High Ecological Value (HEV) waters

(no results)

Refer to **Map 2 - MSES - Wetlands and Waterways** for an overview of the relevant MSES.

MSES - Species

7a. Threatened (endangered or vulnerable) wildlife

Values are present

7b. Special least concern animals

Not applicable

7c i. Koala habitat area - core (SEQ)

Not applicable

7c ii. Koala habitat area - locally refined (SEQ)

Not applicable

7d. Wildlife habitat (sea turtle nesting areas)

Not applicable

Threatened (endangered or vulnerable) wildlife habitat suitability models

Species	Common name	NCA status	Presence
Boronia keysii	Keys boronia	V	None
Calyptorhynchus lathami	Glossy black cockatoo	V	None
Casuarius casuarius johnsonii	Sthn population cassowary	E	None
Crinia tinnula	Wallum froglet	V	None
Denisonia maculata	Ornamental snake	V	Core
Euastacus bindal	Mount Elliot crayfish	CR	None
Euastacus binzayedi		CR	None
Euastacus eungella		E	None
Euastacus hystricosus		E	None
Euastacus jagara	Jagara hairy crayfish	CR	None
Euastacus maidae		CR	None
Euastacus monteithorum		E	None
Euastacus robertsi		E	None
Taudactylus pleione	Kroombit tinkerfrog	E	None
Litoria freycineti	Wallum rocketfrog	V	None
Litoria olongburensis	Wallum sedgefrog	V	None
Macadamia integrifolia		V	None
Melaleuca irbyana	swamp tea-tree	E	None
Macadamia ternifolia		V	None
Macadamia tetraphylla	bopple nut	V	None
Petrogale penicillata	brush-tailed rock-wallaby	V	None
Petrogale coenensis	Cape York rock-wallaby	E	None
Petrogale purpureicollis	purple-necked rock-wallaby	V	None
Petrogale sharmani	Sharmans rock-wallaby	V	None
Petrogale xanthopus celeris	yellow-footed rock-wallaby (Qld subspecies)	V	None
Petaurus gracilis	Mahogany Glider	E	None
Petrogale persephone	Proserpine rock-wallaby	E	None
Phascolarctos cinereus	Koala - outside SEQ*	E	None
Pezoporus wallicus wallicus	Eastern ground parrot	V	None
Xeromys myoides	Water Mouse	V	None

*For koala model, this includes areas outside SEQ. Check 7c SEQ koala habitat for presence/absence.

Threatened (endangered or vulnerable) wildlife species records

(No results)

Special least concern animal species records

(No results)

Shorebird habitat (critically endangered/endangered/vulnerable)

Not applicable

Shorebird habitat (special least concern)

Not applicable

**Nature Conservation Act 1992 (NCA) Status- Endangered (E), Vulnerable (V) or Special Least Concern Animal (SL). Environment Protection and Biodiversity Conservation Act 1999 (EPBC) status: Critically Endangered (CE) Endangered (E), Vulnerable (V)*

Migratory status (M) - China and Australia Migratory Bird Agreement (C), Japan and Australia Migratory Bird Agreement (J), Republic of Korea and Australia Migratory Bird Agreement (R), Bonn Migratory Convention (B), Eastern Flyway (E)

To request a species list for an area, or search for a species profile, access Wildlife Online at:

https://www.qld.gov.au/environment/plants-animals/species-list/

Refer to **Map 3a - MSES - Species - Threatened (endangered or vulnerable) wildlife and special least concern animals** and **Map 3b - MSES - Species - Koala habitat area (SEQ)** and **Map 3c - MSES - Wildlife habitat (sea turtle nesting areas)** for an overview of the relevant MSES.

MSES - Regulated Vegetation

For further information relating to regional ecosystems in general, go to:

https://www.qld.gov.au/environment/plants-animals/plants/ecosystems/

For a more detailed description of a particular regional ecosystem, access the regional ecosystem search page at:

https://environment.ehp.qld.gov.au/regional-ecosystems/

8a. Regulated Vegetation - Endangered/Of concern in Category B (remnant)

Regional ecosystem	Vegetation management polygon	Vegetation management status
11.3.4/11.3.2/11.4.9a/11.3.25	E-subdom	rem_end
11.4.8/11.4.9b/11.5.15	E-dom	rem_end
11.7.2/11.4.9b/11.5.15	E-subdom	rem_end

8b. Regulated Vegetation - Endangered/Of concern in Category C (regrowth)

Not applicable

8c. Regulated Vegetation - Category R (GBR riverine regrowth)

Regulated vegetation map category	Map number
R	8650

8d. Regulated Vegetation - Essential habitat

Values are present

8e. Regulated Vegetation - intersecting a watercourse**

A vegetation management watercourse is mapped as present

8f. Regulated Vegetation - within 100m of a Vegetation Management wetland

Not applicable

Refer to **Map 4 - MSES - Regulated Vegetation** for an overview of the relevant MSES.

MSES - Offsets

9a. Legally secured offset areas - offset register areas

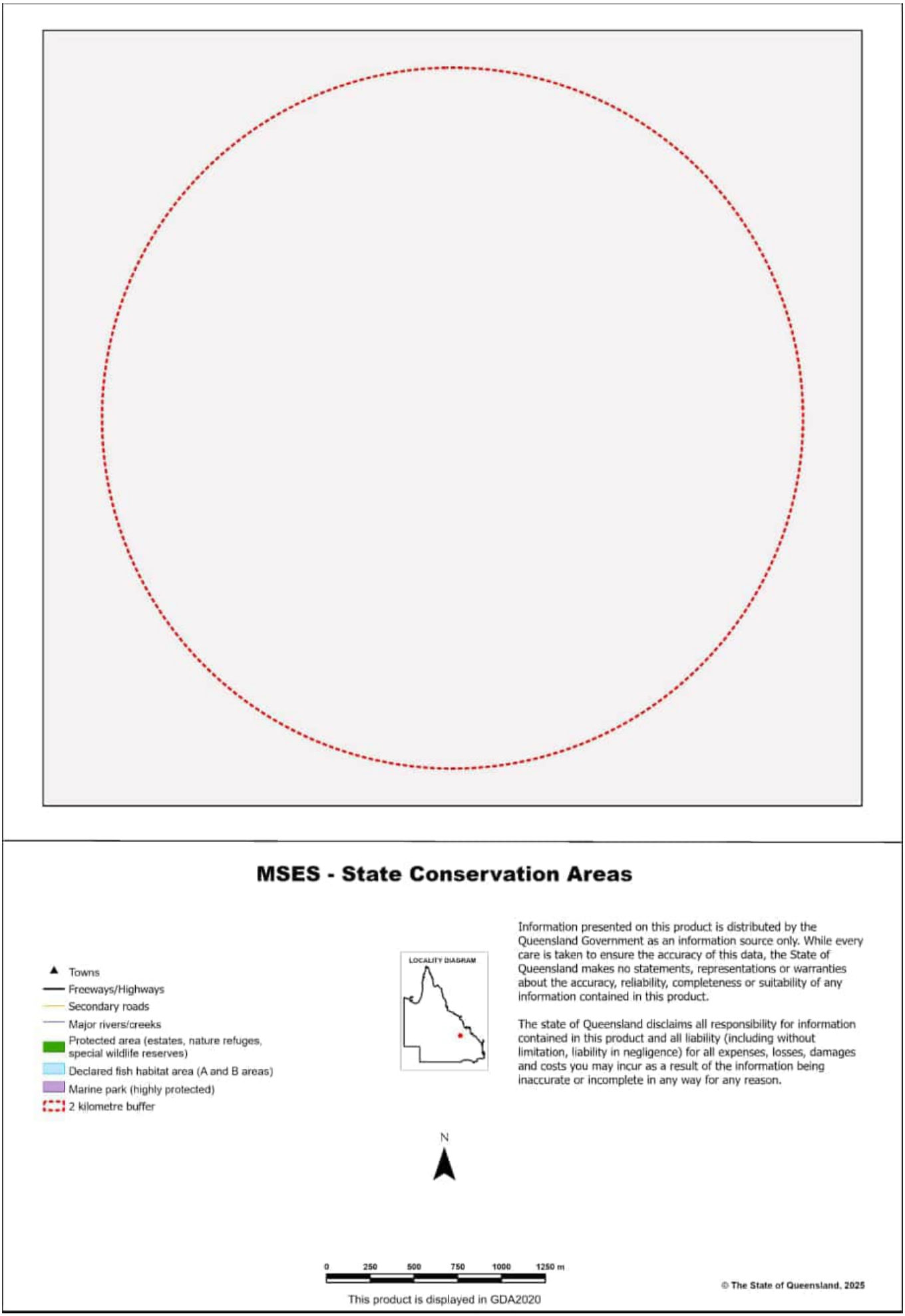
(No results)

9b. Legally secured offset areas - vegetation offsets through a Property Map of Assessable Vegetation

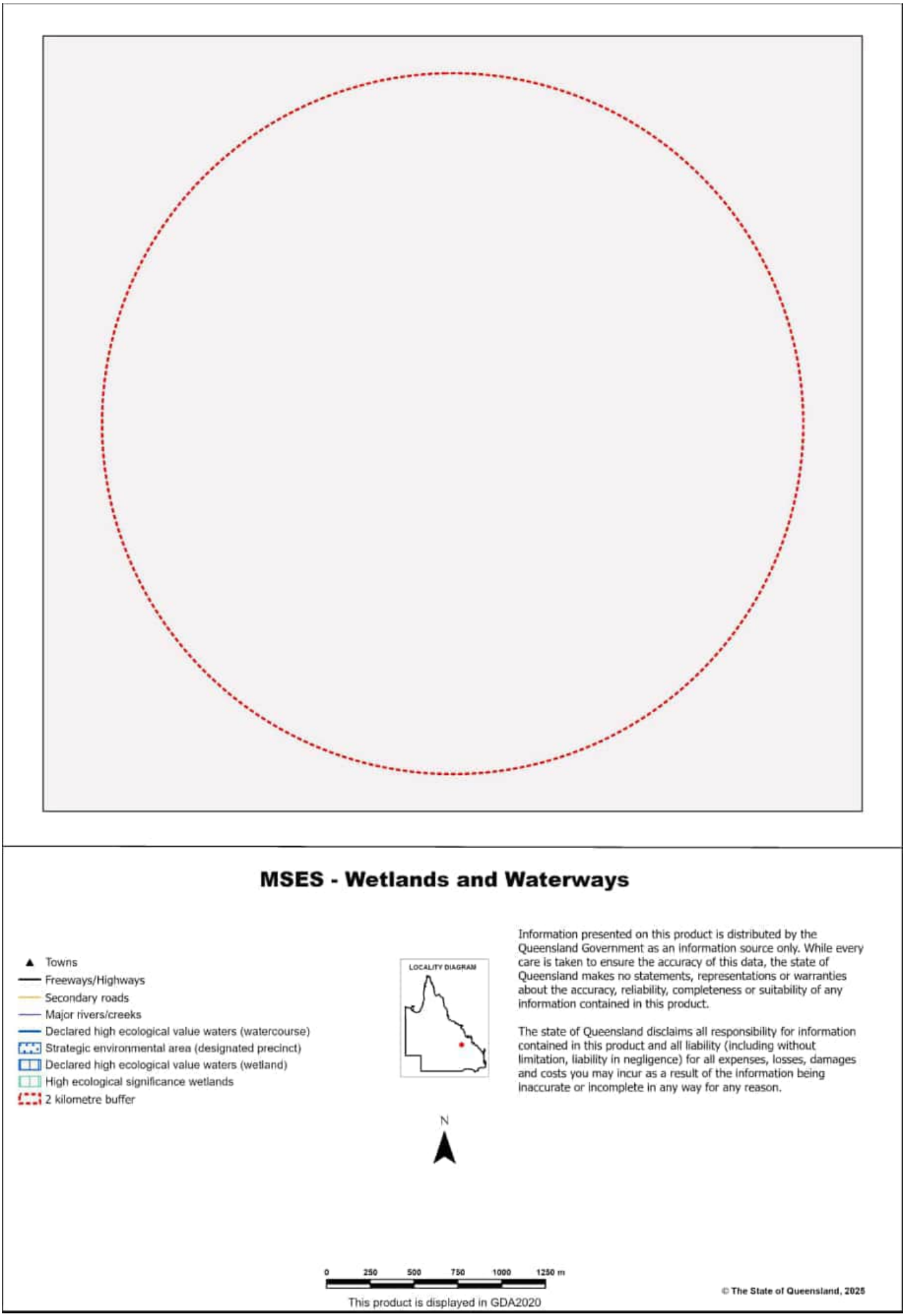
(No results)

Refer to **Map 5 - MSES - Offset Areas** for an overview of the relevant MSES.

