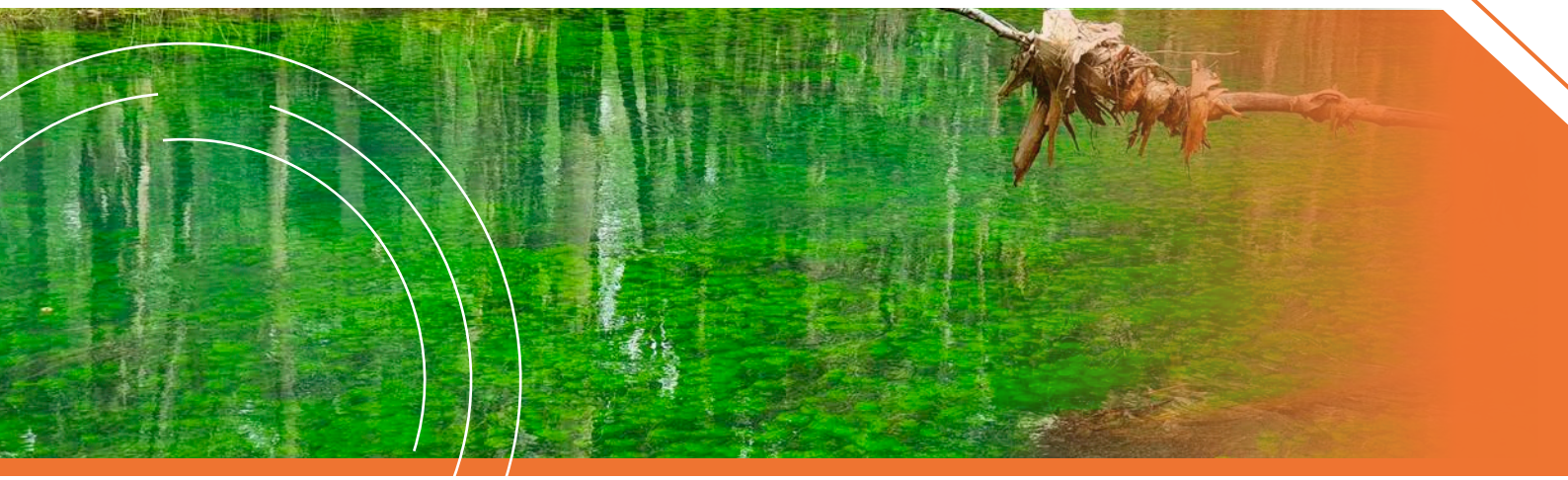
# Offset Management Strategy



# Aurukun Bauxite Project

# Biodiversity offset strategy

Prepared for Glencore Bauxite Resources Pty Ltd

July 2024

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Glencore Bauxite Resources Pty Ltd

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Approved by

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# Executive summary

The Aurukun Bauxite Project involves the construction and operation of a bauxite mine and associated infrastructure on a greenfield site in western Cape York, Queensland (Figure 2.1). The proponent is the Aurukun Bauxite Project Joint Venture, an unincorporated joint venture between Glencore Bauxite Resources Pty Ltd and MDP Bauxite Pty Ltd, a wholly owned subsidiary of Mitsubishi Corporation.

The mine would produce up to 15 million tonnes per annum of Run of Mine bauxite ore, which equates to up to eight million dry tonnes per annum of product bauxite. Bauxite ore would be mined using open cut mining methods and the ore would be washed and screened in an on-site beneficiation plant. The product bauxite would then be transported by road train to a coastal loading facility located approximately 15 km to the west of the mine site. Transhipping arrangements would be used to load the product bauxite to ocean going vessels.

The total clearing footprint for the Project over its life of mine of more than 20 years is an area of 6,885.10 ha with the location of Project infrastructure and mining areas (the direct impact footprint) shown in Figure 2.2 and Figure 2.4. In addition, the total impact footprint for some threatened species includes areas of habitat that may be isolated as a result of clearing activities causing potential indirect impact on habitat functionality for that species. The full assessment of direct and indirect impacts to species habitats is provided in the Aurukun Bauxite Mine Environmental Impact Statement (EIS).

The Project requires primary approvals under Federal *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and Queensland *Environmental Protection Act 1994* (EP Act). An Environmental Impact Statement (EIS) has been prepared to support these approvals. As part of the EIS, significant impact assessments (SIAs) have been completed for matters of national and state environmental significance based on results of extensive seasonal terrestrial, aquatic and marine ecology surveys. Results of the SIAs found that the following prescribed values and associated impacts would require an offset under the relevant legislation.

**Table ES1 Biodiversity offset requirements**

| Prescribed matter | MNES | MSES | Total impact being offset (ha) |
|---|---|---|---|
| Palm Cockatoo (Australian) (*Probosciger aterrimus macgillivrayi*) | ✓ | ✓ | 8,531.8 |
| Red Goshawk (*Erythrotriorchis radiatus*) | ✓ | ✓ | 8,781 |
| Masked Owl (northern) (*Tyto novaehollandiae kimberli)* | ✓ | ✓ | 8,781 |
| Black-footed Tree Rat (north Qld) (*Mesembriomys gouldii rattoides*) | ✓ | ✗ | 6,885.1 |
| Watercourse vegetation | ✗ | ✓ | 111.88 |
| High Ecological Value (HEV) waters | ✗ | ✓ | 5.76 |

This Biodiversity Offset Strategy summarises the Project's environmental offset requirements under State and Federal frameworks and identifies the preferred approach for offset delivery and how it will comply with applicable offset policies, being EPBC Act Environmental Offsets Policy (DCCEEW 2012) and Queensland Environmental Offset Policy (DES 2023a). It is proposed that at least 90% of the total offset requirement will be delivered as land-based offsets.

The largest component of the Project's environmental offset requirements is the offsetting of impacts on habitat of threatened fauna species under EPBC Act. Within these habitats are areas supporting MSES values, including watercourse vegetation, HEV waters and threatened species. There are patches of native vegetation within the Project area that support two or more prescribed matters thereby showing the potential for co-location of these values.

The proposed location of the land-based offset will be in the Cape York bioregion in an area known to support populations of the relevant threatened species impacted and will contain suitable habitats (including the ecosystem and species function that was impacted). For example, if breeding habitat is being lost, then breeding habitat will be included in the offset. Through active management and mitigation of threats, habitat quality will be improved.

This Biodiversity Offset Strategy describes the management actions proposed that will provide for habitat quality improvements to be gained over time and threats reduced. Conservation outcomes anticipated to be achieved through land-based offsets and the associated management actions include:

- through implementation of an appropriate fire management regime:
    - protection of existing hollows (of differing sizes) utilised by Palm Cockatoo, Masked Owl and Black-footed Tree Rat as well as supporting prey species for the Red Goshawk
    - protection of existing tall trees in proximity to water that could be used by Red Goshawk for nesting
    - protection of riparian vegetation communities and vine thickets which provide refuge and roosting habitat for a number of threatened species
    - increasing the number of large trees that have the potential to form hollows in the future and provide habitat for threatened species
    - increasing the availability of foraging resources for Palm Cockatoo and Black-footed Tree Rat
    - increasing ground cover, woody debris and species recruitment through changed fire management regimes
- through the implementation of weed and feral animal management programs:
    - increasing habitat quality through reduction of weeds and pest animals
    - increasing the number of small and medium sized mammals which are an important food resource for Masked Owl
    - reducing non-native plant cover improving feeding grounds for Red Goshawk (as well as reducing fuel loads that may contribute to hot bushfires)
- through implementation of targeted species monitoring programs, improving our understanding of these threatened species, their habitat utilisation and breeding requirements.

Monitoring programs will also look to identify effectiveness of bushfire management regimes implemented for the target threatened species and improvement of their habitat quality and ecosystem function over time.

Two potential offset areas have been identified and preliminary EPBC Act offset calculators completed for each to demonstrate offset suitability. At this time, the preference is to progress Offset Area 1. Further details are provided in Section 5.4, Appendix C and Appendix D and details of both offsets are summarised below.

**Table ES2 Offset areas: preliminary calculation – MNES species**

| Species | Area of impact (ha) | Offset Area | | Habitat quality | | | Risk of Loss without offset | NPV (adj ha) | % offset |
|---|---|---|---|---|---|---|---|---|---|
| | | No. | Area (ha) | Start | Future (no offset) | Future (w/offset) | | | |
| Palm Cockatoo | 8,531.8 | #1 | 38,000 | 7 | 6 | 8 | 1% | 6,017 | 100% |
| | | #2 | 38,000 | 7 | 6 | 8 | 1% | 6,018 | 100% |
| Red Goshawk | 8,781 | #1 | 47,500 | 7 | 6 | 8 | 1% | 6,166 | 100% |
| | | #2 | 38,000 | 6 | 5 | 8 | 1% | 6,415 | 104% |
| Black-footed Tree-rat | 6,885.1 | #1 | 31,000 | 7 | 6 | 8 | 1% | 4,908 | 101% |
| | | #2 | 24,000 | 5 | 4 | 7 | 1% | 4,923 | 102% |
| Masked Owl | 8,781 | #1 | 28,000 | 5 | 4 | 6 | 1% | 4,390 | 100% |
| | | #2 | 28,000 | 5 | 4 | 6 | 1% | 4,391 | 100% |

These preliminary calculations have found that an upper offset area extent is approximately 47,500 ha. The location of each potential offset area in proximity to the Project is shown in Figure 5.1.

The proponent intends to continue and progress landholder discussions, and in the dry season of 2024 commence field assessments of Offset Area 1 to confirm suitability of the offset area, gather regional ecosystem and habitat quality information, and conduct some targeted species surveys. Offset Area 1 is the preferred option at this time and further detail is provided in Section 5.1.1. Should this option be deemed suitable, including post feedback from regulators, the final offset area will be refined based on targeted surveys and completion of full habitat quality assessments.

It is then proposed that an Offset Area Management Plan (OAMP) be prepared for regulatory approval prior to Project commencement.

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# 1 Introduction

This Biodiversity Offset Strategy (BOS) has been prepared as part of an Environmental Impact Statement (EIS) for the Aurukun Bauxite Project (the Project).