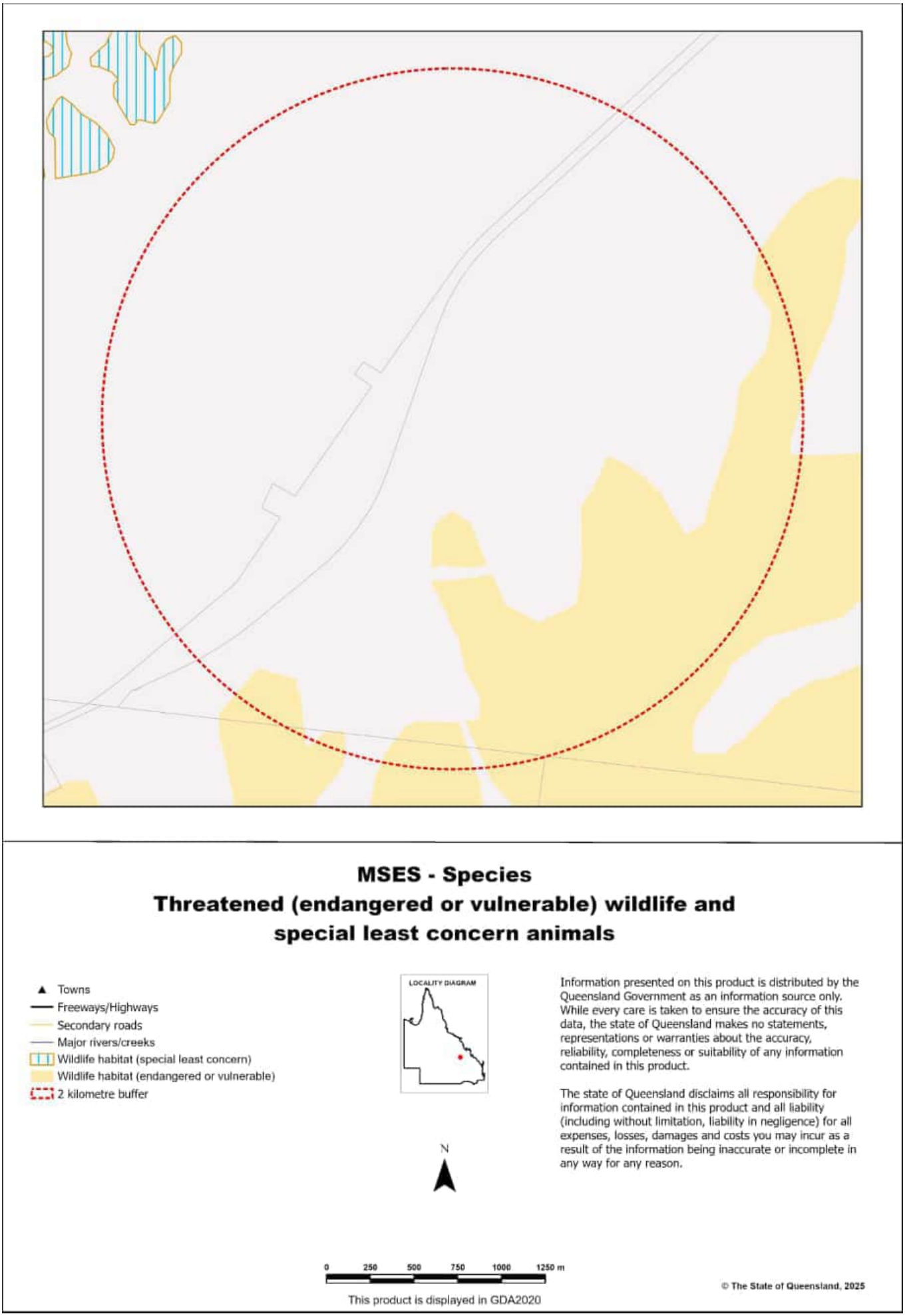
Map 1 - MSES - State Conservation Areas



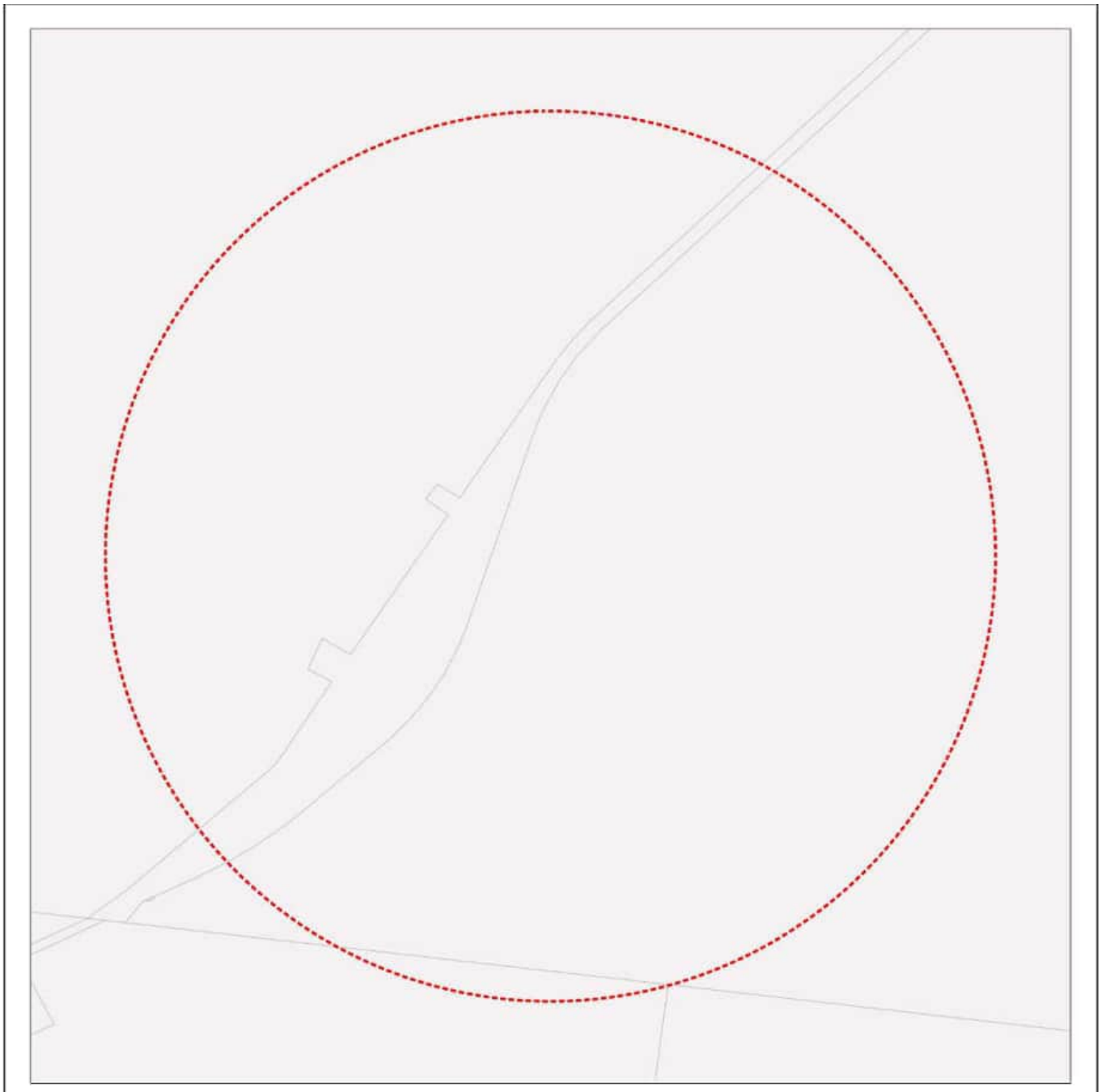
Map 2 - MSES - Wetlands and Waterways



Map 3a - MSES - Species - Threatened (endangered or vulnerable) wildlife and special least concern animals



Map 3b - MSES - Species - Koala habitat area (SEQ)



MSES - Species
Koala habitat area (SEQ)

- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Koala habitat area (core)
- Koala habitat area (locally refined)
- 2 kilometre buffer

LOCALITY DIAGRAM



While every care is taken to ensure the accuracy of this product, the Department of the Environment, Tourism, Science and Innovation acting on behalf of the State of Queensland makes no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which you might incur as a result of the data being inaccurate or incomplete in any way and for any reason. Due to varying sources of data, spatial locations may not coincide when overlaid.

The represented layers for SEQ 'koala habitat area-core' and 'koala habitat area- locally refined' in MSES are sourced directly from the regulatory mapping under the Nature Conservation (Koala) Conservation Plan 2017. Whilst every effort is made to ensure the information remains current, there may be delays between updating versions. Please refer to the original mapping for the most recent version. See https://environment.des.qld.gov.au/wildlife/animals/living-with/koalas/mapping

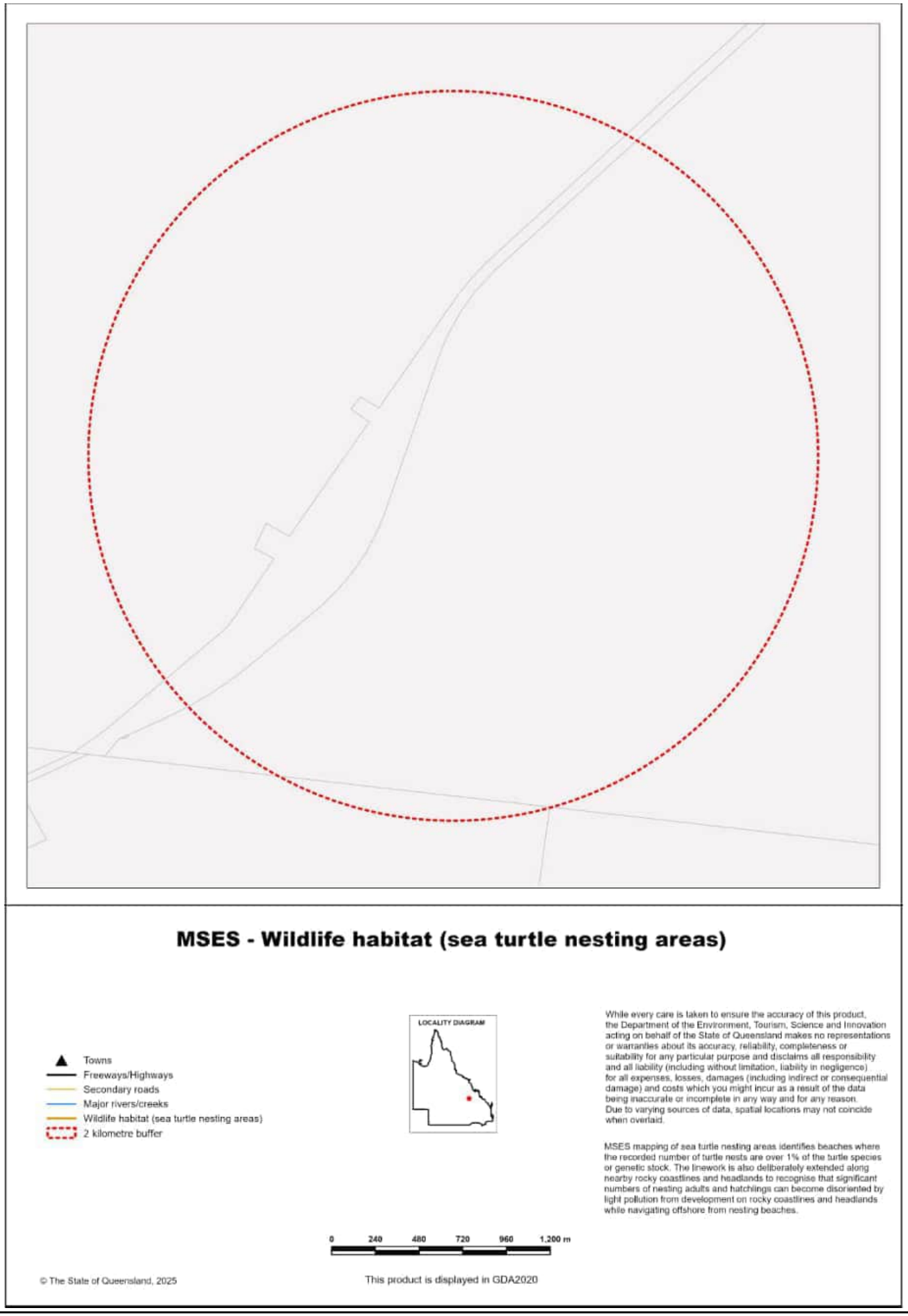
The koala habitat mapping within South East Queensland uses regional ecosystem linework compiled at a scale varying from 1:25,000 to 1:100,000. Linework should be used as a guide only. The positional accuracy of regional ecosystem data mapped at a scale of 1:100,000 is +/- 100 metres.

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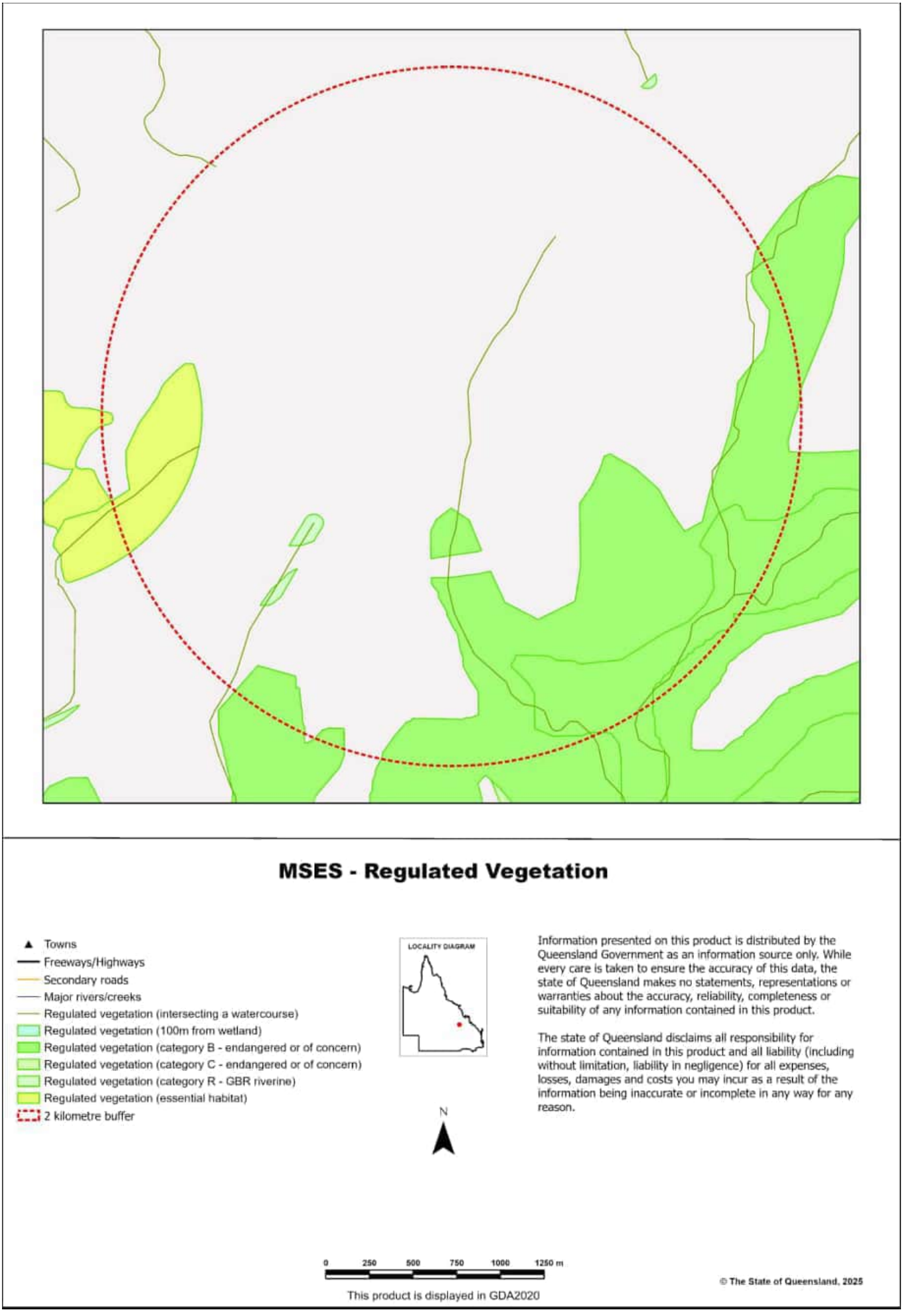
0 240 480 720 960 1,200 m

This product is displayed in GDA2020

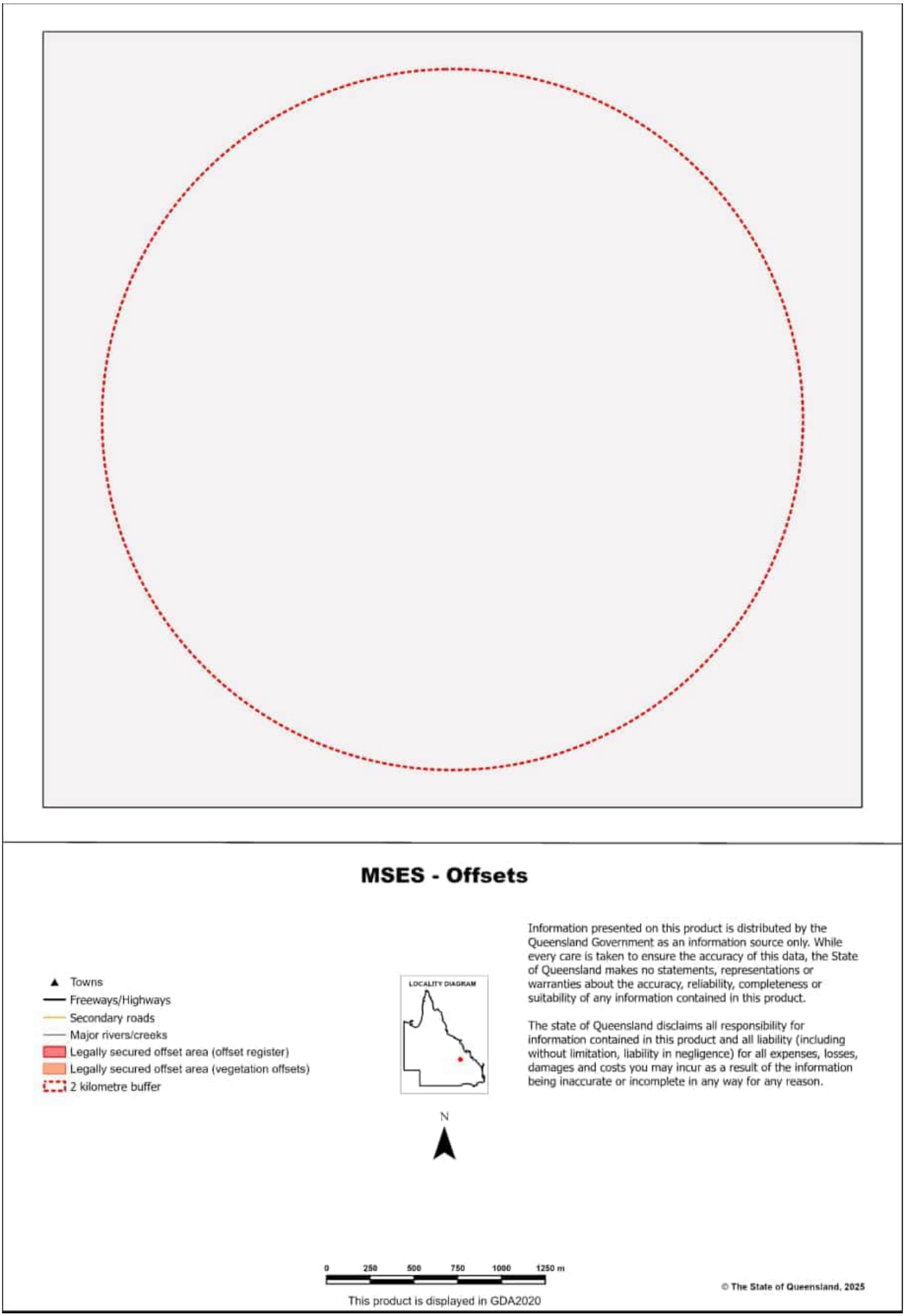
Map 3c - MSES - Species - Wildlife habitat (sea turtle nesting areas)



Map 4 - MSES - Regulated Vegetation



Map 5 - MSES - Offset Areas



Appendices

Appendix 1 - Matters of State Environmental Significance (MSES) methodology

MSES mapping is a regional-scale representation of the definition for MSES under the State Planning Policy (SPP). Its primary purpose is to support implementation of the SPP biodiversity policy.