The Project's EIS has been prepared under the *Environmental Protection Act 1994* (EP Act) and will be used in support of applications for required approvals, including an Environmental Authority (EA), Mining Leases (MLs) and approval under the Federal *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The Project has identified its potential to have significant impacts on matters of national environmental significance (MNES) and matters of state environmental significance (MSES). Accordingly, and under the Terms of Reference for the EIS (DES 2020), the proponent is required to propose offsets that are consistent with the requirements of the applicable State and/or Commonwealth legislation or policies, namely the following:

- Where a significant residual impact will occur on a prescribed environmental matter, as outlined in the *Environmental Offsets Regulation 2014*, the offset proposal(s) must be consistent with the requirements of Queensland's *Environmental Offsets Act 2014* and the latest version of the Queensland environmental offsets policy (DES 2022).

- Where the Commonwealth offset policy requires an offset for significant residual impact on a MNES, the offset proposal(s) must be consistent with the requirements of the latest version of the EPBC Act environmental offsets policy (DSEWPC 2012) and relevant guidelines.

This BOS is the proponent's offset management strategy for the Project and incorporates the intended scope of an offset area management plan that would be developed for approval prior to Project commencement, as well as the next steps to finalising the biodiversity offsets and associated timing. No offset staging is proposed. The BOS includes:

- a summary of significant, residual impacts to prescribed matters that require offsetting

- identification of suitable preliminary offset sites for each prescribed matter (including maps showing offset extent and location of biodiversity values)

- description of how the proposed offset/s will meet requirements of the EPBC Act Environmental Offsets Policy and *Environmental Offsets Act 2014* (Qld) for each matter

- description of the conservation outcomes to be achieved including an indication of management and monitoring actions to be undertaken

- preliminary offset calculators for MNES to inform offset area requirements, and justify suitability of offset areas proposed

- details of how the environmental offset will provide connectivity with other habitats, populations and biodiversity corridors

- evidence that the relevant biodiversity values and/or their habitat can be present in the potential offset area/s

- options for legal security and addressing any tenure or resource tenements

- future steps to finalise offsets including preparation of an offset area management plan, and timeline in relation to approval and commencement of the Project.

# 2 Project background

## 2.1 Project description

The Project involves the construction and operation of a bauxite mine and associated infrastructure on a greenfield site in western Cape York, Queensland (Figure 2.1).

The mine would produce up to 15 million tonnes per annum of Run of Mine bauxite ore, which equates to up to eight million dry tonnes per annum of product bauxite. Bauxite ore would be mined using open cut mining methods. The ore would be washed and screened in an on-site beneficiation plant. The product bauxite would then be transported by road train to a coastal loading facility (CLF) located approximately 15 km to the west of the mine site. Transhipping arrangements would be used to load the product bauxite to ocean going vessels.

Fines material (produced from the washing and screening process) would be emplaced in a fines containment area for the first three years of operation and then (from year 4 onwards) emplaced within pits where mining has been completed. Once mining and any backfilling with fines has been completed, mined areas would be progressively rehabilitated with the final landform profiled to promote free drainage and prevent erosion before being revegetated using native species.

Infrastructure required as part of the Project includes infrastructure related to the mining, processing and transport of bauxite ore (including the CLF), an accommodation village, and a water supply dam on Tapplebang Creek. Infrastructure will all be built in the first two years of the Project.

The Project would have a mine life of approximately 22 years and areas will be progressively cleared over this time. The total clearing footprint for the Project over its life of mine is an area of 6,885.10 ha with the location of Project infrastructure and mining areas (the direct impact footprint) shown in Figure 2.2 and Appendix E. The total area of remnant vegetation to be cleared is 6,885.10 ha.

Decommissioning would be undertaken from year 23 to year 25, with an active monitoring and maintenance phase commencing halfway through decommissioning and extending until year 27.

## 2.2 Project setting

The Project site (the area where the proposed Project would take place, and which would be subject to a mining tenure application) is in a remote location in western Cape York. The nearest city is Cairns, approximately 600 km to the south-east of the Project site and the nearest town is Aurukun township, approximately 23 km from the southern boundary of the Project site (Figure 2.1).

The Project site straddles the Aurukun Local Government Area and the Cook Local Government Area and covers an area of approximately 23,100 ha. The Project site includes:

- the mine site, located within mineral development licence 2001 (MDL 2001), where mining activity and the majority of Project infrastructure would be located
- the product bauxite transport corridor, which includes the coastal loading facility (CLF) and haul road, and extends to the coast (to the west of the mine site).

The Project site is located on a broad tertiary plateau of gently undulating plains with occasional shallow drainage depressions. The elevation within the Project site ranges from 9 m Australian Height Datum (AHD) near the coast to 91 m AHD in the eastern portion of the mine site.

The Project site is traversed by Tapplebang Creek and Coconut Creek (Figure 2.2), with waters flowing south-west to join the Ward River, ultimately flowing into the Gulf of Carpentaria near Aurukun township. All vegetation within the Project site is remnant vegetation, predominantly comprising eucalypt tall woodlands with scrubby woodland to open forest fringing the watercourses that drain the plateau.

A portion of the Project site extends westward to the Gulf of Carpentaria and includes the stretch of coastline in the vicinity of the CLF, comprising a low headland on the landward boundary of a sandy beach.


**Figure 2.1 Project locality**

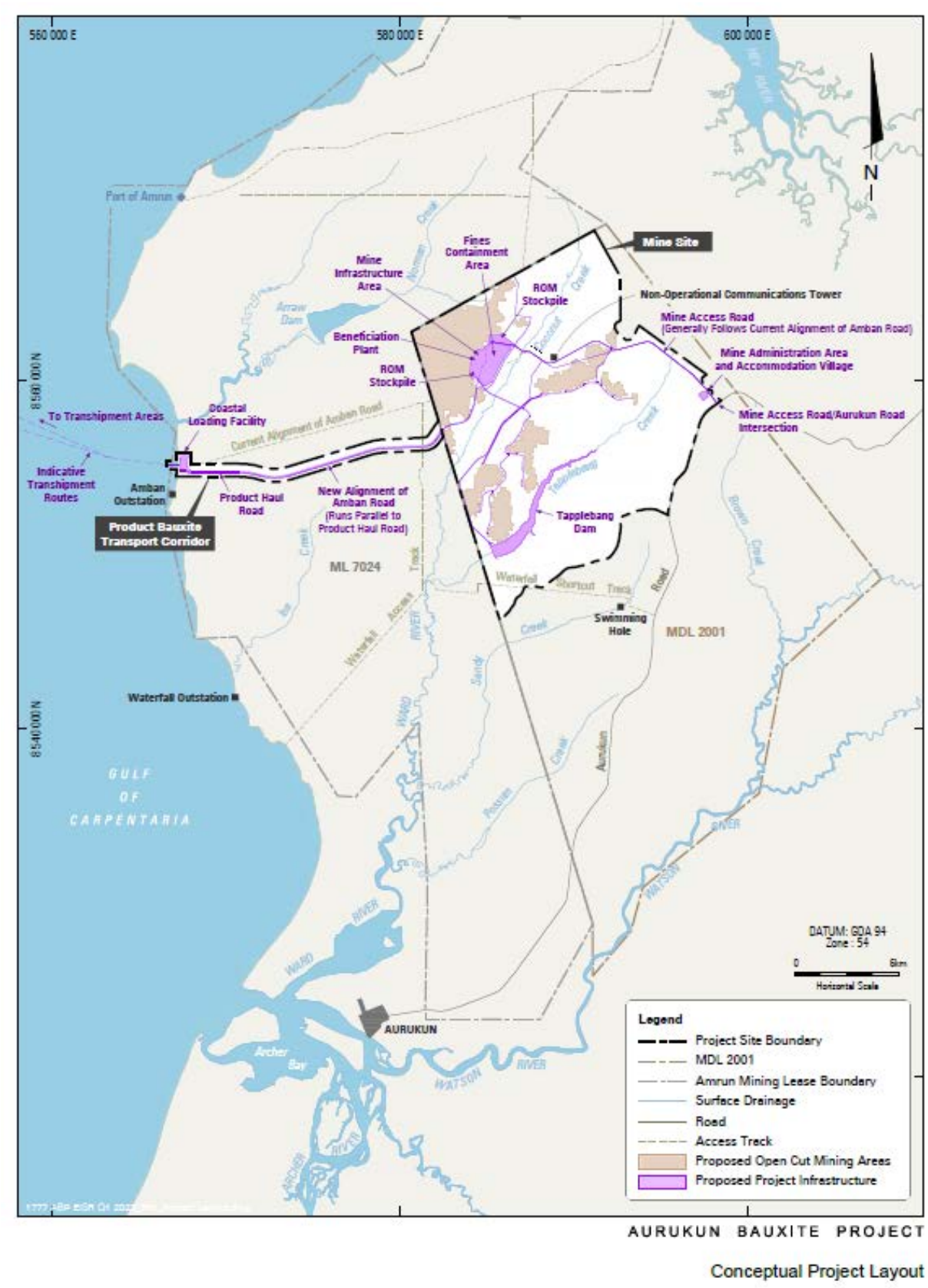



**Figure 2.2** **Project area and impact footprint**

## 2.3 Regional setting

The Project is located on the western side of Cape York (western Cape York) in the Weipa plateau subregion of Cape York bioregion. Key townships in western Cape York include Weipa, Napranum and Aurukun (Figure 2.1). Weipa is the regional centre for western Cape York and a key residential location for people employed in the surrounding bauxite mining operations. Napranum and Aurukun are small Indigenous communities.

There are large areas of undisturbed land in western Cape York and vast tracts of remnant vegetation, with the Cape York bioregion being 99.4% remnant vegetation. Farming, largely grazing, is the most widespread land use in western Cape York. Bauxite mining is also prevalent. There are a number of large protected areas in Cape York, including some which are owned and managed by local Aboriginal Traditional Owners. The Cape York Peninsula Tenure Resolution Program returns ownership and management of identified lands on Cape York Peninsula to local Aboriginal Traditional Owners. This program ensures Cape York Peninsula's iconic natural assets are protected while nurturing the rich and diverse cultural values of First Nations groups across this vast and unique region (DES 2023).

Cape York has a tropical climate characterised by a distinct wet season (generally around November to April) and dry season (generally around May to October). Temperatures are relatively warm year-round, with slightly cooler temperatures over the dry season. The highest mean daily maximum temperature at the Weipa Aero weather station is 35.8 °C, and the lowest mean daily minimum temperature at the weather station is 18.7 °C.

The annual rainfall pattern illustrates the tropical climate of the Cape York region, with 97% of the annual rainfall occurring during November to April. Mean annual rainfall is 1,911.4 mm. Relative humidity is generally higher in the morning compared to the afternoon. The highest monthly average relative humidity is recorded in February for both morning and afternoon values (86% and 76%, respectively). Winds are typically from the east to the south-east and are predominantly moderate in strength.

## 2.4 Land use and tenure

The Project site is used occasionally by both Traditional Owners and other residents of Aurukun township for various activities, including hunting. Land surrounding the Project site is used by Traditional Owners for a range of recreational activities, such as camping and fishing.

The mine site and adjacent land (to the south and east) is located within Lot 211 on SP241404, which is Aboriginal freehold title under the *Aboriginal Land Act 1991* (Qld) (AL Act). Ngan Aak-Kunch Aboriginal Corporation (NAK) is the holder, on behalf of the Wik and Wik Waya People (Figure 2.3).

The land to the west of the mine site is subject to a lease of Crown land, held by RTA Weipa Pty Ltd (Rio Tinto) for mining and other purposes, as defined in the *Commonwealth Aluminium Corporation Pty Limited Agreement Act 1957* (Comalco Act). The Project's proposed Product Bauxite Transport Corridor would need to cross the Rio Tinto mining lease to access the proposed CLF.

The Wik and Wik Waya people hold the Native Title rights over the Project site, with the exception of a small parcel of land on which a non-operational communications tower is located. NAK is the nominated agent/representative and Prescribed Body Corporate in respect of the Native Title rights of the Wik and Wik Waya people.

To the east of the Project site (along Aurukun Road towards the Peninsula Developmental Road) are large parcels of pastoral land, including Sudley Station, Merluna Station, and Watson River Station (Figure 2.4).

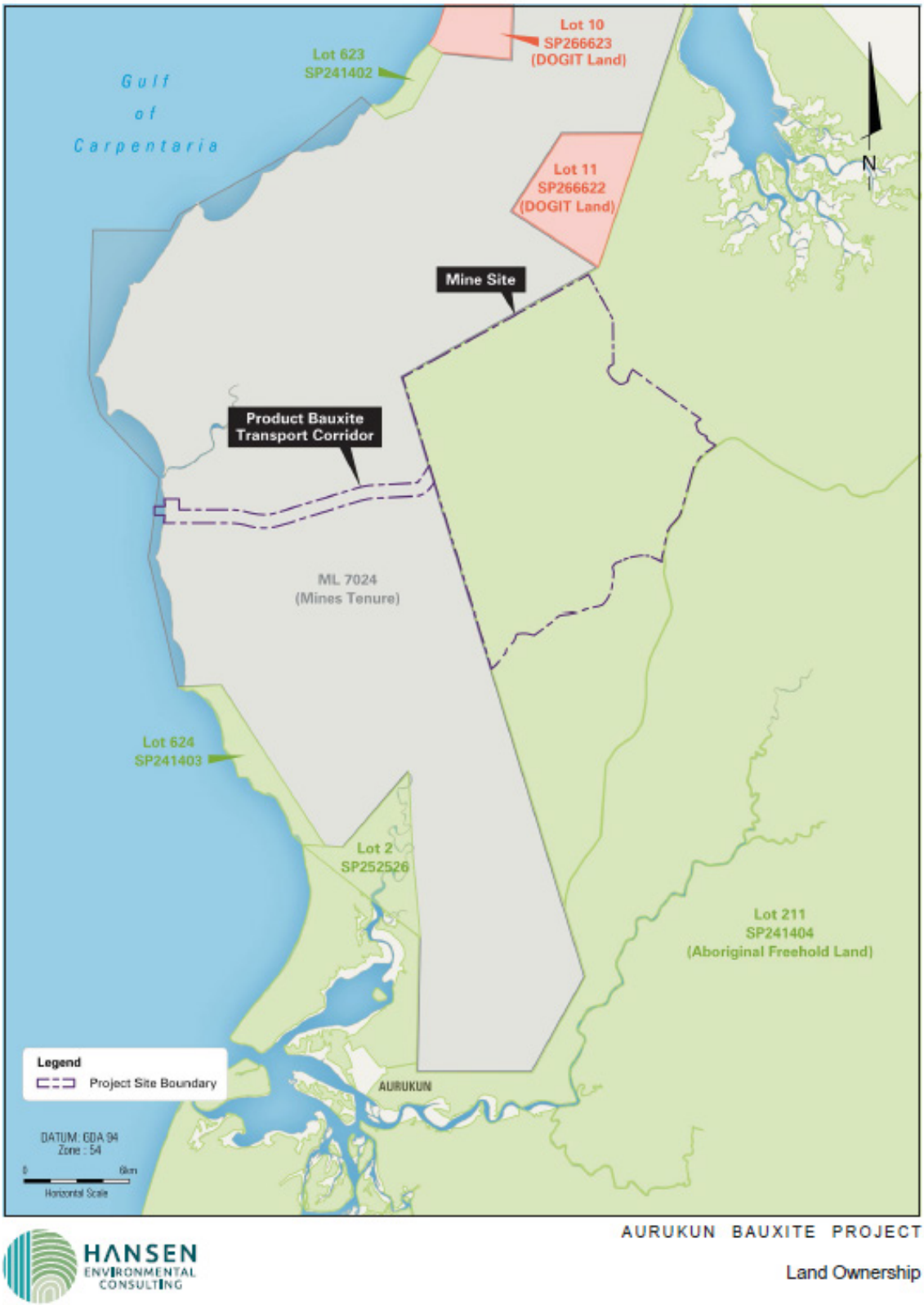



**Figure 2.3 Land tenures**

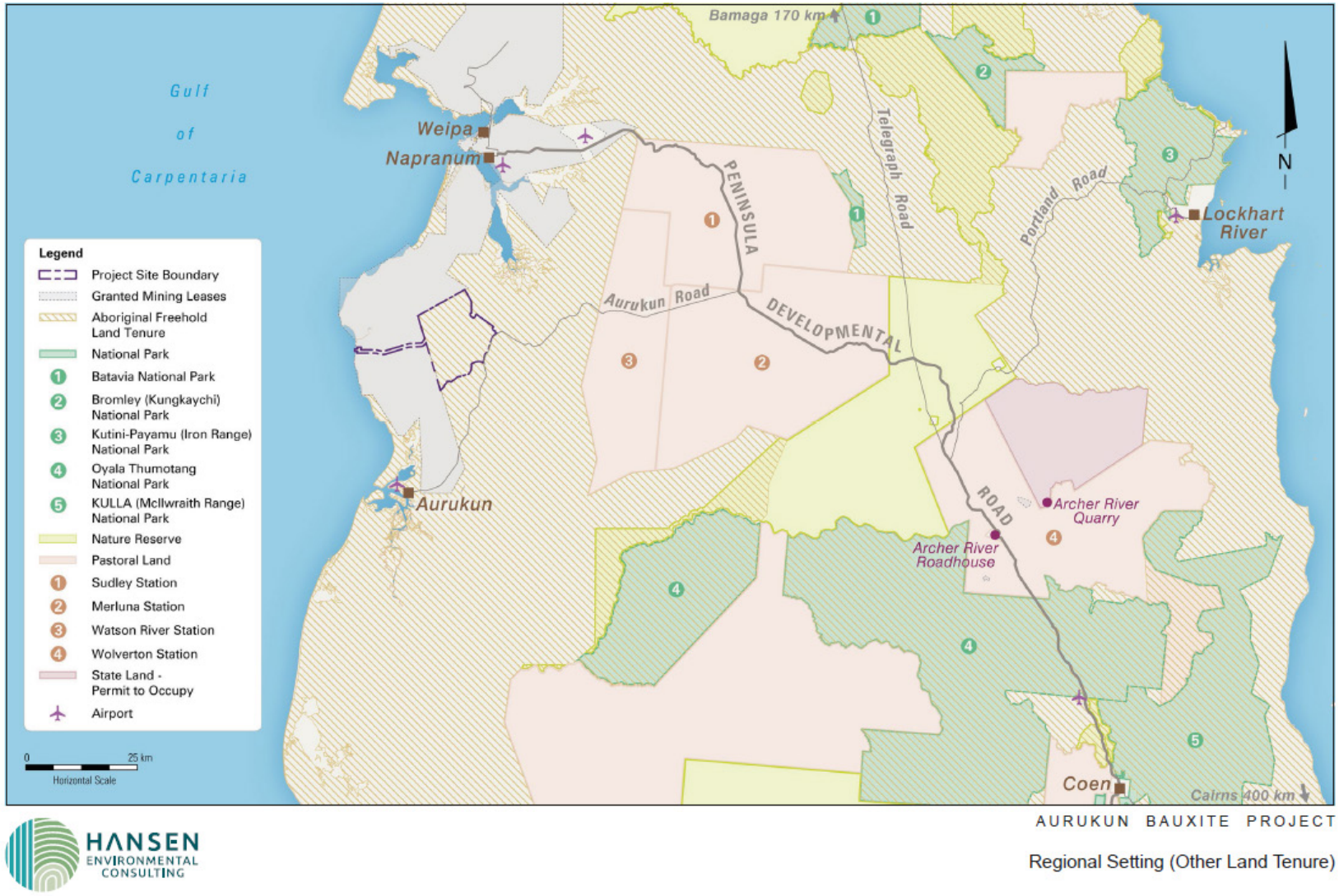



**Figure 2.4 Regional land use**

## 2.5 Ecological setting

### 2.5.1 Terrestrial ecology

The majority of the Project site comprises remnant vegetation with small sections containing cleared or non-remnant areas, including Amban Road, an abandoned airstrip along Amban Road, and non-remnant regrowth shrubland at the western end of the Product Bauxite Transport Corridor that was historically cleared and maintained as an airstrip. These cleared and disturbed areas comprise approximately 108.60 ha of the study area (Appendix E.1) (EcoSM 2023). Terrestrial ecology surveys were conducted over a larger 'study area' that was approximately 26,252 ha in area.