MSES mapping does not replace the regulatory mapping or environmental values specifically called up under other laws or regulations.

MSES mapping does not determine whether state or local development assessment is required. For state assessment triggers refer to the Development Assessment Mapping System (DAMS). For local assessment triggers, refer to the relevant local planning scheme.

The Queensland Government's "Method for mapping - matters of state environmental significance can be downloaded from:

http://www.ehp.qld.gov.au/land/natural-resource/method-mapping-mses.html .

Appendix 2 - Source Data

The datasets listed below are available on request from:

http://qldspatial.information.qld.gov.au/catalogue/custom/index.page

- Matters of State environmental significance

Note: MSES mapping is not based on new or unique data. The primary mapping product draws data from a number of underlying environment databases and geo-referenced information sources. MSES mapping is a versioned product that is updated generally on a twice-yearly basis to incorporate the changes to underlying data sources. Several components of MSES mapping made for the current version may differ from the current underlying data sources. To ensure accuracy, or proper representation of MSES values, it is strongly recommended that users refer to the underlying data sources and review the current definition of MSES in the State Planning Policy, before applying the MSES mapping.

Individual MSES layers can be attributed to the following source data available at QSpatial:

MSES layers	**current QSpatial data (http://qspatial.information.qld.gov.au)**
Protected Areas-Estates, Nature Refuges, Special Wildlife Reserves	- Protected areas of Queensland - Nature Refuges - Queensland - Special Wildlife Reserves- Queensland
Marine Park-Highly Protected Zones	Moreton Bay marine park zoning 2008
Fish Habitat Areas	Queensland fish habitat areas
Strategic Environmental Areas-designated	Regional Planning Interests Act - Strategic Environmental Areas
HES wetlands	Map of Queensland Wetland Environmental Values
Wetlands in HEV waters	HEV waters: - EPP Water intent for waters Source Wetlands: - Queensland Wetland Mapping (Current version 5) Source Watercourses: - Vegetation management watercourse and drainage feature map (1:100000 and 1:250000)
Wildlife habitat (threatened and special least concern)	-WildNet database species records - habitat suitability models (various) - SEQ koala habitat areas under the Koala Conservation Plan 2019
VMA regulated regional ecosystems	Vegetation management regional ecosystem and remnant map
VMA Essential Habitat	Vegetation management - essential habitat map
VMA Wetlands	Vegetation management wetlands map
Legally secured offsets	Vegetation Management Act property maps of assessable vegetation. For offset register data-contact DETSI
Regulated Vegetation Map	Vegetation management - regulated vegetation management map

Appendix 3 - Acronyms and Abbreviations

AOI	- Area of Interest
DETSI	- Department of the Environment, Tourism, Science and Innovation
EP Act	- Environmental Protection Act 1994
EPP	- Environmental Protection Policy
GDA2020	- Geocentric Datum of Australia 2020
GEM	- General Environmental Matters
GIS	- Geographic Information System
MSES	- Matters of State Environmental Significance
NCA	- Nature Conservation Act 1992
RE	- Regional Ecosystem
SPP	- State Planning Policy
VMA	- Vegetation Management Act 1999

Queensland Government

Department of the Environment, Tourism, Science and Innovation

Environmental Reports

Regional Ecosystems

Biodiversity Status

For the selected area of interest
Longitude: 148.8385853576 Latitude: -23.91220309238 with 2 kilometre buffer

Environmental Reports - General Information

The Environmental Reports portal provides for the assessment of selected matters of interest relevant to a user specified location, or area of interest (AOI). All area and derivative figures are relevant to the extent of matters of interest contained within the AOI unless otherwise stated. Please note, if a user selects an AOI via the "central coordinates" option, the resulting assessment area encompasses an area extending for a 2km radius from the input coordinates.

All area and area derived figures included in this report have been calculated via reprojecting relevant spatial features to Albers equal-area conic projection (central meridian = 146, datum Geocentric Datum of Australia 2020). As a result, area figures may differ slightly if calculated for the same features using a different co-ordinate system.

Figures in tables may be affected by rounding.

The matters of interest reported on in this document are based upon available state mapped datasets. Where the report indicates that a matter of interest is not present within the AOI (e.g. where area related calculations are equal to zero, or no values are listed), this may be due either to the fact that state mapping has not been undertaken for the AOI, that state mapping is incomplete for the AOI, or that no values have been identified within the site.

The information presented in this report should be considered as a guide only and field survey may be required to validate values on the ground.

Important Note to User

Information presented in this report is based upon the Queensland Herbarium & Biodiversity Science's Regional Ecosystem framework. The Biodiversity Status has been used to depict the extent of "Endangered", "Of Concern" and "No Concern at Present" regional ecosystems in all cases, rather than the classes used for the purposes of the *Vegetation Management Act 1999* (VMA). Mapping and figures presented in this document reflect the Queensland Herbarium & Biodiversity Science's Remnant and Pre-clearing Regional Ecosystem Datasets, and not the certified mapping used for the purpose of the VMA.

For matters relevant to vegetation management under the VMA, please refer to the Department of Natural Resources and Mines, Manufacturing, and Regional and Rural Development website https://www.nrmmrrd.qld.gov.au/

Please direct queries about these reports to: Queensland.Herbarium@qld.gov.au

Disclaimer

Whilst every care is taken to ensure the accuracy of the information provided in this report, the Queensland Government makes no representations or warranties about its accuracy, reliability, completeness, or suitability, for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which the user may incur as a consequence of the information being inaccurate or incomplete in any way and for any reason.



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Summary Information

The following table provides an overview of the AOI with respect to selected topographic and environmental themes. Refer to **Map 1** for locality information.

Table 1: Details for area of interest:
Longitude: 148.8385853576 Latitude: -23.91220309238 with 2 kilometre buffer, with area 1256.64 ha

Local Government(s)	Catchment(s)	Bioregion(s)	Subregion(s)
Central Highlands Regional	Fitzroy	Brigalow Belt	Isaac - Comet Downs

The table below summarizes the extent of remnant vegetation classed as "Endangered", "Of concern" and "No concern at present" regional ecosystems classified by Biodiversity Status within the area of interest (AOI).

Table 2: Summary table, biodiversity status of regional ecosystems within the AOI

Biodiversity Status	Area (Ha)	% of AOI
Endangered	194.75	15.50
Of concern	55.44	4.41
No concern at present	521.02	41.46
Total remnant vegetation	771.22	61.37

Refer to **Map 2** for further information.

Regional Ecosystems

1. Introduction

Regional ecosystems are vegetation communities in a bioregion that are consistently associated with particular combinations of geology, landform and soil (Sattler and Williams 1999). Descriptions of Queensland's Regional ecosystems are available online from the Regional Ecosystem Description Database (REDD). Descriptions are compiled from a broad range of information sources including vegetation, land system and geology survey and mapping and detailed vegetation site data. The regional ecosystem classification and descriptions are reviewed as new information becomes available. A number of vegetation communities may form a single regional ecosystem and may be distinguished by differences in structure or sub-dominant species in the ecologically dominant layer. Vegetation communities with different dominant species in the ecologically dominant layer may be amalgamated in to a regional ecosystem if they are not mappable and predictable in the landscape at 1:100 000 scale. Vegetation communities may be mappable at a scale larger than 1:100 000. Vegetation communities within a regional ecosystem are denoted by a letter following the regional ecosystem code (e.g. a, b, c). Vegetation communities and regional ecosystems are amalgamated into a higher level classification of broad vegetation groups (BVGs).

A published methodology for survey and mapping of regional ecosystems across Queensland (Neldner et al 2023) provides further details on regional ecosystem concepts and terminology.

This report provides information on the type, status, and extent of vegetation communities, regional ecosystems and broad vegetation groups present within a user specified area of interest. Please note, for the purpose of this report, the Biodiversity Status is used. This report has not been developed for application of the *Vegetation Management Act 1999* (VMA). Additionally, information generated in this report has been derived from the Queensland Herbarium & Biodiversity Science's Regional Ecosystem Mapping, and not the regulated mapping certified for the purposes of the VMA. If your interest/matter relates to regional ecosystems and the VMA, users should refer to the Department of Natural Resources and Mines, Manufacturing, and Regional and Rural Development website https://www.nrmmrrd.qld.gov.au/.

With respect to the Queensland Biodiversity Status,

"Endangered" regional ecosystems are described as those where:

- remnant vegetation is less than 10 per cent of its pre-clearing extent across the bioregion; or 10-30% of its pre-clearing extent remains and the remnant vegetation is less than 10,000 hectares, or
- less than 10 per cent of its pre-clearing extent remains unaffected by severe degradation and/or biodiversity loss*, or
- 10-30 percent of its pre-clearing extent remains unaffected by severe degradation and/or biodiversity loss and the remnant vegetation is less than 10,000 hectares; or
- it is a rare** regional ecosystem subject to a threatening process.***

"Of concern" regional ecosystems are described as those where:

- the degradation criteria listed above for 'Endangered' regional ecosystems are not met and,
- remnant vegetation is 10-30 per cent of its pre-clearing extent across the bioregion; or more than 20 per cent of its pre-clearing extent remains and the remnant extent is less than 10,000 hectares, or
- 10-30 percent of its pre-clearing extent remains unaffected by moderate degradation and/or biodiversity loss.****

and "No concern at present" regional ecosystems are described as those where:

- remnant vegetation is over 30 percent of its pre-clearing extent across the bioregion, and the remnant area is greater than 10,000 hectares, and
- the degradation criteria listed above for 'Endangered' or 'Of concern' regional ecosystems are not met.

**Severe degradation and/or biodiversity loss is defined as: floristic and/or faunal diversity is greatly reduced but unlikely to recover within the next 50 years even with the removal of threatening processes; or soil surface is severely degraded, for example, by loss of A horizon, surface expression of salinity; surface compaction, loss of organic matter or sheet erosion.*

***Rare regional ecosystem: pre-clearing extent (<1000 ha); or patch size (<100 ha and of limited total extent across its range).*

****Threatening processes are those that are reducing or will reduce the biodiversity and ecological integrity of a regional ecosystem. For example, clearing, weed invasion, fragmentation, inappropriate fire regime or grazing pressure, or infrastructure development.*

*****Moderate degradation and/or biodiversity loss is defined as: floristic and/or faunal diversity is greatly reduced but unlikely to recover within the next 20 years even with the removal of threatening processes; or soil surface is moderately degraded.*

2. Remnant Regional Ecosystems

The following table identifies the remnant regional ecosystems and vegetation communities mapped within the AOI and provides their short descriptions, Biodiversity Status, and remnant extent within the selected AOI. Please note, where heterogeneous vegetated patches (mixed patches of remnant vegetation mapped as containing multiple regional ecosystems) occur within the AOI, they have been split and listed as individual regional ecosystems (or vegetation communities where present) for the purposes of the table below. In such instances, associated area figures have been generated based upon the estimated proportion of each regional ecosystem (or vegetation community) predicted to be present within the larger mixed patch.

Table 3: Remnant regional ecosystems, description and status within the AOI

Regional Ecosystem	Short Description	BD Status	Area (Ha)	% of AOI
11.10.1	Blakella citriodora woodland on coarse-grained sedimentary rocks	No concern at present	62.49	4.97
11.3.2	Eucalyptus populnea woodland on alluvial plains	Of concern	18.48	1.47
11.3.25	Eucalyptus tereticornis or E. camaldulensis woodland fringing drainage lines	Of concern	6.16	0.49
11.3.4	Eucalyptus tereticornis and/or Eucalyptus spp. woodland on alluvial plains	Of concern	30.80	2.45
11.4.8	Eucalyptus cambageana woodland to open forest with Acacia harpophylla or A. argyrodendron on Cenozoic clay plains	Endangered	102.35	8.14
11.4.9a	Acacia harpophylla shrubby woodland with Terminalia oblongata on Cenozoic clay plains	Endangered	6.16	0.49
11.4.9b	Acacia harpophylla shrubby woodland with Terminalia oblongata on Cenozoic clay plains	Endangered	76.44	6.08
11.5.15	Semi-evergreen vine thicket on Cenozoic sand plains and/or remnant surfaces	Endangered	9.81	0.78
11.5.9b	Eucalyptus crebra and other Eucalyptus spp. and Corymbia spp. woodland on Cenozoic sand plains and/or remnant surfaces	No concern at present	2.42	0.19
11.7.2	Acacia spp. woodland on Cenozoic lateritic duricrust. Scarp retreat zone	No concern at present	456.11	36.30
non-remnant	None	None	484.59	38.56

Refer to **Map 2** for further information. **Map 3** also provides a visual estimate of the distribution of regional ecosystems present before clearing.

Table 4 provides further information in regards to the remnant regional ecosystems present within the AOI. Specifically, the extent of remnant vegetation remaining within the bioregion, the 1:1,000,000 broad vegetation group (BVG) classification, whether the regional ecosystem is identified as a wetland, and extent of representation in Queensland's Protected Area Estate. For a description of the vegetation communities within the AOI and classified according to the 1:1,000,000 BVG, refer to **Table 6**.

Table 4: Remnant regional ecosystems within the AOI, additional information

Regional Ecosystem	Remnant Extent	BVG (1 Million)	Wetland	Representation in protected estate
11.10.1	Pre-clearing 981000 ha; Remnant 2023 848000 ha	10a	Not a Wetland	High
11.3.2	Pre-clearing 1872000 ha; Remnant 2023 482000 ha	17a	Contains Palustrine	Low
11.3.25	Pre-clearing 842000 ha; Remnant 2023 541000 ha	16a	Riverine	Low
11.3.4	Pre-clearing 680000 ha; Remnant 2023 177000 ha	16c	Not a Wetland	Low
11.4.8	Pre-clearing 730000 ha; Remnant 2023 67000 ha	25a	Contains Palustrine	Low
11.4.9a	Pre-clearing 989000 ha; Remnant 2023 88000 ha	25a	Not a Wetland	Low
11.4.9b	Pre-clearing 989000 ha; Remnant 2023 88000 ha	25a	Not a Wetland	Low
11.5.15	Pre-clearing 43000 ha; Remnant 2023 14000 ha	7a	Not a Wetland	Low
11.5.9b	Pre-clearing 371000 ha; Remnant 2023 242000 ha	18b	Not a Wetland	Low
11.7.2	Pre-clearing 549000 ha; Remnant 2023 358000 ha	24a	Not a Wetland	Low
non-remnant	None	None	None	None

Representation in Protected Area Estate: High greater than 10% of pre-clearing extent is represented; Medium 4 - 10% is represented; Low less than 4% is represented, No representation.