Darwin Stringybark (*Eucalyptus tetrodonta*) +/- Cape Melville Bloodwood (*Corymbia nesophila*) woodland to tall woodland on tertiary plateaux (RE3.5.36b) dominates the Project site with over 25,000 ha present within the terrestrial ecology study area (approx. 96% of study area). It was found to be in moderate to good condition, although many areas are experiencing the effects of high intensity fires, exhibited by limited diversity of the shrub layer and sparse fallen timber (see Photograph 2.1 and Photograph 2.2). Canopy was variably composed of Darwin Stringybark, Long-fruited Bloodwood (*Corymbia novoguinensis*), Cape Melville Bloodwood (*Corymbia nesophila*), Gum-topped Bloodwood (*Corymbia stockeri* subsp. *peninsularis*), Broadleaved Carbeen (*Corymbia disjuncta*), Cooktown Ironwood (*Erythrophleum chlorostachys*), and Nonda (*Parinari nonda*).

Abundant hollow-bearing trees were observed in most areas of this habitat type, although the prevalence of mature trees was limited in areas that have been subjected to hot fires (EcoSM 2023).

A summary of the REs present across the study area based on field assessments are summarised in Table 2.1 and mapping of REs is provided in Appendix E.1. No threatened ecological communities (TECs) under EPBC Act or Endangered and Of Concern REs under *Vegetation Management Act 1999* (VM Act) are present in the study area.

**Table 2.1 Regional ecosystems across project study area**

| Regional ecosystem (RE) | Broad vegetation group (BVG) 1M | Status (VM Act) | Description | Total within study area (ha) |
|---|---|---|---|---|
| 3.2.2 | 3a | Least concern | Semi-deciduous vine thicket to vine forest on beach dunes and ridges | 0.7 |
| 3.2.24 | 28d | Least concern | Mixed open tussock grassland and open forblands or shrublands on exposed foredunes and islands | 0.7 |
| 3.3.9b | 22b | Least concern | *Xanthostemon crenulatus* (penda), *Lophostemon suaveolens* (swamp mahogany), *Asteromyrtus brassii* woodland to open forest +/- *Dillenia alata* (red beech) +/- *Melaleuca saligna* (paperbark). | 44.6 |
| 3.3.9a | 22b | Least concern | Swamp Box (*Lophostemon suaveolens*) fringing forest | 250.1 |
| 3.3.20a | 9e | Least concern | *Corymbia clarksoniana* or *C. novoguinensis* woodland to open forest on alluvial plains. Occurs on a variety of alluvial plains derived from a range of geological substrates | 3.5 |
| 3.3.20b | 9e | Least concern | Long-fruited Bloodwood (*Corymbia novoguinensis*), Swamp Box +/- Paperbark (*Melaleuca* spp.) woodland on alluvium | 337.1 |
| 3.3.49 | 21a | Least concern | Broad-leaved Tea Tree (*Melaleuca viridiflora*) low open woodland to low woodland on low-lying plains | 12.2 |

**Table 2.1 Regional ecosystems across project study area**

| Regional ecosystem (RE) | Broad vegetation group (BVG) 1M | Status (VM Act) | Description | Total within study area (ha) |
|---|---|---|---|---|
| 3.3.50g | 22a | Least concern | Broad-leaved Paperbark (*Melaleuca quinquenervia*) shrubland to closed heath on floodplain swamps | 10.3 |
| 3.3.64 | 34c | Least concern | *Baloskion tetraphyllum* subsp. *meiostachyum* and/or *Leptocarpus* spp. and/or *Dapsilanthus spathaceus* open sedgeland in drainage swamps | 0.4 |
| 3.5.36b | 14a | Least concern | Darwin Stringybark (*Eucalyptus tetrodonta*) +/- Cape Melville Bloodwood (*Corymbia nesophila*) woodland to tall woodland on tertiary plateaux | 25,222.20 |
| 3.5.39 | 14b | Least concern | *Eucalyptus tetrodonta* +/- *Corymbia clarksoniana* woodland on sand plains | 0.3 |
| 3.7.3 | 13a | Least concern | *Eucalyptus cullenii* +/- *E. tetrodonta* woodland on erosional escarpments and plains | 0.7 |
| 3.7.4 | 14b | Least concern | Darwin Stringybark and Broad-leaved Carbeen (*Corymbia disjuncta*) woodland on ironstone knolls | 260.1 |
| | | | **Total** | **26,142.90** |

**Photograph 2.1** Swamp Box riparian vegetation fringing Tapplebang Creek where large trees and tree hollows are abundant (RE3.3.9a)

**Photograph 2.2** Darwin Stringybark woodland with lack of large trees (RE3.5.36b)

### 2.5.2 Aquatic ecology

The majority of the Project site is located within the local catchments of Coconut Creek and Tapplebang Creek. Coconut Creek and Tapplebang Creek traverse the site flowing to the south-west, and join downstream of the project site boundary, forming the Ward River. Ward River is part of the Watson River Catchment and discharges into Archer Bay. Coconut Creek and Tapplebang Creek are intermittent and although flows exist for an extended period after the wet season, only remnant pools remain by the late dry season.

The watercourses and wetlands within the Project site are deemed to be High Ecological Value (HEV) waters under the *Environmental Protection (Water and Wetland Biodiversity) Policy 2019* (Qld) because the biological integrity of the water is effectively unmodified or highly valued.

The aquatic habitats in the Project site are associated with Tapplebang Creek and Coconut Creek. Aquatic habitats are in good condition due to their generally undisturbed nature. However, Feral Pigs (*Sus scrofa*) are prevalent in the Project site and the effects of their wallowing and foraging are apparent along creeks and drainage features (Aurukun Bauxite Project EIS 2023).

## 2.6 Approval status of the Project

The proposed action of the Project has been assessed as a controlled action by the Australian Government (EPBC2020/8624). The Project will require assessment and approval under the EPBC Act before it can proceed.

The Project's EIS (under the EP Act) will assess the potential impacts of the Project on the controlling provisions as an accredited assessment process under Part 8 of the EPBC Act.

# 3 Environmental impact assessments

## 3.1 Ecological studies

Extensive ecology surveys have been conducted over numerous years and seasons from Early Dry Season of 2018 to Early Dry Season of 2021, and then supplementary targeted surveys for threatened species have been completed in 2022. The surveys have included:

- vegetation community surveys (including mapping of regional ecosystems (REs))
- threatened flora and fauna surveys, including elliot traps, pitfall traps, camera traps, active searches, anabat, bird surveys and spotlighting
- electrofishing, baited traps and netting in aquatic settings.

Survey methods and effort were designed to comply with applicable survey guidelines for the identified target species with additional targeted surveys designed based on expert guidance and the most up to date literature such as for the Palm Cockatoo (Australian) (*Probosciger aterrimus macgillivrayi*). Survey efforts and timing are summarised in Chapter 8 – Terrestrial Ecology, Chapter 9 – Aquatic Ecology and Chapter 11 – MNES of the Project's EIS (Aurukun Bauxite Project EIS 2023).

A number of technical studies were undertaken as part of the EIS to assess the potential impacts of the Project on prescribed matters that may require offsets. These included the following:

- Terrestrial Ecology Assessment, undertaken by Ecological Survey and Management and documented in the EIS Terrestrial Ecology Assessment Report (Appendix L of the Aurukun Bauxite Project EIS 2023).
- Aquatic Ecology Assessment, undertaken by C&R Consulting and documented in the EIS Aquatic Ecology Assessment Report (Appendix M of the Aurukun Bauxite Project EIS 2023).
- Marine Assessment, undertaken by BMT Commercial Australia Pty Ltd and documented in the EIS Marine Assessment Report (Appendix O of the Aurukun Bauxite Project EIS 2023).
- Wildlife Lighting Impact Assessment, undertaken by Pendoley Environmental Pty Ltd and documented in the EIS Wildlife Lighting Impact Assessment Report (Appendix P of the Aurukun Bauxite Project EIS 2023).
- Acoustic surveys conducted for the Northern Masked Owl and Cape York Rufous Owl undertaken by Adaptive NRM Pty Ltd (Adaptive NRM 2023) (incorporated into Appendix L of the Aurukun Bauxite Project EIS 2023).
- Targeted surveys for Palm Cockatoo assessing habitat use including breeding and foraging areas, undertaken by Ecotone (Appendix L2 of the Aurukun Bauxite Project EIS 2023). These surveys included walking transect lines up to 1,500 m from project watercourses at 100 m spacings therefore were also good for identifying nests for Red Goshawk.

## 3.2 Survey results

Survey results from the above studies that are relevant to MNES and MSES are outlined below.

### 3.2.1 Terrestrial flora

A total of 486 flora species were recorded in the study area during the flora field surveys undertaken as part of the EIS Terrestrial Ecology Assessment. No threatened flora species under the NC Act or EPBC Act have been observed during seasonal ecology surveys, and the species identified through desktop searches are considered unlikely to occur. This determination was based on several factors including a lack of suitable habitat in (or in proximity to) the terrestrial ecology study area, the location, extent and timing of targeted threatened flora surveys undertaken and/or the lack of nearby records.

High risk trigger areas as defined and mapped under *Nature Conservation (Plants) Regulation 2020* for protected plants were extensively surveyed and it was noted essential habitat for the Cooktown Orchid (*Dendrobium bigibbum*) occurred just north of the study area. Flora surveys were conducted during the flowering period and did not record the Cooktown Orchid or other threatened flora species.

### 3.2.2 Terrestrial fauna

A total of 182 native fauna species were recorded during the fauna survey undertaken as part of the EIS Terrestrial Ecology Assessment, comprising 101 species of birds, 31 species of mammals, 34 species of reptiles, and 16 species of amphibians.

Desktop searches indicated that 15 fauna species listed as threatened under the EPBC Act potentially occur in the study area. Of these, three threatened fauna species listed under the EPBC Act have been observed in the study area which are:

- Palm cockatoo (Australian) (*Probosciger aterrimus macgillivrayi*)
- Red Goshawk (*Erythrotriorchis radiatus*)
- Black-footed Tree-rat (north Qld) (*Mesembriomys gouldii rattoides*).

Observations of threatened fauna species in the study area and associated habitats are shown in Appendix E.2. A likelihood of occurrence assessment was undertaken for the remaining species as part of the EIS Terrestrial Ecology Assessment. This assessment concluded that two additional threatened fauna species under EPBC Act have not been recorded but are considered to have a moderate or high likelihood of occurring, those being:

- White-throated Needletail (*Hirundapus caudacutus*)
- Masked owl (northern) *(Tyto novaehollandiae kimberli).*

The fauna species listed only under the NC Act that were either recorded or assessed as being likely to occur within the study are including:

- Short-beaked Echidna (*Tachyglossus aculeatus*) listed as Special Least Concern
- Rufous Owl (Cape York subspecies) (*Ninox rufa meesi*) listed as Near Threatened.