The distribution of mapped wetland systems within the area of interest is displayed in **Map 6**.

The following table lists known special values associated with a regional ecosystem type.

Table 5: Remnant regional ecosystems within the AOI, special values

Regional Ecosystem	Special Values
11.10.1	11.10.1: Potential habitat for NCA listed species: Acacia argentina, Acacia calantha, Acacia handonis, Acacia islana, Acacia pedleyi, Acacia sp. (Ruined Castle Creek P.I.Forster+ PIF17848), Apatophyllum teretifolium, Calytrix islensis, Capparis humistrata, Cerbera dumicola, Cryptandra ciliata, Eucalyptus beaniana, Homoranthus tricolor, Livistona nitida, Macrozamia crassifolia, Melaleuca groveana, Melaleuca irbyana, Micromyrtus rotundifolia, Ozothamnus eriocephalus, Pomaderris coomingalensis, Pseudanthus pauciflorus subsp. arenicola, Rutidosis crispata, Samadera bidwillii, Sannantha brachypoda, Zieria inexpectata.
11.3.2	11.3.2: Habitat for threatened flora species Homopholis belsonii. This ecosystem is also known to provide suitable habitat for koalas (Phascolarctos cinereus).
11.3.25	11.3.25: Shown to be associated with a high fauna species richness in the Taroom area (Venz et al. 2002). Within parts of the Fitzroy catchment, this RE is known habitat for the threatened freshwater turtle Rheodytes leukops. Known to be important habitat for other riparian freshwater turtle species. This ecosystem is also known to provide suitable habitat for koalas (Phascolarctos cinereus).
11.3.4	11.3.4: Potential habitat for NCA listed species: Acacia pedleyi, Callicarpa thozetii, Cycas megacarpa, Cycas ophiolitica, Digitaria porrecta, Eriocaulon carsonii subsp. orientale, Livistona nitida, Rhaponticum australe, Samadera bidwillii, Sannantha brachypoda. This ecosystem is also known to provide suitable habitat for koalas (Phascolarctos cinereus).
11.4.8	11.4.8a: Larger gilgai provides ephemeral wetland habitat.
11.4.9a	11.4.9: Potential habitat for NCA listed species: Cadellia pentastylis, Solanum adenophorum, Solanum dissectum, Solanum elachophyllum, Solanum johnsonianum, Xerothamnella herbacea.
11.4.9b	11.4.9: Potential habitat for NCA listed species: Cadellia pentastylis, Solanum adenophorum, Solanum dissectum, Solanum elachophyllum, Solanum johnsonianum, Xerothamnella herbacea.
11.5.15	11.5.15: Habitat for threatened plant species including Fontainea fugax, Pomaderris clivicola and Cadellia pentastylis and the near threatened species Macropteranthes leiocaulis; a wide range of flora and fauna species with disjunct distributions.
11.5.9b	11.5.9: Potential habitat for NCA listed species: Cerbera dumicola, Cossinia australiana, Cycas ophiolitica, Solanum elachophyllum.
11.7.2	11.7.2: Habitat for threatened plant species including Acacia wardellii.
non-remnant	None

3. Remnant Regional Ecosystems by Broad Vegetation Group

BVGs are a higher-level grouping of vegetation communities. Queensland encompasses a wide variety of landscapes across temperate, wet and dry tropics and semi-arid climatic zones. BVGs provide an overview of vegetation communities across the state or a bioregion and allow comparison with other states. There are three levels of BVGs which reflect the approximate scale at which they are designed to be used: the 1:5,000,000 (national), 1:2,000,000 (state) and 1:1,000,000 (regional) scales.

A comprehensive description of BVGs is available at: https://publications.qld.gov.au/dataset/redd/resource/

The following table provides a description of the 1:1,000,000 BVGs present and their associated extent within the AOI.

Table 6: Broad vegetation groups (1 million) within the AOI

BVG (1 Million)	Description	Area (Ha)	% of AOI
None	None	484.59	38.56
10a	Dry woodlands to open woodlands dominated by Blakella citriodora (spotted gum).	62.49	4.97
16a	Open forest and woodlands dominated by Eucalyptus camaldulensis (river red gum) (or E. tereticornis (blue gum)) and/or E. coolabah (coolabah) (or E. microtheca (coolabah)) fringing drainage lines. Associated species may include Melaleuca spp., Blakella tessellaris (carbeen), Angophora spp., Casuarina cunninghamiana (riveroak). Does not include alluvial areas dominated by herb and grasslands or alluvial plains that are not flooded.	6.16	0.49
16c	Woodlands and open woodlands dominated by Eucalyptus coolabah (coolabah) or E. microtheca (coolabah) or E. largiflorens (black box) or E. tereticornis (blue gum) or E. chlorophylla on floodplains. Does not include alluvial areas dominated by herb and grasslands or alluvial plains that are not flooded.	30.80	2.45
17a	Woodlands dominated by Eucalyptus populnea (poplar box) (or E. brownii (Reid River box)) on alluvium, sand plains and footslopes of hills and ranges.	18.48	1.47
18b	Woodlands dominated Eucalyptus crebra (sens. lat.) (narrow-leaved red ironbark) frequently with Corymbia or Blakella spp. or Callitris spp. on flat to undulating plains.	2.42	0.19
24a	Low woodlands to tall shrublands dominated by Acacia spp. on residuals. Species include A. shirleyi (lancewood), A. catenulata (bendee), A. microsperma (bowyakka), A. clivicola, A. sibirica, A. rhodoxylon (rosewood) and A. leptostachya (Townsville wattle).	456.11	36.30
25a	Open forests to woodlands dominated by Acacia harpophylla (brigalow) sometimes with Casuarina cristata (belah) on heavy clay soils. Includes areas co-dominated with A. cambagei (gidgee) and/or emergent eucalypts.	184.95	14.72
7a	Semi-evergreen vine thickets on wide range of substrates.	9.81	0.78

Refer to **Map 4** for further information. **Map 5** also provides a representation of the distribution of vegetation communities as per the 1:5,000,000 BVG believed to be present prior to European settlement.

4. Technical and BioCondition Benchmark Descriptions

Technical descriptions provide a detailed description of the full range in structure and floristic composition of regional ecosystems (e.g. 11.3.1) and their component vegetation communities (e.g. 11.3.1a, 11.3.1b). See: http://www.qld.gov.au/environment/plants-animals/plants/ecosystems/technical-descriptions/

The descriptions are compiled using site survey data from the Queensland Herbarium & Biodiversity Science's QBEIS database. Distribution maps, representative images (if available) and the pre-clearing and remnant extent (hectares) of each vegetation community derived from the regional ecosystem mapping data are included. The technical descriptions should be used in conjunction with the fields from the regional ecosystem description database (REDD) for a full description of the regional ecosystem.

Technical descriptions include data on canopy height, canopy cover and native plant species composition of the predominant layer, which are attributes relevant to assessment of the remnant status of vegetation under the *Vegetation Management Act 1999*. However, as technical descriptions reflect the full range in structure and floristic composition across the climatic, natural disturbance and geographic range of the regional ecosystem, local reference sites should be used for remnant assessment where possible (Neldner et al. 2023 (PDF)* section 3.3 of: https://www.qld.gov.au/__data/assets/pdf_file/0033/459186/methodology-mapping-surveying-v7.pdf

The technical descriptions are subject to review and are updated as additional data becomes available.

When conducting a BioCondition assessment, these technical descriptions should be used in conjunction with BioCondition benchmarks for the specific regional ecosystem, or component vegetation community. http://www.qld.gov.au/environment/plants-animals/biodiversity/benchmarks/

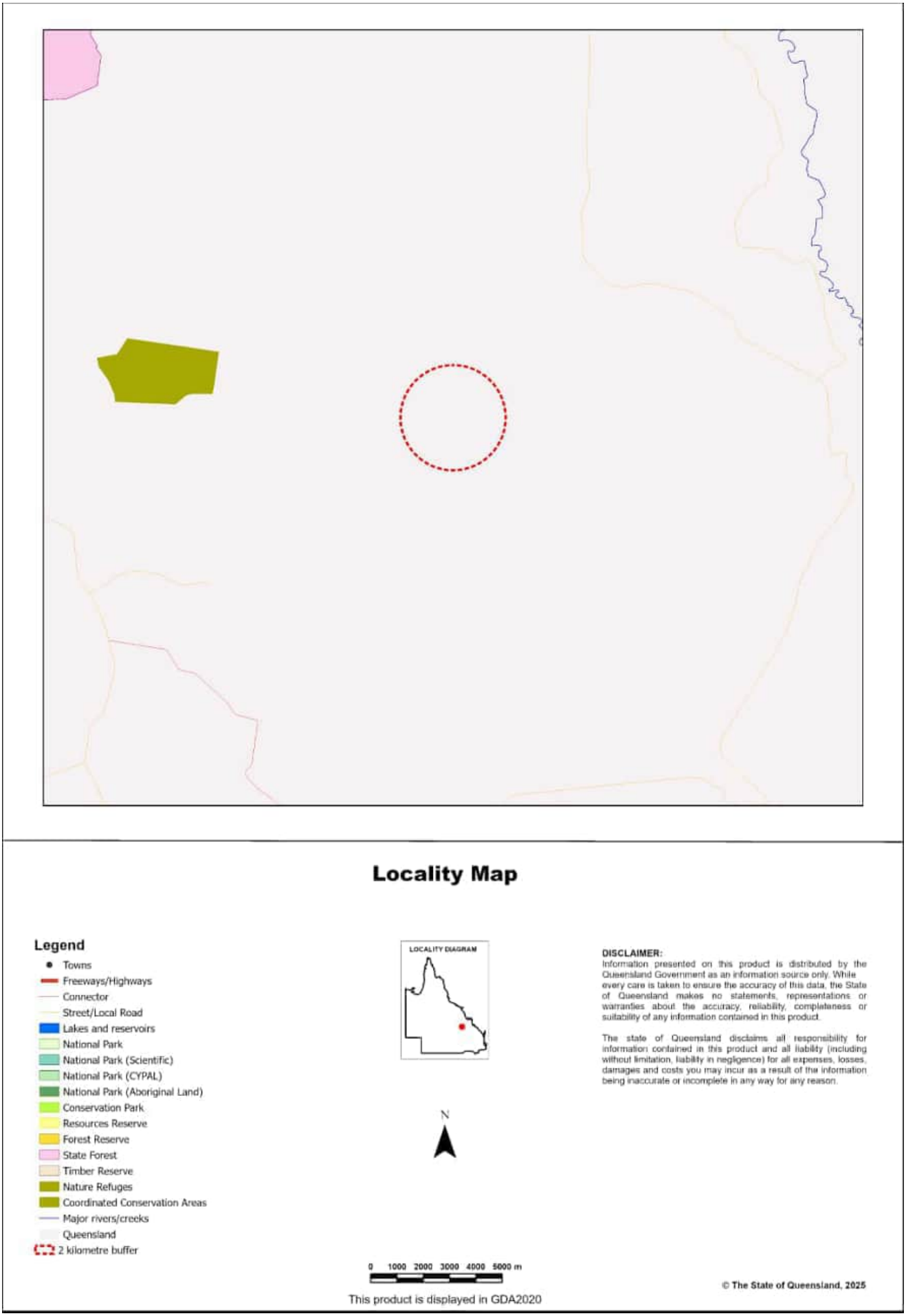
Benchmarks are based on a combination of quantitative and qualitative information and should be used as a guide only. Benchmarks are specific to one regional ecosystem vegetation community, however, the natural variability in structure and floristic composition under a range of climatic and natural disturbance regimes has been considered throughout the geographic extent of the regional ecosystem. Local reference sites should be used for this spatial and temporal (seasonal and annual) variability.

Table 7: List of remnant regional ecosystems within the AOI for which technical and biocondition benchmark descriptions are available

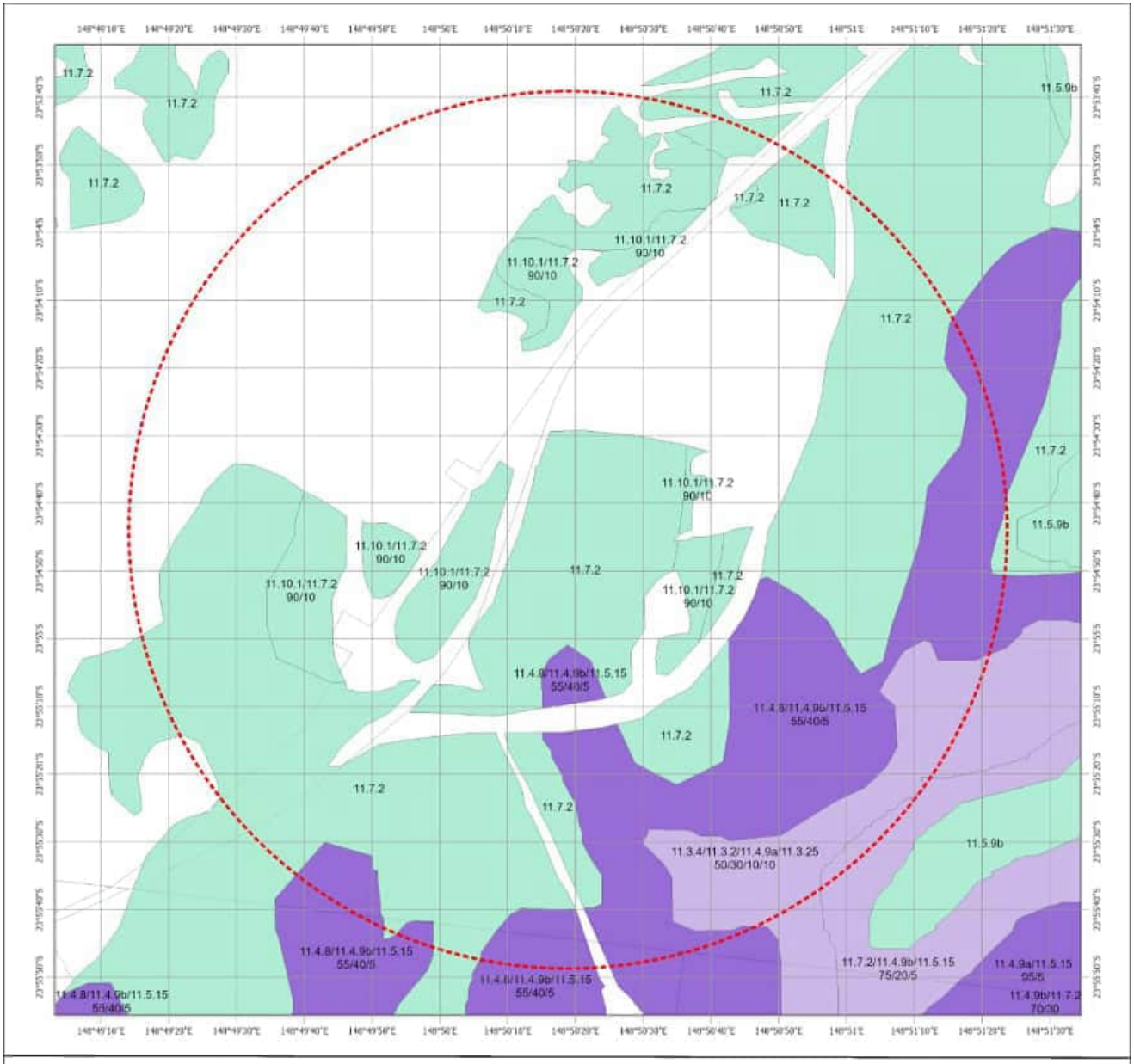
Regional ecosystems mapped as within the AOI	Technical Descriptions	Biocondition Benchmarks
11.10.1	Available	Available
11.3.2	Available	Available
11.3.25	Available	Available
11.3.4	Available	Available
11.4.8	Available	Available
11.4.9a	Available	Not currently available
11.4.9b	Available	Not currently available
11.5.15	Available	Available
11.5.9b	Available	Available
11.7.2	Available	Available
non-remnant	Not currently available	Not currently available