Essential habitat for Rufous Owl is mapped in the study area; however, this species is not a MSES due to being Near Threatened. An assessment of significance for the Short-beaked Echidna considered that the Project was unlikely to have a significant impact on this species. Further details on State listed fauna species is provided in Section 8 – Terrestrial Ecology of the EIS.

### 3.2.3 Terrestrial migratory

Desktop searches indicated that 17 fauna species listed as migratory under the EPBC Act potentially occur within the terrestrial ecology study area. Of these, the following migratory species were recorded during the field surveys:

- Eastern Osprey (*Pandion haliaetus*)
- Oriental Cuckoo (*Cocculus optatus*)
- Satin Flycatcher (*Myiagra cyanoleuca*)
- Spectacled Monarch (*Symposiarchus trivirgatus*).

An additional four migratory species are considered to have a moderate or high likelihood of occurring being:

- Black-faced Monarch (*Monarcha trivirgatus*)
- Glossy Ibis (*Plegadis falcinellus)*
- Rufous Fantail *(Rhipidura rufifrons*)
- Fork-tailed Swift (|*Apus pacificus*).

### 3.2.4 Aquatic species

The likelihood of any threatened or migratory aquatic species identified in database searches being present in the aquatic ecology study area was assessed based on the known habitat preferences of these species, the availability and condition of habitats within the aquatic ecology study area, the results of field surveys, and nearby records.

Two threatened aquatic species were recorded or assessed as having a moderate possibility of being present in the freshwater reaches of the aquatic ecology study area. The freshwater reaches of the aquatic ecology study area are most relevant to the assessment, given that the groundwater and surface water studies concluded that the Project is not predicted to impact the downstream, estuarine reaches of the Ward River.

The Estuarine Crocodile (*Crocodylus porosus*) (listed as Migratory and Marine under the EPBC Act and Vulnerable under the NC Act) was recorded on the Project site (in both Coconut Creek and Tapplebang Creek) as well as downstream of the Project site (in the Ward River).

The Largetooth Sawfish (*Pristis pristis*) (listed as Vulnerable and Migratory under the EPBC Act and Least Concern under the NC Act) was assessed as having a moderate possibility of being present in the freshwater reaches of the Ward River (downstream of the Project site). The Largetooth Sawfish utilises flowing freshwater systems to access large permanent water bodies (preferably open, off-channel wetlands/lagoons) during times of flow to use them as a nursery area, before migrating back downstream during subsequent flow events (Peverell 2009). The EIS Aquatic Ecology Assessment Report considers it is unlikely that it would utilise the two watercourses within the project site because of the size of the watercourses, the types of habitats available and the quality of the water present. Additional environmental DNA sampling undertaken for this species in these watercourses recorded no detections of any sawfish species within any samples collected.

In the EIS, Section 9 – Aquatic Ecology provides a summary of the MSES within the freshwater reaches of the aquatic ecology study area. It indicates that the relevant MSES are:

- WPA or HES wetlands
- a wetland or watercourse designated as HEV waters
- protected wildlife habitat and mapped essential habitat for aquatic species
- waterways providing for fish passage.

## 3.3 Assessments of significance

### 3.3.1 Fauna

Assessments of significance have been undertaken for MNES fauna species in accordance with the *Commonwealth Matters of National Environmental Significance Significant Impact Guidelines 1.1* (Department of the Environment 2013). The significance assessment for the species found to be present on site, or assessed to have a moderate or high likelihood of occurrence concluded that the Project was unlikely to cause a significant impact to the White-throated Needletail but has the potential to result in a significant, residual impact on all remaining species. Full details are provided in Section 11 – Matters of National Environmental Significance in the EIS and a summary of the significant, residual impact assessment findings is provided in Appendix F of this BOS.

At a State level, prescribed matters of state environmental significance (MSES) were assessed under the applicable Significant Residual Impact Guideline (DEHP 2014) for approvals under EP Act. Those fauna species only listed under NC Act have had significant impact assessments undertaken. The relevant species are the Rufous Owl (Cape York subspecies) listed as Near Threatened and Short-beaked Echidna listed as Special Least Concern. Those fauna species that are dual listed under EPBC Act and NC Act have only been assessed under the EPBC Guideline which is consistent with the *Environmental Offsets Act 2014*.

The full impact assessments are provided in Terrestrial Ecology Report (Appendix L of EIS) and a summary of the significant, residual impact assessment findings is provided in Appendix F of this BOS.

It was found that the Project is unlikely to have a significant impact on the Short-beaked Echidna and Near Threatened species are not a MSES, so no offset is required.

### 3.3.2 Migratory species

The Referral Guideline for 14 Migratory Species[1] has been used to assess the potential significance of impacts to 7 of the species listed above (excepting for the Glossy Ibis). These seven bird species are specifically listed in this guideline.

This assessment concluded that there is a low risk of significant impacts to these species. In the case of the Glossy Ibis, it was noted that its habitat in the study area is restricted to the Paperbark wetlands and sedgelands areas in the south of the ecology study area which is not within the Project site and is located approximately 1.3 km to the south-west of the direct impact footprint. A summary of the significant, residual impact assessment findings is provided in Appendix F of this BOS.

[1] Referral guideline for 14 birds listed as migratory species under the EPBC Act (dcceew.gov.au)

### 3.3.3 Aquatic species and values

An assessment of significance was undertaken for each of the aquatic species listed under EPBC Act determined to be known or likely to be present, being Estuarine Crocodile and Largetooth Sawfish in accordance with the Significant Impact Guidelines 1.1: Matters of National Environmental Significance (Department of the Environment (DotE) 2013). The assessments (provided in Section 11 - Matters of National Environmental Significance) concluded that the project is not likely to have a significant, residual impact on either species.

No additional threatened aquatic species (listed solely under Queensland legislation) were returned from database searches.

The remaining aquatic related MSES values being: WPA or HES wetlands, a wetland or watercourse designated as HEV waters and fish passage were assessed using Queensland SRI Guideline (DEHP 2014), with the results concluding that the Project is predicted to give rise to a significant residual impact on a watercourse designated as HEV waters. This impact relates to the reach of Tapplebang Creek within the dam lake inundation area, which extends for 10 kilometres (km), impacting 5.76 hectares (ha) of creek and HEV waters. This section of the watercourse will be artificially modified, which is considered a significant impact.

A summary of the significant, residual impact assessment findings is provided in Appendix F and full details of the impact assessments are in Section 9 – Aquatic Ecology.

## 3.4 MNES threatened species to be offset and associated habitats

Further description of those threated species on which a significant, residual impact may occur is set out below.

**Table 3.1 Palm Cockatoo**

| | |
|---|---|
| **EPBC Act status** | Vulnerable (effective 31 October 2015) |
| **NC Act status** | Endangered (effective November 2022) |
| **Approved Conservation Advice** | Threatened Species Scientific Committee (2015). Conservation Advice *Probosciger aterrimus macgillivrayi* palm cockatoo (Australian). Canberra: Department of the Environment[2]. |
| **Adopted/Made Recovery Plans** | There is no adopted or made Recovery Plan for this species |
| **Adopted/Made Threat Abatement Plans** | No Threat Abatement Plan has been identified as being relevant for this species |
| **Biology/Ecology** | Australian Palm Cockatoos inhabit rainforest, riparian forest along watercourses and adjoining areas of Eucalyptus and Melaleuca/Banksia woodland (Treby 2005, Murphy 2006) from north of Pormpuraaw on the west coast to Saltwater Creek, Princess Charlotte Bay on the east coast (Storch 1996, Higgins 1999).<br>Palm Cockatoos forage as individuals or in small flocks, and feed on seeds of woodland, littoral and closed forest tree species, either from the canopy or on the ground (Wood 1988, Storch 1996). As obligate-hollow nesters, breeding sites are selected within hollow trees, particularly *Eucalyptus tetrodonta*, with large hollows required to support the regular provisioning of offspring by an adult occurring inside the cavity.<br>Observations for western Cape York made by Ecotone indicate birds typically nest in Darwin Stringybark open forest to woodland within 1,500 m of riparian or rainforest vegetation (Zdenek et al. 2022), moving more widely in open woodlands in early morning and late evening, whilst taking refuge and foraging in denser riparian or rainforest vegetation and associated ecotonal areas for much of the day (Ecotone 2023). |

[2] Conservation Advice Probosciger aterrimus macgillivrayi (palm cockatoo (Australian)) (environment.gov.au)

**Table 3.1 Palm Cockatoo**

| | |
|---|---|
| | Palm Cockatoos require large tree hollows (>20 cm opening diameter) for breeding (Heinsohn et al. 2003, Murphy et al. 2003, Igag et al. 2019, Zdenek et al. 2022). Most Palm Cockatoo nests within the Australian population are known from live trees, predominantly Darwin Stringybark (*Eucalyptus tetrodonta*), but also from other Eucalyptus, Corymbia or Melaleuca species, or from *Lophostemon suaveolens* (Storch 1996, Murphy et al. 2003, Murphy 2005).<br>Foraging habitat consists of vegetation communities that contain seeds fed on by Palm Cockatoos. Palm Cockatoos are considered specialised seed eaters, with Murphy (2005) noting they predominately feed upon seeds of the fruit of Scrub Turpentine (*Canarium australasicum*) and Nonda Plum (*Parinari nonda*) trees on Cape York. Other confirmed food trees for Palm Cockatoo on Cape York include Darwin Stringybark (*Eucalyptus tetrodonta*), Cocky Apple (*Planchonia careya*), Arnhem Quandong (*Elaeocarpus arnhemicus*) (Storch 1996), Black Bean (*Castanospermum australe*) (Forshaw 1973), Bushman's Clothes-peg (*Grevillea glauca*), Milky Plum (*Persoonia falcata*), and potentially other Elaeocarpus species (Igag 2002). |
| **Project context** | A targeted survey for this species was undertaken by Ecotone (Appendix L2 of the EIS) which comprised more than 500 km of transects in the Project site.<br>Breeding habitat on western Cape York overwhelmingly occurs within 1,500 m of riparian and alluvial vegetation along watercourses (RE3.3.9a; RE3.3.20), rainforest (RE3.3.5) or other closed forest vegetation (RE3.5.4), and within the riparian/alluvial vegetation, rainforest, or other closed forest itself. The use of the breeding habitat within the 1,500 m distance from riparian or rainforest vegetation on western Cape York, appears to be noticeably gradational, where used hollows are found in much higher density closer to the boundary between riparian/woodland habitats (Ecotone 2023). Approximately 80% of hollows selected for display or breeding may be found within the first 550 m from the riparian vegetation boundary (Ecotone 2023).<br>The study area provides a high abundance of potentially suitable hollow-bearing trees for nesting. The Palm Cockatoo Habitat Survey Report (Appendix L2 of the EIS) identifies 518 potential hollows suitable for Palm Cockatoo in the area surveyed at a density of one potential hollow per 10 ha. The density of potential hollows was found to be consistent with surveys undertaken elsewhere on western Cape York. Therefore, sufficiently large hollows may not be a limiting factor in habitat selection by Palm Cockatoos on Cape York Peninsula where extensive intact areas of homogenous tall Darwin Stringybark woodland is available. Rather, large hollows in relative proximity to riparian/alluvial corridors is more likely to be the key driver.<br>Habitat mapping for this species on the Project site and species observations are provided in Appendix E. |
| **Threats** | The Approved Conservation Advice for this species notes the following:<br>• Inappropriate fire regimes are a significant threat to palm cockatoos (Murphy et al. 2003).<br>• Fire affects the stability of the rainforest/woodland ecotone and is needed to maintain recruitment of large trees with frequent, high-intensity fires are destroying nest trees directly.<br>• Land clearing near Weipa for bauxite mining has also reduced hollow availability, and has removed small patches of rainforest feeding habitat (Gould, cited in Garnett et al. 2011).<br>• Palm cockatoos (Australian) also experience competition from sulphur-crested cockatoos (*Cacatua galerita*) that compete for nest-trees (Heinsohn et al., 2003) and have increased over the last 2 decades around Weipa (Gould, cited in Garnett et al. 2011). |