Maps

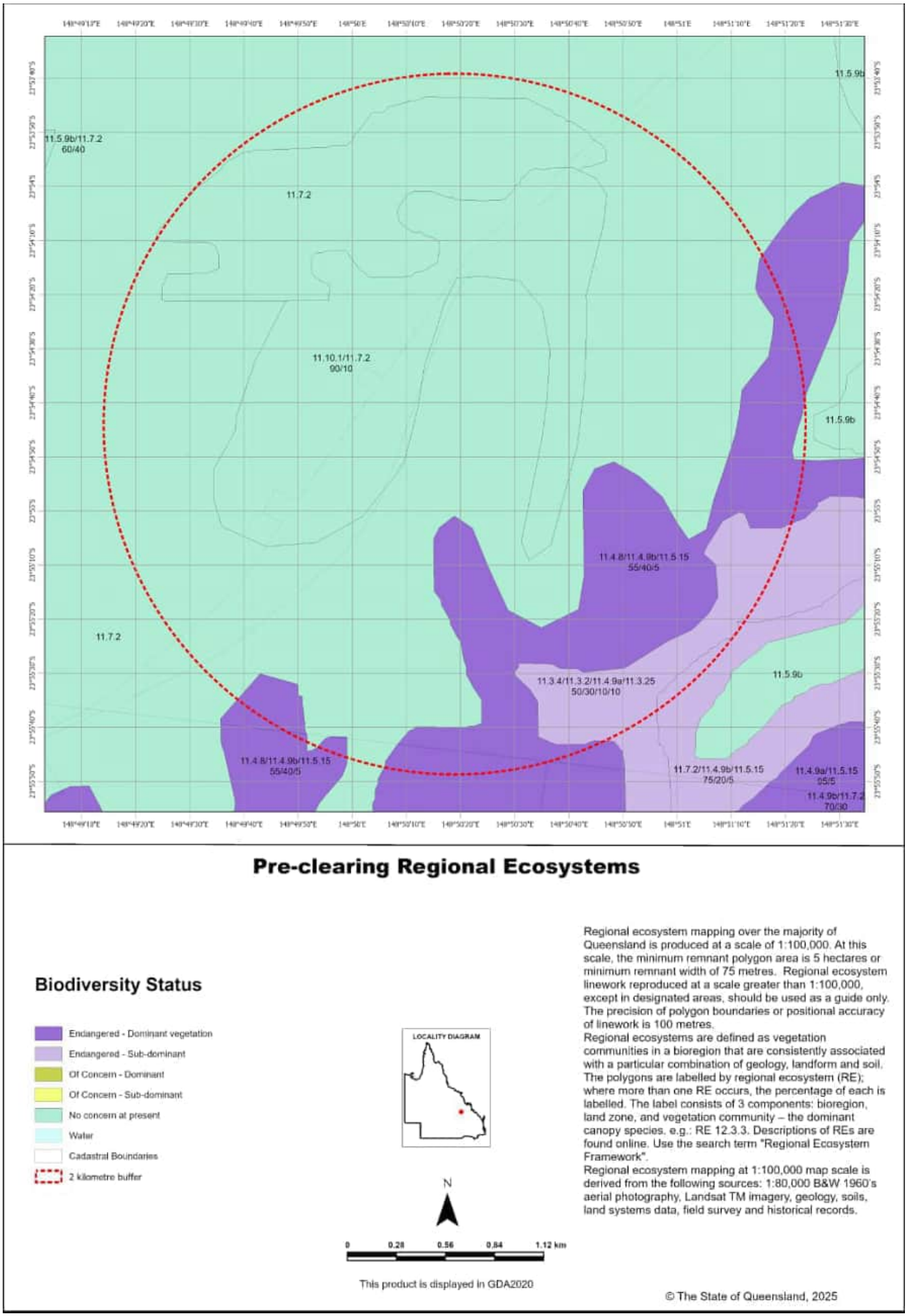
Map 1 - Location



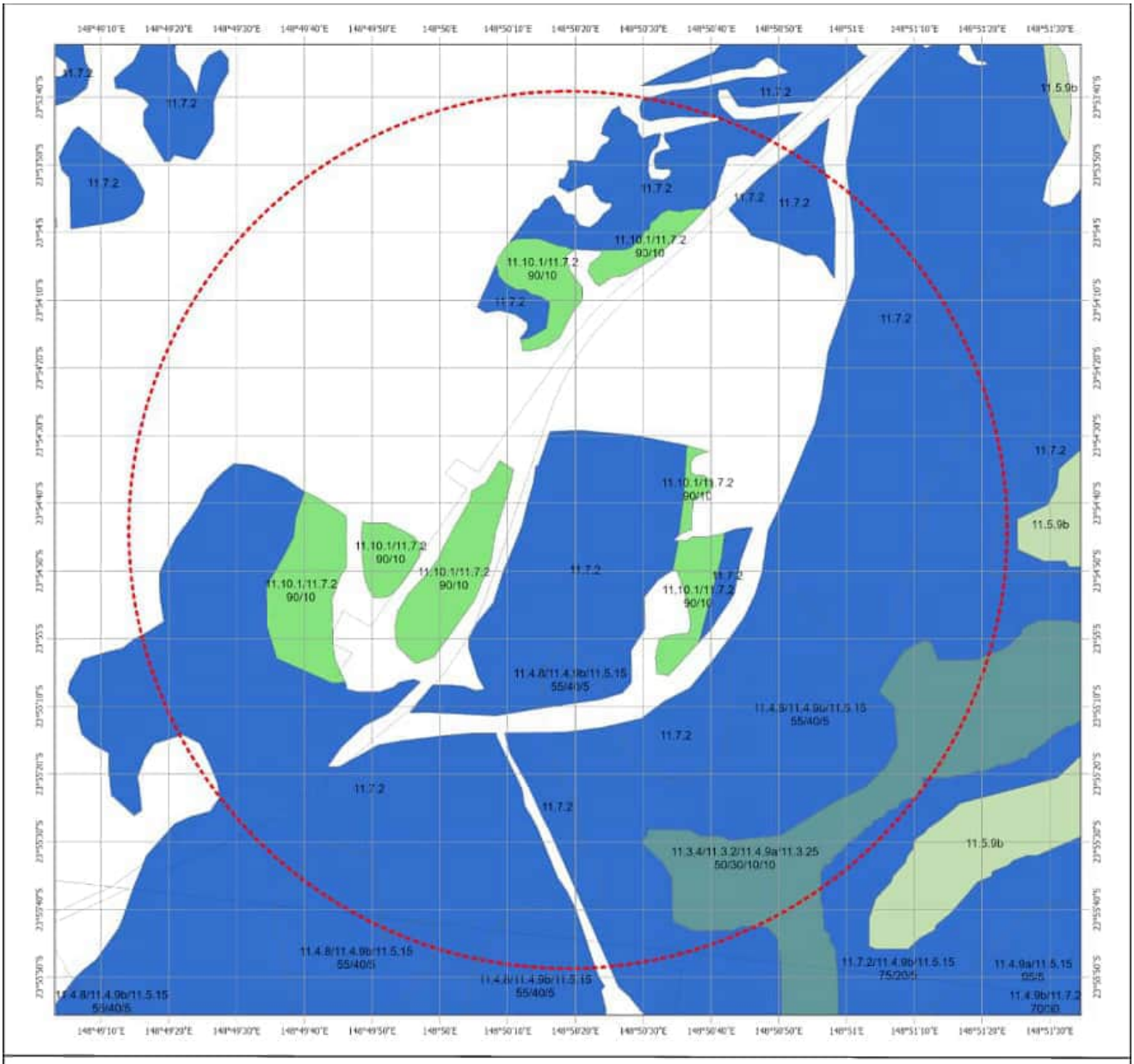
Map 2 - Remnant 2021 regional ecosystems



Map 3 - Pre-clearing regional ecosystems



Map 4 - Remnant 2021 regional ecosystems by BVG (5M)



Remnant 2021 Regional Ecosystems coloured by Broad Vegetation Groups

Broad Vegetation Groups
BVG5M Description (BVG1M codes)

- 1. Rainforests and scrubs (1-7b)
- 2. Wet eucalypt open forests (8-8b)
- 3. Eucalypt woodlands to open forests (mainly eastern Qld) (9-15b)
- 4. Eucalypt open forests to woodlands on floodplains (16-16d)
- 5. Eucalypt dry woodlands on inland depositional plains (17-18d)
- 6. Eucalypt low open woodlands usually with spinifex understorey (19-19d)
- 7. Callitris woodland - open forests (20a)
- 8. Melaleuca open woodlands on depositional plains (21-22c)
- 9. Acacia aneura (mulga) dominated open forests, woodlands and shrublands (23-23b)
- 10. Other acacia dominated open forests, woodlands and shrublands (24-26a)
- 11. Mixed species woodlands, open woodland - (inland bioregions) includes wooded downs (27-27c)
- 12. Other coastal communities or heaths (28-29b)
- 13. Tussock grasslands, forblands (30-32b)
- 14. Hummock grasslands (33-33b)
- 15. Wetlands (swamps and lakes) (34-34g)
- 16. Mangroves and saltmarshes (35-35b)
- Non-remnant vegetation, cultivated or built environment
- Water
- Cadastral Boundaries
- 2 kilometre buffer