## Table 3.2 Red Goshawk

| | |
|---|---|
| **EPBC Act status** | Endangered (effective 31 March 2023) |
| **NC Act status** | Endangered (effective November 2022) |
| **Approved Conservation Advice** | Department of Climate Change, Energy, the Environment and Water (2023). Conservation Advice for *Erythrotriorchis radiatus* (red goshawk). Canberra: Department of Climate Change, Energy, the Environment and Water[3]. |
| **Adopted/Made Recovery Plans** | Department of Environment and Resource Management (2012). National recovery plan for the red goshawk *Erythrotriorchis radiatus*. Report to the Department of Sustainability, Environment, Water, Population and Communities, Canberra. Queensland Department of Environment and Resource Management, Brisbane[4]. |
| **Adopted/Made Threat Abatement Plans** | No Threat Abatement Plan has been identified as being relevant for this species |
| **Biology/Ecology** | Red goshawks are currently known to breed from the Kimberley, east to Cape York Peninsula, and on the Tiwi Islands (MacColl et al. 2021).<br>The species inhabits coastal and sub-coastal tall open forests and woodlands, tropical savannas traversed by wooded or forested rivers, and the edges of rainforests (Marchant & Higgins 1993). Resident pairs of red goshawks prefer intact, extensive woodlands and forests with a mosaic of open vegetation types that are suitable for fast manoeuvring flight (Marchant & Higgins 1993). Favoured areas appear to contain permanent water, as they are relatively fertile and biologically rich, and support large populations of bird prey species and more likely to have nesting trees.<br>Red goshawks hunt live prey with medium to large sized birds making up 95% of the species' diet, although they also take mammals, reptiles and insects (Czechura & Hobson 2000).<br>Breeding pairs of red goshawks maintain the same territories (including nest sites) year after year (Hollands 1984; Aumann & Baker-Gabb 1991). Red goshawks typically breed in nests they build in tall trees >20 m (range 18.5–40.5 m) with an open limb and canopy structure (Aumann & Baker-Gabb 1991; Debus 2017). These trees commonly occur in proximity to, or along, a watercourse or wetland (Debus 2017). A basket-shaped nest of sticks (approximately 0.5–1.2 m across) is constructed by the male, in which the female lays 1–2 eggs (Aumann & Baker-Gabb 1991). The female incubates the eggs for 39–43 days (Debus et al. 2015).<br>The previous Approved Conservation Advice (2015) described stick nests, in which 1–2 eggs are laid, as being restricted to trees that are taller than 20 m and within 1 km of a watercourse or wetland (Aumann & Baker-Gabb, 1991). The more recent Approved Conservation Advice (2023) describes breeding habitat as areas with large, tall trees (>14 m) within proximity to a watercourse (within 2.5 km), that occur within foraging habitat.<br>Due to a small population size, all foraging and breeding habitat is considered critical to the survival of the species. Red goshawks naturally occur at low densities and require tracts of relatively intact and biodiverse land for hunting and nesting. |
| **Project Context** | Red goshawks are currently known to breed from the Kimberley, east to Cape York Peninsula, and on the Tiwi Islands (MacColl et al. 2021). The species therefore has wide distribution across Cape York including western Cape York where the Project is situated. The Gulf Plains bioregion, formerly viewed as a dispersal barrier, is now considered readily traversable (MacColl et al. 2021). The satellite-tracked adults and juveniles from Queensland and the Northern Territory also soared to higher than 1,000 m, suggesting the Tiwi Islands population is unlikely to be isolated by the narrow water barrier to the mainland (~27 km) (MacColl et al. 2021). |

[3] Conservation advice Erythrotriorchis radiatus (red goshawk) (environment.gov.au)

[4] National recovery plan for the red goshawk (Erythrotriorchis radiatus) - DCCEEW

## Table 3.2 Red Goshawk

| | |
|---|---|
| | This species was recorded as part of bird surveys and incidentally, at four locations in the ecology study area during seasonal and targeted surveys for Palm Cockatoo, in Eucalyptus and Corymbia woodland to tall woodland and Swamp Box fringing forest. It was recorded on a number of occasions at the Tapplebang Creek location. No Red Goshawk nests were identified in the ecology survey area during the surveys despite the extensive surveys undertaken between 2018 and 2022, including during Ecotone's targeted traverse surveys (which involved walking transect lines up to 1,500 m from project watercourses at 100 m spacing (based on the distance from the centreline at which Palm Cockatoo hollows and the nests of other target species can be reliably seen (i.e. 50 m) (Ecotone Flora Fauna Consultants 2023)) and including all areas proposed to be cleared for permanent infrastructure.<br><br>This species was also recorded at two locations along the Ward River downstream of the terrestrial ecology study area.<br><br>All remnant habitats in the terrestrial ecology study area are considered to provide either potential breeding/nesting, hunting/foraging and/or dispersal habitat for this species (i.e. 'coastal and sub-coastal tall open forests and woodlands'). Within the project site, this includes Eucalyptus and Corymbia woodland to tall woodland, Swamp Box fringing forest, Mixed foredune complex and Paperbark woodland and sedgeland due to the extensive remnant coverage of these structurally suitable communities, availability of tall trees and riparian forests.<br><br>However, communities within approximately 2.5 km of persistent water features within the terrestrial ecology study area, are likely to be preferred as breeding/nesting habitat.<br><br>Habitat mapping for this species on the Project site and species observations are provided in Appendix E. |
| **Threats** | The Approved Conservation Advice for this species notes the following:<br>• Habitat loss is the biggest threat to the species (ACF 2020; MacColl et al. 2021). Red goshawk foraging and breeding habitat have been impacted by the historic and ongoing clearing and fragmentation of native forests and woodlands for agriculture, forestry, mining and urbanisation.<br>• Native tree and shrub seedlings are highly susceptible to domestic livestock grazing. This can lead to a reduction or removal of understorey habitat which can reduce the abundance of red goshawk prey.<br>• Inappropriate fire regimes on mainland northern Australia may have changed habitat structure, impacting the availability of the red goshawk's prey species (MacColl et al. 2021).<br>– Reduced fire frequencies (for example, due to loss of cultural burning or inappropriate burning seasonality) has led to vegetation thickening across some parts of the savannahs of the species' range mostly within Cape York Peninsula, which would likely impede the species' ability to forage.<br>– Conversely, too intense fires can also destroy nesting trees and/or reduce breeding success as nests can be abandoned or nestlings killed in the nest by fires that scorch the canopy. |

## Table 3.3 Black-footed tree rat (north Queensland)

| | |
|---|---|
| **EPBC Act status** | Vulnerable (effective 26 June 2015) |
| **NC Act status** | Least concern (effective November 2022) |
| **Approved Conservation Advice** | Threatened Species Scientific Committee (2015). Conservation Advice *Mesembriomys gouldii rattoides* Black-footed tree-rat (north Queensland). Canberra: Department of the Environment. |
| **Adopted/Made Recovery Plans** | There is no adopted or made Recovery Plan for this species |
| **Adopted/Made Threat Abatement Plans** | No Threat Abatement Plan has been identified as being relevant for this species |
| **Biology/Ecology** | This is a large, nocturnal, solitary rodent, known to occupy eucalypt forests and woodlands particularly where hollow abundance is high and, although it is known from margins of eucalypt and rainforests, it tends not to use rainforest habitats (TSSC 2015b). Typical habitat has been described as 'lowland open forests and woodland dominated by Darwin Woollybutt (*Eucalyptus miniata*) and/or Darwin Stringybark, particularly where these forests have a relatively dense shrubby understory' (Woinarski and Burbidge 2016). It shelters and dens predominantly in hollows and sometimes in the dense foliage of Pandanus species.<br>Habitat critical to the survival of this species (in accordance with the Commonwealth Significant Impact Guidelines) is not defined by DCCEEW.<br>It feeds from the ground and in trees, on fruit (particularly *Pandanus* spp.), seeds, insects, flowers and grass. The species' home range is up to 60-70 ha (Woinarski and Burbidge 2016). Little is known about the breeding characteristics of the species, although, it is thought to breed throughout the year, peaking in August–September (TSSC 2015b). |
| **Project context** | The Black-footed Tree-rat was recorded at one location in the terrestrial ecology study area in Swamp Box fringing forest on Tapplebang Creek, by identifiable remains, as part of seasonal surveys for this project and another individual was also captured on infrared camera in Eucalyptus and Corymbia woodland to tall woodland.<br>Suitable habitat for this species in the terrestrial ecology study area in the form of all remnant habitats (i.e. Eucalyptus and Corymbia woodland to tall woodland, Swamp Box fringing forest, Mixed foredune complex and Paperbark woodland and sedgelands), although the Swamp Box fringing forest may be preferred due to its structural diversity. General tree hollow transects (Section 4.3.1) indicate an average density of ~19 hollows per hectare of varying sizes across the ecological study area.<br>Observations and habitat for this species on the Project site are displayed in Appendix E.2. |
| **Threats** | The Approved Conservation Advice for this species notes the following:<br>• There is little information available about the ecology of the black-footed tree rat (north Queensland).<br>• Threat factors with 'severe' consequence rating are listed as inappropriate fire regimes, predation by feral cats and habitat loss/fragmentation.<br>• Inappropriate fire regimes are likely causal factor in decline (Winter & Atherton 1985).<br>• A moderate consequence of habitat change due to exotic invasive grasses which will change the ability of this species to forage effectively on the ground and result in fires that are more intense. |

## Table 3.4 Masked owl (northern)

| | |
|---|---|
| **EPBC Act status** | Vulnerable (effective 16 July 2000) |
| **NC Act status** | Vulnerable (effective November 2022) |
| **Approved Conservation Advice** | Threatened Species Scientific Committee (2015). Conservation Advice *Tyto novaehollandiae kimberli* masked owl (northern). Canberra: Department of the Environment[5]. |
| **Adopted/Made Recovery Plans** | There is no adopted or made Recovery Plan for this species |
| **Adopted/Made Threat Abatement Plans** | Department of Sustainability, Environment, Water, Population and Communities (2012). Threat abatement plan to reduce the impacts on northern Australia's biodiversity by the five listed grasses. Department of Sustainability, Environment, Water, Population and Communities[6]. |
| **Biology/Ecology** | The species has been recorded in riparian forest, rainforest, open forest, Melaleuca swamps and the edges of mangroves and on the margins of sugar cane fields. The species hunts in open woodland and 'feeds on small to medium-sized terrestrial mammals' (DAWE 2020c). Habitat critical to the survival of this species (in accordance with the Commonwealth Significant Impact Guidelines) is not defined by DCCEEW.<br>There is a lack of evidence of this species occupying the ecology study area despite using contemporary industry-accepted methods, i.e. the deployment of ARUs with a reasonable sample size across the ecology study area. However, potentially suitable habitat is present on western Cape York Peninsula and survey effort using appropriate contemporary techniques (ARUs) has been lacking on western Cape York Peninsula generally.<br>The ecological study area comprises 26,429 hectares of habitat for masked Owl (Appendix E.2). Potentially suitable roosting habitat is mapped as Swamp Box fringing forest (317 hectares) and the remaining remnant Eucalyptus and Corymbia woodland to tall woodland, Mixed foredune complex and Paperbark woodlands and sedgelands, provide potentially suitable foraging, breeding/nesting and dispersal habitat (25,825.9 ha). These habitats within 2.5 km of roosting habitat are likely to be preferred by this species in the ecology study area and equate to 20,711.9 ha.<br>The tree hollow transects undertaken in the ecology study area indicate hollow habitat availability (at densities of ~19/ha), of varying size, for potential Masked Owl nesting activities across the ecology study area, including densities of approximately 13.5 medium (10-20 cm diameter) and large hollows (>20 cm diameter) per hectare. The overall hollow density is probably comparable with other similar habitats on the western side of Cape York Peninsula.<br>The Masked Owl nests in large hollows in large trees, usually Eucalypts, and usually within closed forest (DAWE 2020c). Breeding pairs are thought to occupy permanent home ranges but may concentrate use in smaller portions of these home ranges at different times. Reported home ranges vary in size from approximately 500 ha to more than 1,000 ha, and is thought to be influenced by location, prey availability, seasonal conditions, habitat, and disturbance, although birds or pairs may primarily stay within a smaller area of the home range (Higgins, 1999). Breeding is potentially at any time of year, although may not breed every year. |
| **Project context** | Potentially suitable riparian and open forest habitat as described in the Commonwealth Government SPRAT profile for this species (DCCEEW 2023c), occurs throughout the ecology study area. It is noted that only one of the REs occurring within the ecology study area, RE 3.7.4, was identified as a primary RE associated with Masked Owl records on Cape York Peninsula by Jackett et. al. in a review of vegetation associated with records of the Masked Owl in north-eastern Queensland, although Clarkson's Bloodwood (*Corymbia clarksoniana*), Darwin Stringybark (*Eucalyptus tetrodonta*) and New Guinea Bloodwood (*Corymbia novoguinensis*) were regionally dominant in the Cape York Peninsula region where Masked Owls were present (Jackett et al. 2020). These vegetation species are also dominant or common within the ecology study area. |

[5] Conservation Advice Tyto novaehollandiae kimberli (environment.gov.au)

[6] Threat abatement plan to reduce the impacts on northern Australia's biodiversity by the five listed grasses - DCCEEW

**Table 3.4 Masked owl (northern)**

| | |
|---|---|
| | While all remnant communities are likely to provide suitable habitat for foraging and nesting, roosting or refuge habitat is likely to comprise denser vegetation assemblages that provide cover and milder microclimates during the day (Jackett pers. comm. March 2023). Within the ecology study area suitable roosting or refugial habitat would include Swamp Box fringing forest associated with Coconut and Tapplebang Creeks, the tributary of Norman Creek and the Ward River. It is also predicted that due to the importance of the riparian roosting habitats, night time foraging activities would likely occur within approximately 2.5 km of this roosting habitat, and nesting activities of this species likely to occur closer (Jackett pers. comm. March 2023).<br>It should be noted, however, that this species was not recorded in the ecology study area despite an intensive targeted survey effort in habitats likely to provide the most suitable roosting opportunities for this species in the ecology study area. It is considered that any Masked Owl using the roosting habitat and foraging in adjacent habitats would have been detected while the ARUs were deployed, if the species had been present. This is because the majority of ARUs were closely spaced (i.e. ~800 m apart), operating for extended consecutive nights along the length of potential roosting habitats in the ecology study area. Potential detection distance for the AudioMoths deployed is not specifically known, however, similar devices have a conservative detection distance of upwards of 200 m, and up to 800 m in good ambient conditions. It is therefore reasonable to predict conservative detection distances of 200–250 m for the AudioMoths used in this study (Jackett pers. comm. March 2023). These results suggest that the Masked Owl is not using roosting habitats in the ecology study area at present.<br>Potential habitat for this species on the Project site is mapped in Appendix E. |
| **Threats** | The Approved Conservation Advice for this species notes the following:<br>• The reason for the decline and low density of masked owls in northern Australia is unclear.<br>• The subspecies has undoubtedly been affected by broad-scale changes to the environment of northern Australia caused by altered fire regimes, grazing by livestock and feral animals, and the invasion of native woodlands by exotic plants, particularly introduced pasture grasses (Woinarski 2004).<br>• The most likely cause of declines is a shortage of food, as small and medium-sized native mammals are becoming increasingly uncommon across much of northern Australia.<br>• The current regime of more intense, frequent and extensive fires may also reduce the availability of the large trees and hollows (Williams et al. 1999) required for nesting. |

## 3.5 Impact Area description

The landscape within and surrounding the Project site is intact, providing regional connectivity with the surrounding landscape. Darwin Stringybark (*Eucalyptus tetrodonta*) woodlands form a predominant community throughout the landscape, with greater diversity of vegetation assemblages observable around riverine, creek or coastal features. The riparian corridors along each of the waterways in the Project site are currently subject to frequent, and sometimes intense fires such as was observed during the 2022 late dry season, with the fringing vegetation often burnt to within the immediate edge of the creek bank. This burning regime effectively reduces the riparian vegetation to the minimum width possible in many instances.

Weed diversity and abundance is relatively low within the Project site. Weeds occur predominantly along Amban Road and the abandoned airstrip along Amban Road. Several feral animal species have been observed within the Project site, including Cane Toads (*Rhinella marina*), Feral Cats (*Felis catus*) and Feral Pigs (*Sus scrofa*) (see Photograph 3.1). Camera trap results indicate an abundance of Feral Cats in the terrestrial ecology study area, which would increase predation pressure on threatened species such as Black-footed tree rat and small mammals which are food source for Masked Owl (EcoSM 2023).

Fauna habitats throughout the terrestrial ecology study area were typically found to be in moderate to good condition. However, habitats were observed to be influenced by a frequent and intensive fire regime, and by Feral Pigs wallowing and rooting in drainage features and watercourses (Aurukun Bauxite EIS 2023).

One of the primary threatening processes that is occurring to MNES and biodiversity at the impact site and surrounding region is fire. Fires are frequent in the regional area and, based on fire scar mapping, the area has had a fire occur every year for at least the past five years, including a very hot and extensive fire in September 2022. Not all areas have burnt every year, but bushfires are a frequent occurrence and fires have occurred over more than 40% of the regional area every year from 2018 to 2022 (refer Figure 3.1). Fires are generally occurring in the late dry season between June and November (Northern Australia and Rangelands Fire Information 2023). Figure 3.2 shows the extensive areas burnt in 2022 and 2021.

As the dry season escalates, and vegetation cures prior to the onset of the Monsoon season, fire risk increases. At this time of year, anthropogenic causes of fire and frequency of cloud to ground lightning strikes can result in disastrous outcomes, impacting culture, livelihoods and ecosystem function. As the season dries out, thousands of square kilometres (anywhere up to three times the area impacted by the 2009 Victorian Bushfires) can burn, often extremely hot. Although it is well understood that the majority of fires in Northern Australia are grass fires, it is less understood that fires at the end of dry season have a huge impact on the canopy of vegetation, thereby having flow-on influences on the entire ecosystem (Cape York Natural Resource Management 2023).

In recent years, fires have been deliberately lit at the end of the dry season, resulting in extensive and hot bushfires covering large areas of bushland. In 2021 the Queensland Fire and Emergency Services (QFES) conducted an arson investigation in Cape York after fires burned through tens of thousands of hectares of grazing land and wildlife habitat. It was noted by the property manager of Piccaninny Plains Wildlife Reserve that these lit fires are burning trunks and branches, causing much more damage than managed grass burning. Wolverton Station and Piccaninny Plains Wildlife Reserve had about 45,000 ha burned by arson in November 2021. Piccaninny Plains is situated in the centre of Cape York Peninsula, extending from the foothills of the McIlwraith Range to the western plains of the Gulf of Carpentaria and provides habitat for threatened species, including Red Goshawk.