LOCALITY DIAGRAM

N

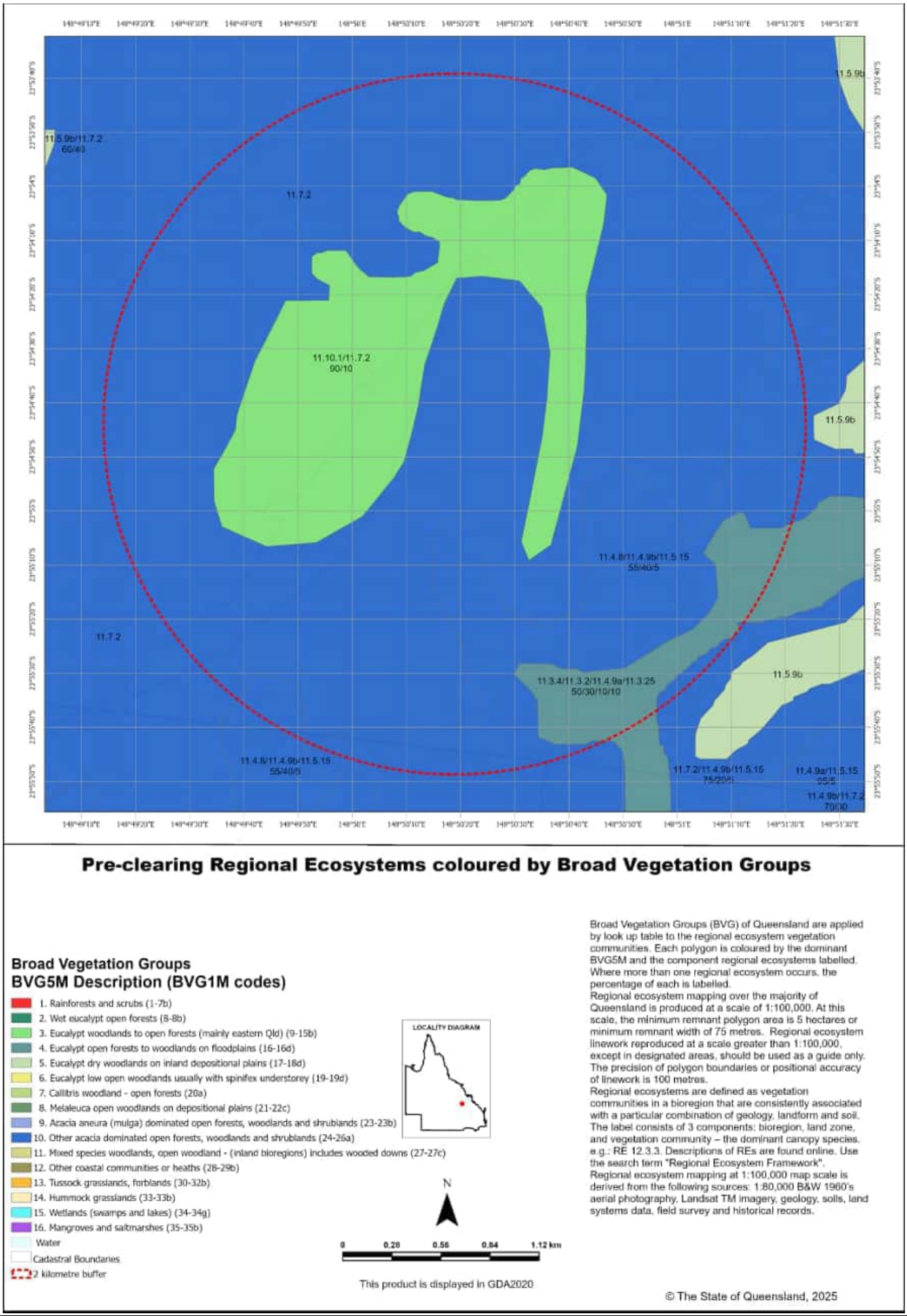
0 0.28 0.55 0.83 1.1 km

This product is displayed in GDA2020

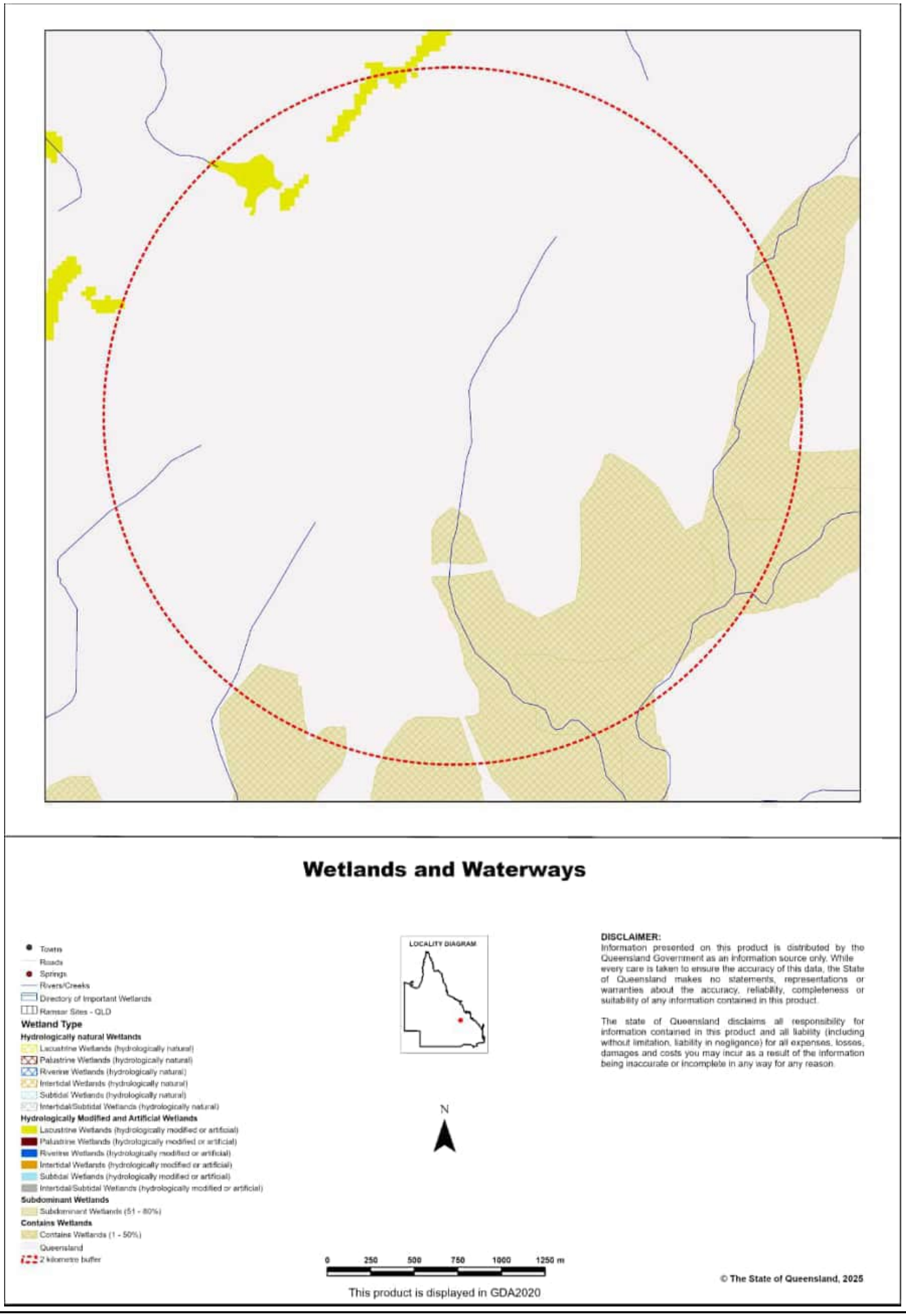
Broad Vegetation Groups (BVG) of Queensland are applied by look up table to the regional ecosystem vegetation communities. Each polygon is coloured by the dominant BVG5M and the component regional ecosystems labelled. Where more than one regional ecosystem occurs, the percentage of each is labelled.
Regional ecosystem mapping over the majority of Queensland is produced at a scale of 1:100,000. At this scale, the minimum remnant polygon area is 5 hectares or minimum remnant width of 75 metres. Regional ecosystem linework reproduced at a scale greater than 1:100,000, except in designated areas, should be used as a guide only. The precision of polygon boundaries or positional accuracy of linework is 100 metres.
Regional ecosystems are defined as vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil.
The label consists of 3 components: bioregion, land zone, and vegetation community – the dominant canopy species. e.g.: RE 12.3.3. Descriptions of REs are found online. Use the search term "Regional Ecosystem Framework".
Regional ecosystem mapping at 1:100,000 map scale is derived from the following sources: 1:80,000 B&W 1960's aerial photography, Landsat TM imagery, geology, soils, land systems data, field survey and historical records.
Remnant woody vegetation is defined as vegetation that has not been cleared or vegetation that has been cleared but where the dominant canopy has >70% of the height and >50% of the cover relative to the undisturbed height and cover of that stratum and is dominated by species characteristic of the vegetation's undisturbed canopy.
Non-remnant vegetation includes regrowth and disturbed native vegetation.

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Map 5 - Pre-clearing regional ecosystems by BVG (5M)



Map 6 - Wetlands and waterways



Links and Other Information Sources

The Department of the Environment, Tourism, Science and Innovation's Website - http://www.qld.gov.au/environment/plants-animals/plants/ecosystems/ provides further information on the regional ecosystem framework, including access to links to the Regional Ecosystem Database, Broad Vegetation Group Definitions, Regional Ecosystem and Land zone descriptions.

Descriptions of the broad vegetation groups of Queensland can be downloaded from: https://www.qld.gov.au/environment/plants-animals/plants/ecosystems/broad-vegetation

The methodology for mapping regional ecosystems can be downloaded from: https://www.qld.gov.au/__data/assets/pdf_file/0033/459186/methodology-mapping-surveying-v7.pdf

Technical descriptions for regional ecosystems can be obtained from: http://www.qld.gov.au/environment/plants-animals/plants/ecosystems/technical-descriptions/

Benchmarks can be obtained from: http://www.qld.gov.au/environment/plants-animals/biodiversity/benchmarks/

For further information associated with the remnant regional ecosystem dataset used by this report, refer to the metadata associated with the Biodiversity status of pre-clearing and Remnant Regional Ecosystems of Queensland dataset (version listed in **Appendix 1**) which is available through the Queensland Spatial Catalogue, Queensland Spatial Catalogue : Queensland Government (information.qld.gov.au)

The Queensland Globe is a mapping and data application. As an interactive online tool, Queensland Globe allows you to view and explore Queensland maps, imagery (including up-to-date satellite images) and other spatial data, including regional ecosystem mapping. To further view and explore regional ecosystems over an area of interest, access the Biota Globe (a component of the Queensland Globe). The Queensland Globe can be accessed via the following link: https://qldglobe.information.qld.gov.au/

References

Neldner, V.J., Niehus, R.E., Wilson, B.A., McDonald, W.J.F., Ford, A.J. and Accad, A. (2023). The Vegetation of Queensland. Descriptions of Broad Vegetation Groups. Version 6.0. Queensland Herbarium, Department of Environment and Science. (https://publications.qld.gov.au/dataset/redd/resource/78209e74-c7f2-4589-90c1-c33188359086)

Neldner, V.J., Wilson, B.A., Dillewaard, H.A., Ryan, T.S., Butler, D.W., McDonald, W.J.F, Richter,D., Addicott, E.P. and Appelman, C.N. (2023) Methodology for survey and mapping of regional ecosystems and vegetation communities in Queensland. Version 7.0. Updated December 2023. Queensland Herbarium, Queensland Department of Environment, Science and Innovation, Brisbane. (https://www.qld.gov.au/__data/assets/pdf_file/0033/459186/methodology-mapping-surveying-v7.pdf).

Sattler, P.S. and Williams, R.D. (eds) (1999). *The Conservation Status of Queensland's Bioregional Ecosystems.* Environmental Protection Agency, Brisbane.

Appendices

Appendix 1 - Source Data

The dataset listed below is available for download from:
http://www.qld.gov.au/environment/plants-animals/plants/ecosystems/download/

- Regional Ecosystem Description Database

The datasets listed below are available for download from:
Queensland Spatial Catalogue : Queensland Government (information.qld.gov.au)

- Biodiversity status of pre-clearing and 2021 remnant regional ecosystems of Queensland
- Pre-clearing Vegetation Communities and Regional Ecosystems of Queensland
- Queensland Wetland Data Version - Wetland lines
- Queensland Wetland Data Version - Wetland points
- Queensland Wetland Data Version - Wetland areas
- Pre-clearing broad vegetation groups of Queensland
- Remnant 2021 broad vegetation groups of Queensland

Appendix 2 - Acronyms and Abbreviations

AOI - Area of Interest
GIS - Geographic Information System
RE - Regional Ecosystem
REDD - Regional Ecosystem Description Database
VMA - *Vegetation Management Act 1999*

Appendix B Flora and Fauna Lists

Table 17: Flora species recorded within the Survey area.

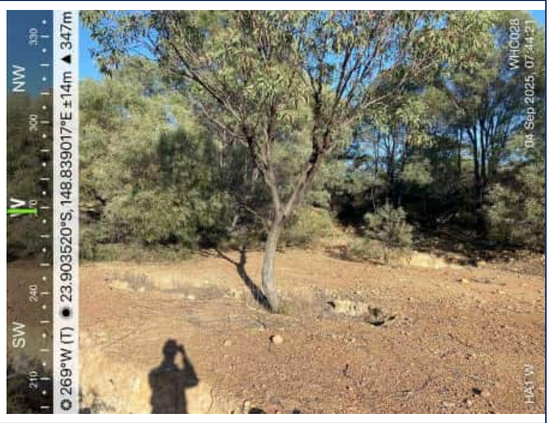
Scientific Name	Common Name
Acacia macradenia	Zig-Zag Wattle
Acacia rhodoxylon	Rosewood
Acacia shirleyi	Lancewood
Acalypha eremorum	Soft Acalypha
Alphitonia excelsa	Soap Tree, Red Ash
Alstonia constricta	Bitterbark, Quinine Bush
Ancistrachne uncinulata	Hooked-Hairy Panic Grass
Aristida calycina	Dark Wiregrass
Aristida caput-medusae	Many-Headed Wiregrass
Bertya opponens	-
Blakella citriodora	Lemon-scented Gum
Bothriochloa bladhii	Forest bluegrass
Callitris glaucophylla	White Cypress Pine
Carissa ovata	Currantbush
Cassia brewsteri	Leichhardt Bean, Bean Tree
Cenchrus ciliaris	Buffel Grass
Cenchrus pennisetiformis	Buffel Grass
Croton insularis	Silver Queensland Cascarilla
Cymbopogon refractus	Barbed-wire Grass
Dinebra decipiens	Slender Canegrass
Dodonaea oxyptera	Hop Bush
Enneapogon pallidus	Conetop Nineawn
Enteropogon ramosus	Spider Grass, Curly Windmill Grass
Entolasia stricta	Wiry Panic
Eragrostis sp.	-
Erythroxylum australe	Cocaine Tree
Eucalyptus crebra	Narrow-leaved Ironbark
Eucalyptus exserta	Queensland Peppermint
Eucalyptus populnea	Poplar Box
Everistia vacciniifolia	Small-leaved Canthium

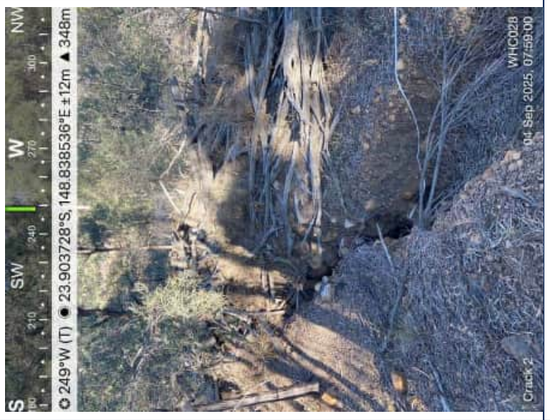
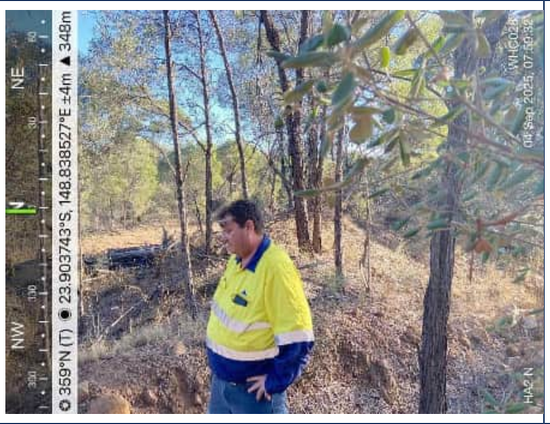
Scientific Name	Common Name
Geijera parviflora	Wilga, Dogwood
Geijera salicifolia	Brush Wilga
Gossypium sturtianum	Sturt's Desert Rose
Harrisia martinii	Harrisia Cactus
Hibiscus heterophyllus	Native Hibiscus, Native Cottonwood
Hovea sp.	-
Melinis repens	Red Natal Grass
Parsonsia straminea	Monkey Rope
Paspalidium caespitosum	Brigalow Grass
Phebalium glandulosum subsp. glandulosum	Desert Phebalium
Sida sp.	-

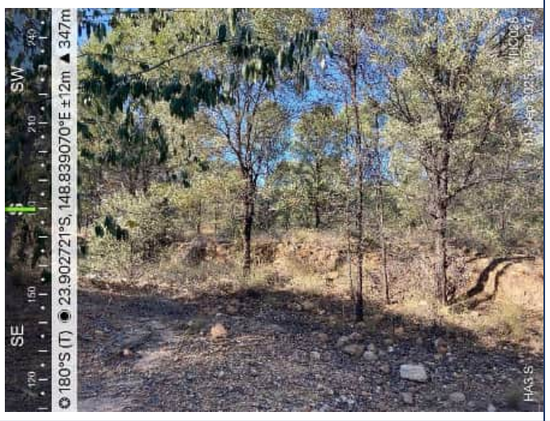
Table 18: Fauna species recorded within the Survey Area.

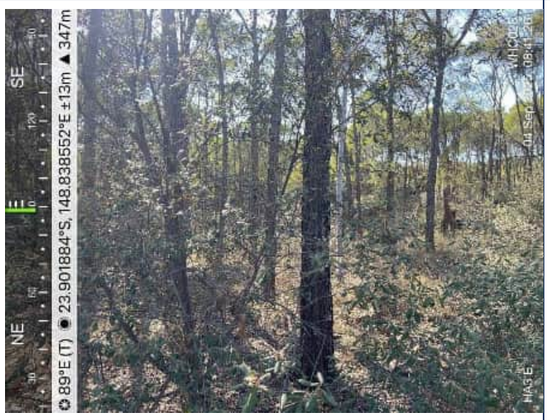
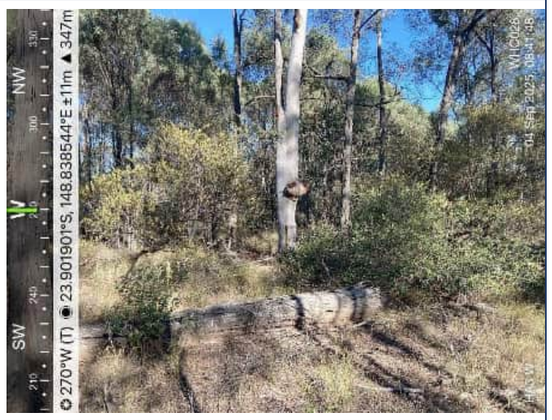
Scientific Name	Common Name
Corvus orru	Torresian Crow
Dacelo novaeguineae	Laughing Kookaburra
Grallina cyanoleuca	Magpie-lark
Gymnorhina tibicen	Australian Magpie
Haliastur sphenurus	Whistling Kite
Macropus giganteus	Eastern Grey Kangaroo
Malurus melanocephalus	Red-backed Fairy Wren
Manorina melanocephala	Noisy Miner
Pheasant Coucal	Pheasant Coucal
Rhipidura albiscapa	Grey Fantail
Strepera graculina	Pied Currawong
Struthidea cinerea	Apostlebird

Appendix C Site Photos

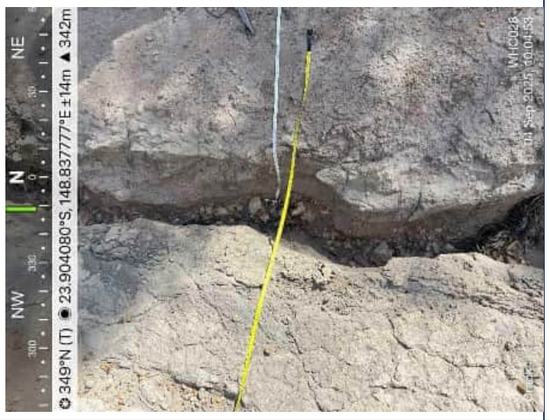
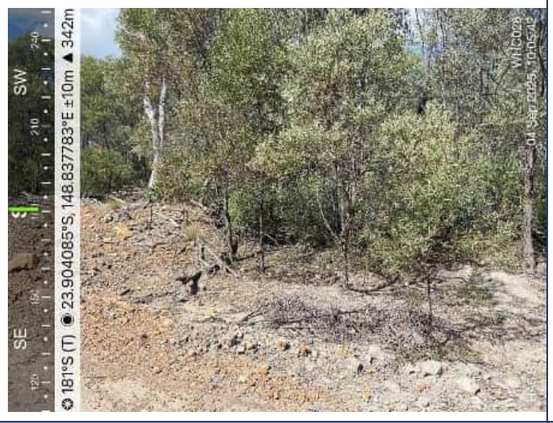
Crack 1 – Habitat Assessment 1			
			
Photo 1: Crack 1	Photo 2: Crack 1		
			
Photo 3: HA1 North	Photo 4: HA1 East	Photo 5: HA1 South	Photo 6: HA1 West

Crack 2 – Habitat Assessment 2			
			
Photo 7: Crack 2	Photo 8: Crack 2		
			
Photo 9: HA2 North	Photo 10: HA2 East	Photo 11: HA2 South	Photo 12: HA2 West

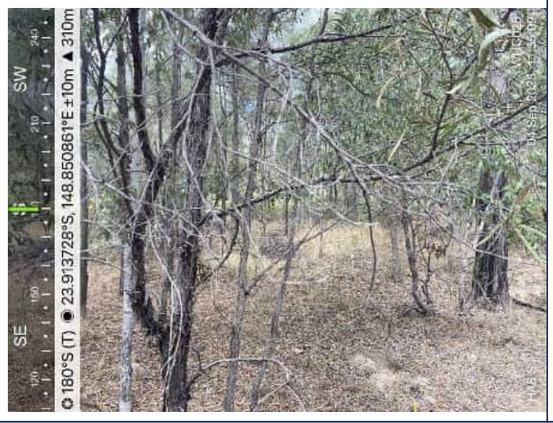
Sinkhole 1 – Habitat Assessment 3			
			
Photo 13: Sinkhole 1	Photo 14: Sinkhole 1		
			
Photo 15: HA3 North	Photo 16: HA3 East	Photo 17: HA3 South	Photo 18: HA3 West

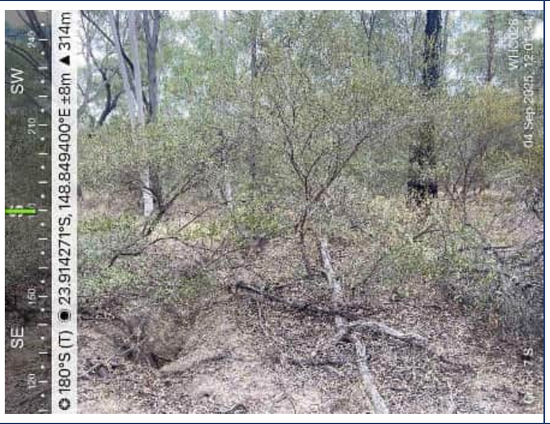
Crack 3 – Habitat Assessment 4			
			
Photo 19: Crack 3	Photo 20: Crack 3		
			
Photo 21: HA4 North	Photo 22: HA4 East	Photo 23: HA4 South	Photo 24: HA4 West

Reference Site 1 – Habitat Assessment 5			
			
Photo 25: HA5 North	Photo 26: HA5 East	Photo 27: HA5 South	Photo 28: HA5 West

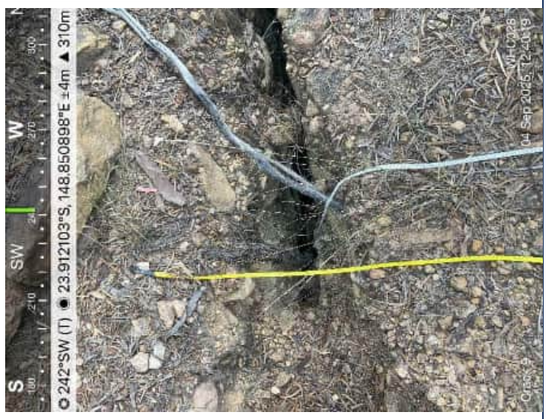
Crack 4 – Habitat Assessment 6			
			
Photo 29: Crack 4	Photo 30: Crack 4		
			
Photo 31: HA6 North	Photo 32: HA6 East	Photo 33: HA6 South	Photo 34: HA6 West

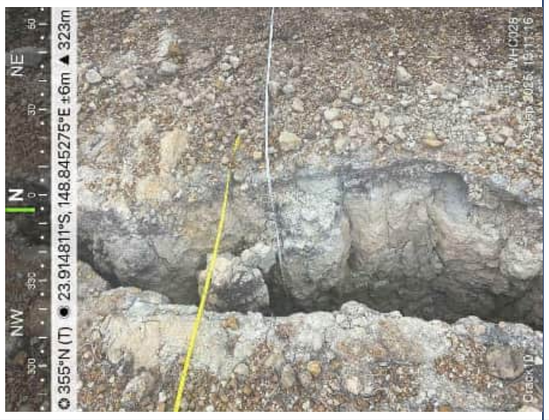
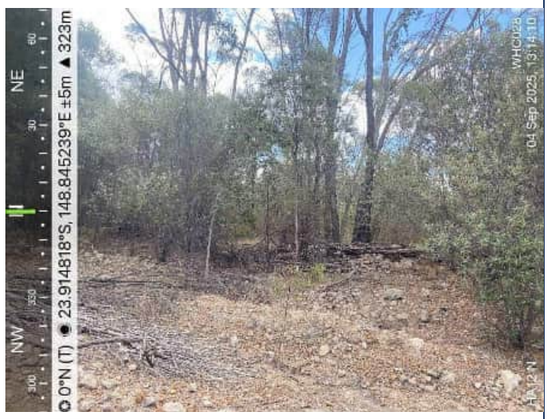
Crack 5 – Habitat Assessment 7			
			
Photo 35: Crack 5	Photo 36: Crack 5	Photo 3: Crack 5	
			
Photo 37: HA7 North	Photo 38: HA7 East	Photo 39: HA7 South	Photo 40: HA7 West

Crack 6 – Habitat Assessment 8			
			
Photo 41: Crack 6	Photo 42: Crack 6		
			
Photo 43: HA8 North	Photo 44: HA8 East	Photo 45: HA8 South	Photo 46: HA8 West

Crack 7 Tertiary Site – Habitat Assessment 9			
			
Photo 47: Crack 7	Photo 48: Crack 7		
			
Photo 49: HA9 North	Photo 50: HA9 East	Photo 51: HA9 South	Photo 52: HA9 West

Crack 8 – Habitat Assessment 10			
			
Photo 53: Crack 8	Photo 54: Crack 8		
			
Photo 55: HA10 North	Photo 56: HA10 East	Photo 57: HA10 South	Photo 58: HA10 West

Crack 9 – Habitat Assessment 11			
			
Photo 59: Crack 9	Photo 60: Crack 9		
			
Photo 61: HA11 North	Photo 62: HA11 East	Photo 63: HA11 South	Photo 64: HA11 West

Crack 10 – Habitat Assessment 12			
			
Photo 65: Crack 10	Photo 66: Crack 10		
			
Photo 67: HA12 North	Photo 68: HA12 East	Photo 69: HA12 South	Photo 70: HA12 West

Crack 11 Tertiary Site – Habitat Assessment 13 & 14



Photo 71: Crack 11

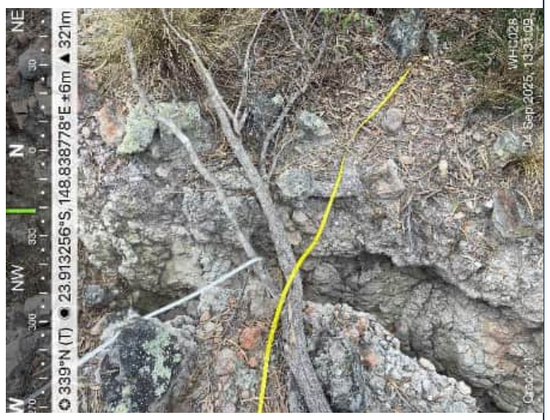


Photo 72: Crack 11



Photo 3: Evidence of dieback Crack 11

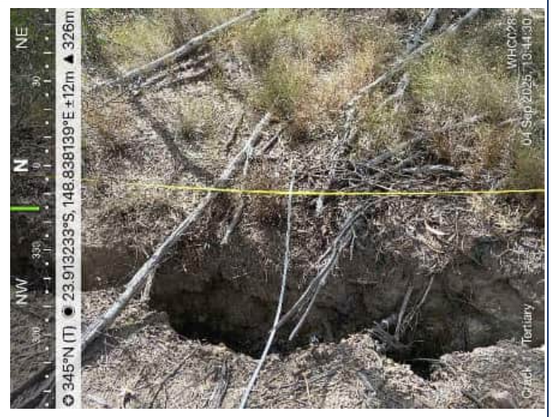


Photo 4: Crack 11



Photo 73: HA13 North

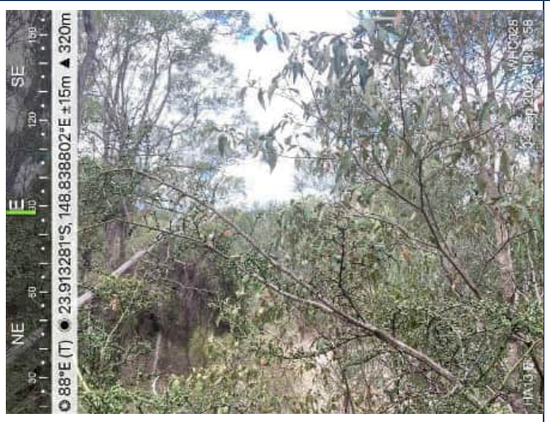


Photo 74: HA11 East

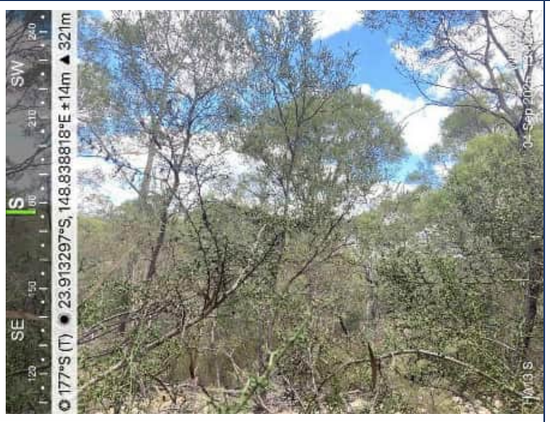


Photo 75: HA11 South



Photo 76: HA11 West

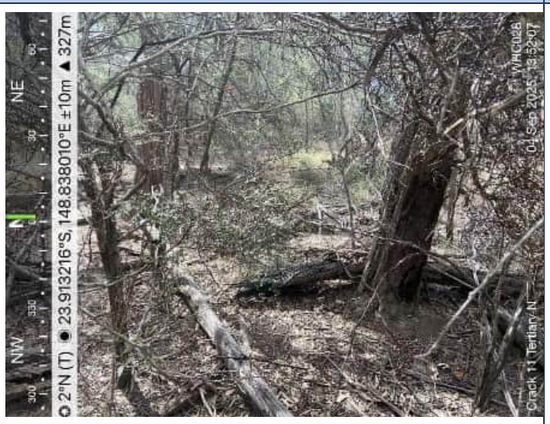


Photo 77: HA11 North



Photo 78: HA11 East

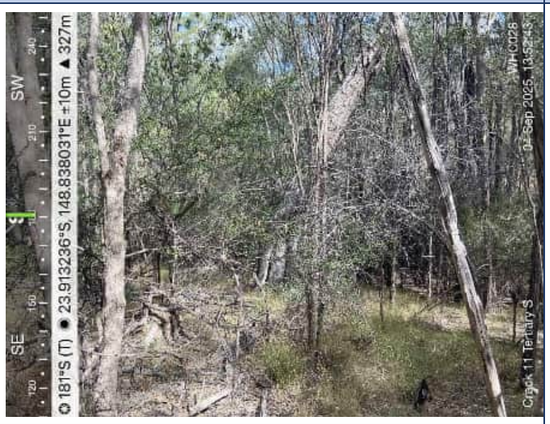


Photo 79: HA11 South

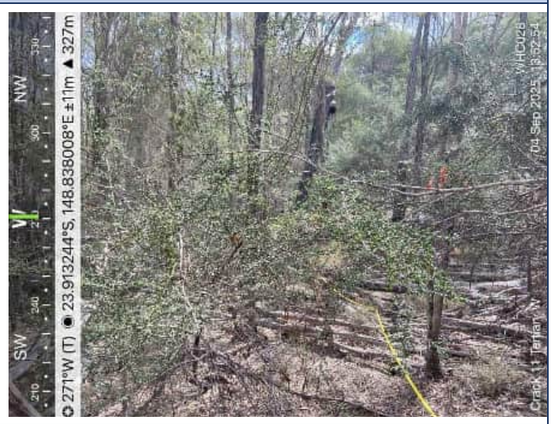


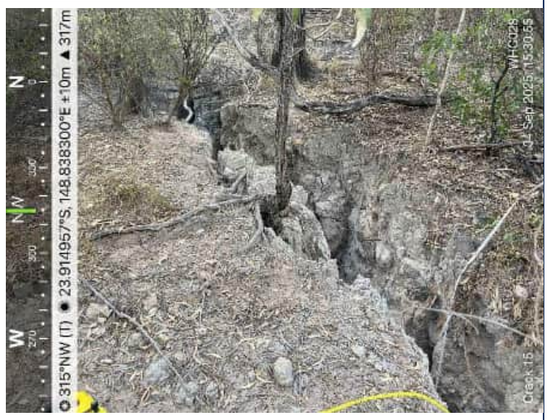
Photo 80: HA11 West

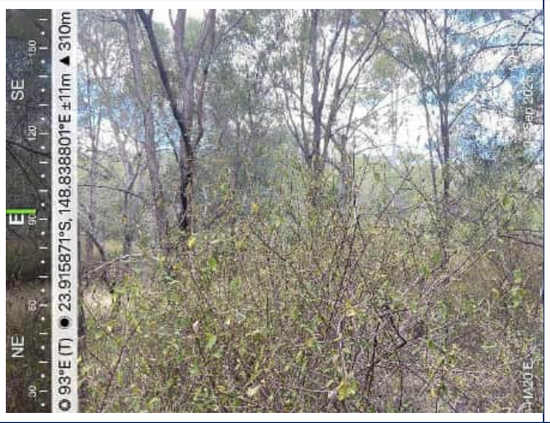
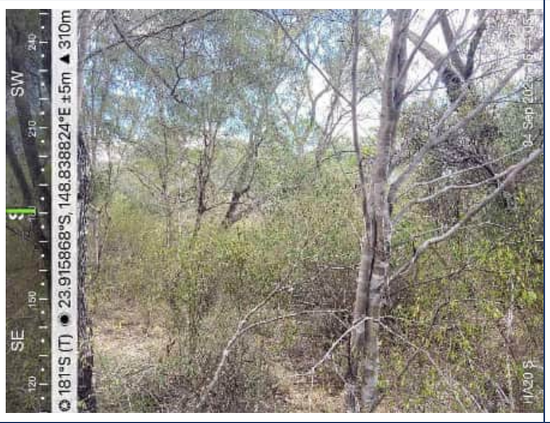
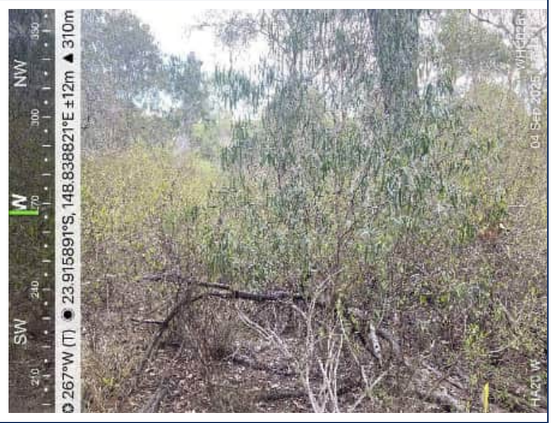
Crack 12 – Habitat Assessment 15			
			
Photo 81: Crack 12	Photo 82: Crack 12		
			
Photo 83: HA15 North	Photo 84: HA15 East	Photo 85: HA15 South	Photo 86: HA15 West

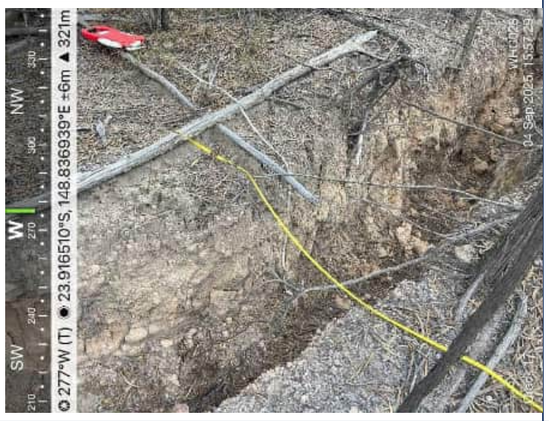
Crack 12b – Habitat Assessment 16			
			
Photo 87: Crack 12b	Photo 88: Crack 12b		
			
Photo 89: HA16 North	Photo 90: HA16 East	Photo 91: HA16 South	Photo 92: HA16 West

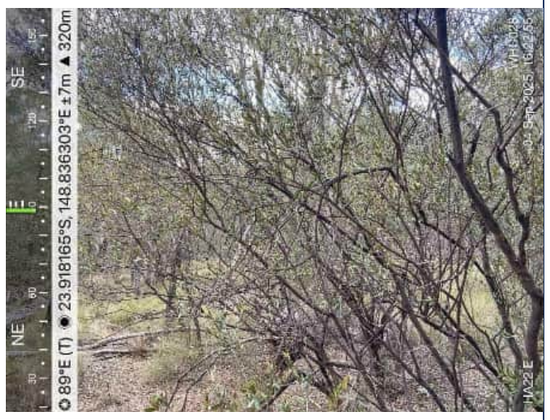
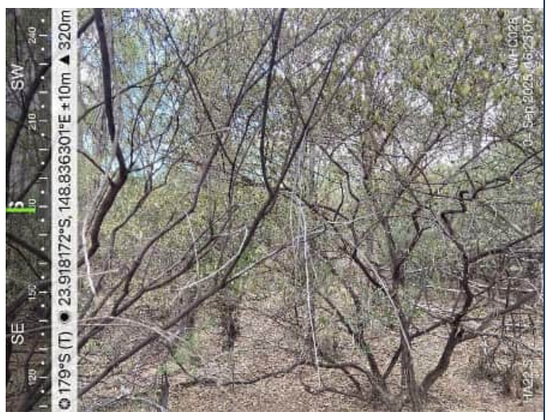
Crack 13 – Habitat Assessment 17			
			
Photo 93: Crack 13	Photo 94: Crack 13	Photo 3: HA17	

Crack 14– Habitat Assessment 18			
			
Photo 95: Crack 14	Photo 96: Crack 14		
			
Photo 97: HA18 North	Photo 98: HA18 East	Photo 99: HA18 South	Photo 100: HA18 West

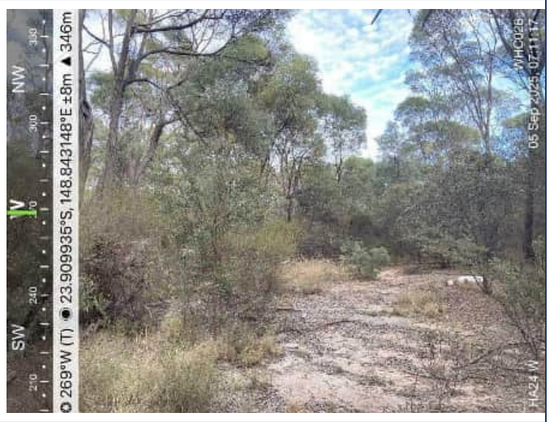
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Photo 103: HA19 North	Photo 104: HA19 East	Photo 105: HA19 South	Photo 106: HA19 West

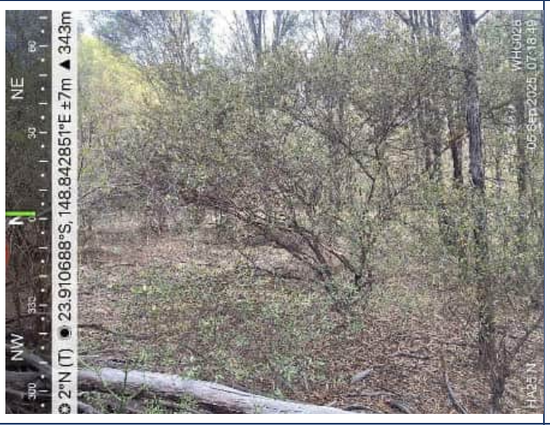
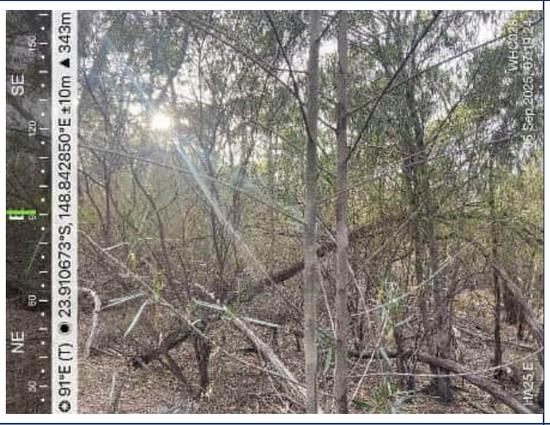
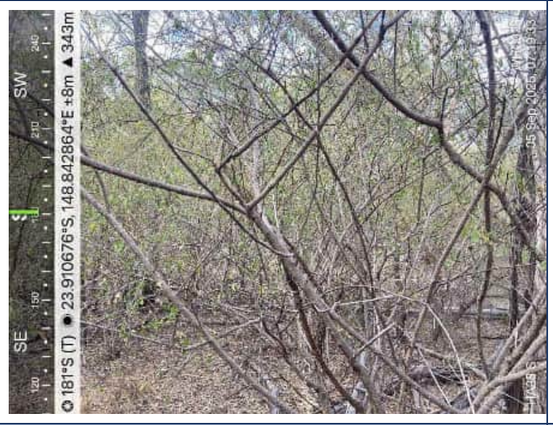
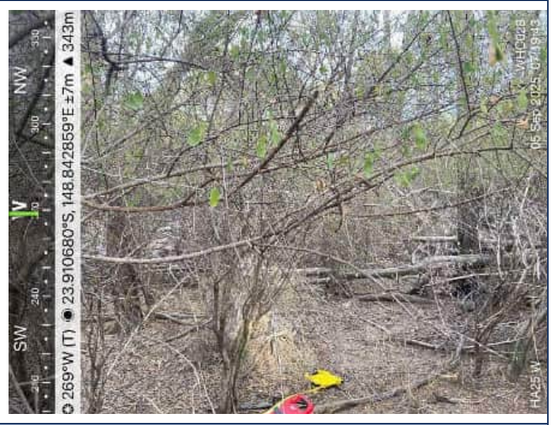
Crack 16 – Habitat Assessment 20			
			
Photo 107: Crack 16	Photo 108: Crack 16		
			
Photo 109: HA20 North	Photo 110: HA20 East	Photo 111: HA20 South	Photo 112: HA20 West

Crack 17 – Habitat Assessment 21			
			
Photo 113: Crack 17	Photo 114: Crack 17	Photo 3: Crack 17 Evidence of Logging	
			
Photo 115: HA21	Photo 116: HA21	Photo 117: HA21	Photo 118: HA21

Crack 18 – Habitat Assessment 22			
			
Photo 119: Crack 18	Photo 120: Crack 18	Photo 3: Crack 18 Evidence of Logging	
			
Photo 121: HA22 North	Photo 122: HA22 East	Photo 123: HA22 South	Photo 124: HA22 West

Crack 19 – Habitat Assessment 23			
			
Photo 125: Crack 19	Photo 126: Crack 19		
			
Photo 127: HA23 North	Photo 128: HA23 East	Photo 129: HA23 South	Photo 130: HA23 West

Crack 20 – Habitat Assessment 24			
			
Photo 131: Crack 20	Photo 132: Crack 20		
			
Photo 133: HA24 North	Photo 134: HA24 East	Photo 135: HA24 South	Photo 136: HA24 West

Crack 21 – Habitat Assessment 25			
			
Photo 137: Crack 21	Photo 138: Crack 21		
			
Photo 139: HA25 North	Photo 140: HA25 East	Photo 141: HA25 South	Photo 142: HA25 West

Crack 22 – Habitat Assessment 26



Photo 143: Crack 22



Photo 144: Crack 22



Photo 3: Crack 22 Evidence of Logging



Photo 145: HA26 North



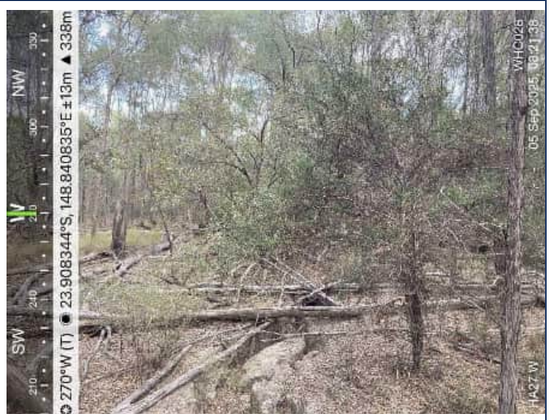
Photo 146: HA26 East



Photo 147: HA26 South



Photo 148: HA26 West

Crack 23 – Habitat Assessment 27			
			
Photo 149: Crack 23	Photo 150: Crack 23	Photo 3: Crack 23 Evidence of Logging	
			
Photo 151: HA26 North	Photo 152: HA26 East	Photo 153: HA26 South	Photo 154: HA26 West

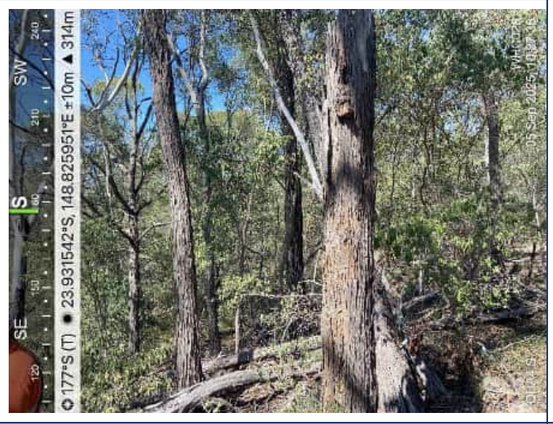
Crack 24 – Habitat Assessment 28			
			
Photo 155: Crack 24	Photo 156: Crack 24		
			
Photo 157: HA28 North	Photo 158: HA28 East	Photo 159: HA28 South	Photo 160: HA28 West

Mapped Crack 1 – Habitat Assessment 29			
			
Photo 161: Mapped Crack 1 – Drainage Line	Photo 162: Mapped Crack 1 – Drainage Line		
			
Photo 163: HA29 North	Photo 164: HA29 East	Photo 165: HA29 South	Photo 166: HA29 West

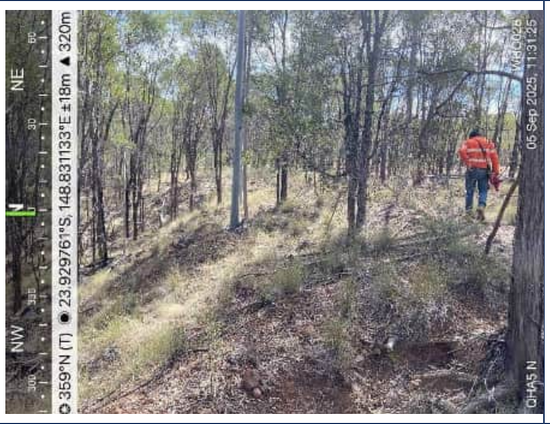
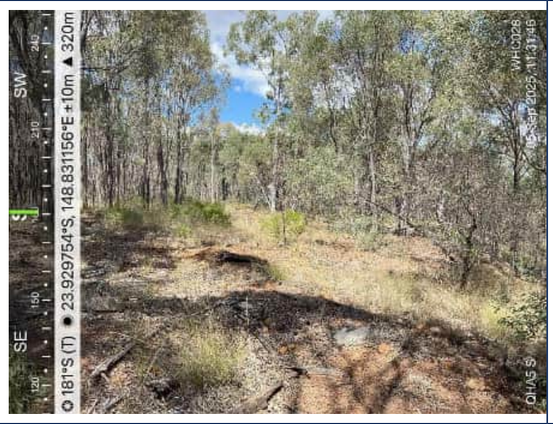
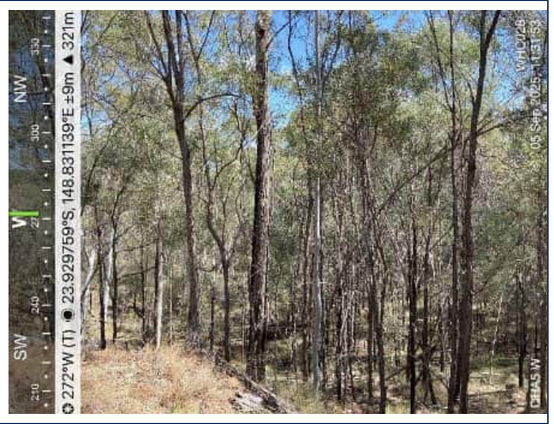
Mapped Crack 2 – Habitat Assessment 30			
			
Photo 167: Mapped Crack 2 – Escarpment Cliff Line			
			
Photo 168: HA30 North	Photo 169: HA30 East	Photo 170: HA30 South	Photo 171: HA30 West

Mapped Crack 3 – Habitat Assessment 31			
			
Photo 172: Mapped Crack 3 – Escarpment Cliff Line			
			
Photo 173: HA31 North	Photo 174: HA31 East	Photo 175: HA31 South	Photo 176: HA31 West

Crack 25 – Habitat Assessment 32			
			
Photo 177: Crack 25	Photo 178: Crack 25		
			
Photo 179: HA32 North	Photo 180: HA32 East	Photo 181: HA32 South	Photo 182: HA32 West

Mapped Crack 4 – Habitat Assessment 33			
			
Photo 183: Mapped Crack 4 – Escarpment Cliff Line			
			
Photo 184: HA29 North	Photo 185: HA29 East	Photo 186: HA29 South	Photo 187: HA29 West

Reference Site 2 – Habitat Assessment 34			
			
Photo 188: HA34 North	Photo 189: HA34 East	Photo 190: HA34 South	Photo 191: HA34 West

Mapped Crack 5 – Habitat Assessment 35			
			
Photo 192: Mapped Crack 5 – Escarpment Slope			
			
Photo 193: HA35 North	Photo 194: HA35 East	Photo 195: HA35 South	Photo 196: HA35 West

Mapped Crack 6 – Habitat Assessment 36			
			
Photo 197: Mapped Crack 6 – Gully	Photo 2: Mapped Crack 6 - Gully		
			
Photo 198: HA36 North	Photo 199: HA36 East	Photo 200: HA36 South	Photo 201: HA36 West


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