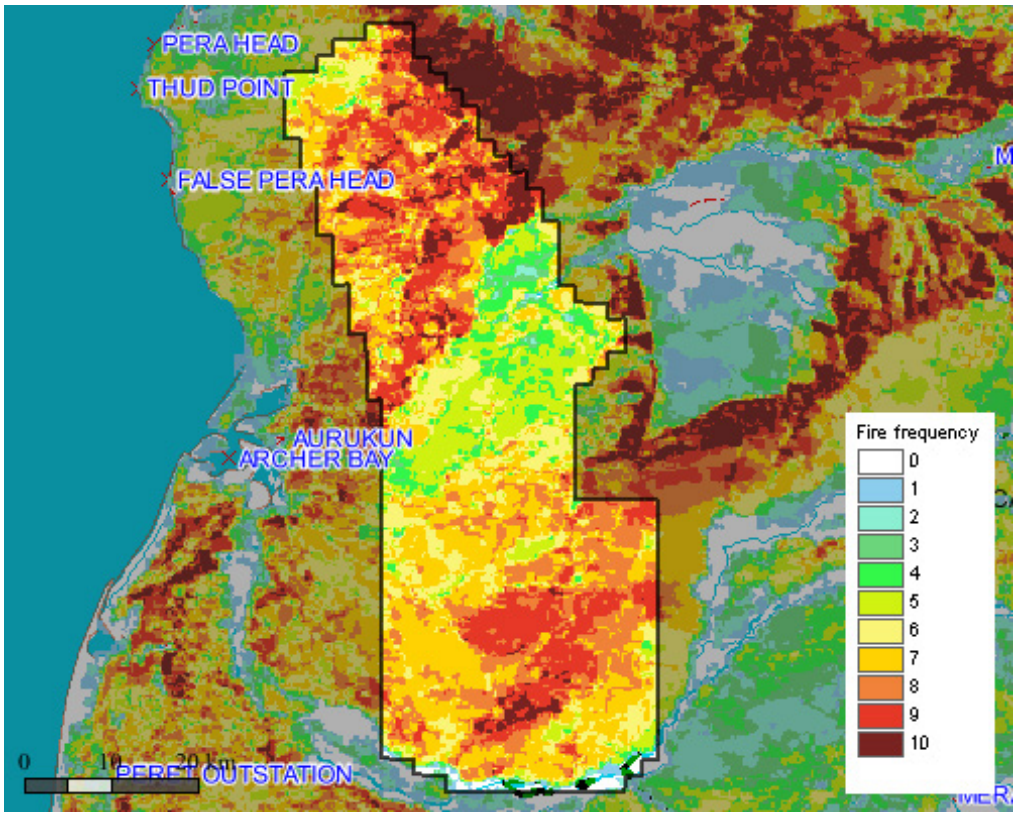



**Figure 3.1 Fire frequency (2013–2022): RA315 (Northern Australia Fire Institute)**

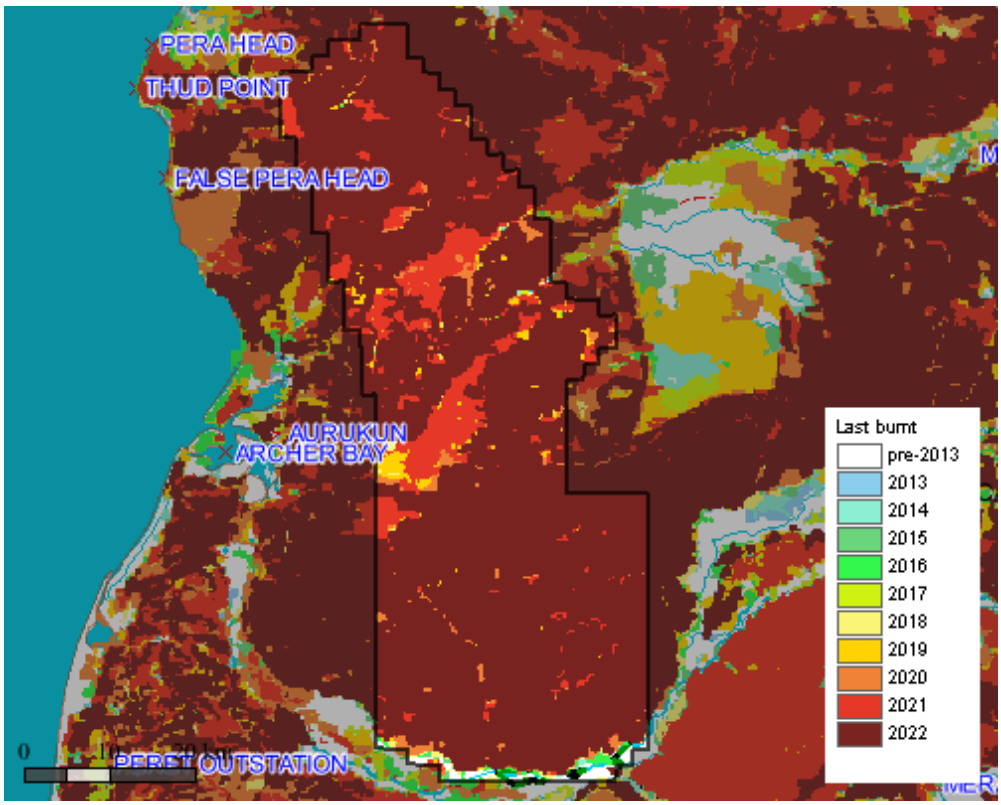



**Figure 3.2 Year last burnt (2013–2022): RA315 (Northern Australia Fire Institute)**

Given the prevalence of fire on the Project site, areas of riparian vegetation on the boundary of creeklines provide an important refuge, retaining more of their understorey layers, woody debris and large trees supporting hollows. However, what has been found on the Project site is that fires are coming up to the edge of riparian vegetation on boundary of creeklines (see Photograph 3.2). As the vegetation up to the riparian areas is being burnt more frequently, this is also exposing the riparian vegetation to greater threat of being impacted by fire in future and opening them up to edge effects.

Effects of these burns are likely to be particularly detrimental to wetland, riparian and vine forest communities and the impacts of these fire events were regularly observed to the top of bank of the various watercourses and drainage features within the ecology study area (Aurukun Bauxite Project EIS 2023).

It is anticipated that over time that the continued prevalence of late season burns, which are hotter and more intense, will modify the vegetation communities in the region and are a threat to retention and abundance of hollow-bearing trees.

**Photograph 3.1** **Feral pigs on Project site (Glencore 2022)**

**Photograph 3.2** **North bank of Tapplebang Creek showing burning to bank of creekline (Ecotone 2023)**

**Photograph 3.3** Woodland post fire in October 2022 (Glencore 2022)

**Photograph 3.4** Example of woodland post fire where some large trees remain (Glencore 2022)

# 4 Biodiversity offset requirements

## 4.1 MNES offset requirements

Impact assessments concluded that the Project is likely to have a significant, residual impact on the following threatened fauna species listed under the EPBC Act:

- Palm Cockatoo
- Red Goshawk
- Black-footed Tree-rat
- Masked Owl.

Where a proposed action is likely to have a significant, residual impact on a threatened species, the *Offset Assessment Guide* (Department of the Environment 2012) is applied in order to assess the suitability of offset proposals prepared to meet the Commonwealth Government's EPBC Act *Environmental Offsets Policy* (Department of Environment 2012).

A summary of impacts on MNES that require offset is set out in Table 4.1. The impact assessments have found that for three species there is potential for indirect impacts to occur as a result of clearing activities, causing some habitat patches to become isolated and, in turn, potentially impact on habitat functionality for that species. The areas potentially indirectly impacted are shown in Appendix E.2.

**Table 4.1 Summary of impacts on protected matters**

| Protected matter | EPBC Act status | NC Act status | Habitat/type | Habitat in the ecology study area (ha) | Direct impact (ha) | Indirect impact (ha) |
|---|---|---|---|---|---|---|
| Palm Cockatoo[7] | V | E | Refuge and Foraging habitat | | 52.2 | 1.2 |
| | | | Breeding and Foraging habitat | 15,705 | 2,913 | 1,645.5 |
| | | | Limited foraging | 10,437 | 3,919 | 0 |
| | | | *Total* | *26,143* | *6,885.1* | *1,646.7* |
| Red Goshawk | E | E | Breeding and Foraging | 21,028.9 | 5,265.4 | 1,896 |
| | | | Additional Foraging | 5,114 | 1,619.7 | 0 |
| Black-footed Tree-rat | V | - | Breeding and Foraging | 26,142.9 | 6,885.1 | 0 |
| Masked Owl | V | V | Preferred roosting | 317 | 47.8 | 0 |
| | | | Foraging / Breeding / Roosting (2.5 km from roosting) | 20,711.9 | 5,217.7 | 1,896 |
| | | | Additional Foraging / Breeding / Roosting | 5,114 | 1,619.6 | 0 |

[7] Refer to Appendix L2 of the Project's EIS for description of the habitat zones for this species.

## 4.2 MSES offset requirements

Significant impact assessments have been completed for MSES applying the applicable *Queensland Significant Residual Impact Guideline* (Department of Environment and Heritage Protection, 2014). Full details of the MSES significant impact assessments are provided in Section 8 – Terrestrial Ecology, Section 9 – Aquatic Ecology and Appendix L of the Project's EIS. A summary has been provided in Appendix F of this strategy.

Under Queensland's environmental offsets framework, where a prescribed activity will have a significant residual impact on a prescribed environmental matter (after the taking of all reasonable avoidance and mitigation measures), an environmental offset may be required where an offset is determined to be a suitable outcome. Clause 15 of the Queensland *Environmental Offsets Act* (EO Act) applies a hierarchy where a State administering agency cannot impose an offset condition for the same, or substantially the same prescribed environmental matter, if that matter, and impact, has been assessed under a relevant Commonwealth Act. This applies whether or not the assessment under the Commonwealth Act resulted in the imposition of an offset condition. The only exclusion to this is impacts in a protected area.

Therefore, where a MSES is the same or substantially the same as a MNES, an offset will not be proposed for that MSES under the Qld offset framework for this Project.

Accordingly, the MSES identified as likely to result in a significant residual impact from the Project, requiring offsets under Qld environmental offset framework, are the following:

- Regulated watercourse vegetation (i.e. remnant REs that occur within certain distances of a relevant stream order)
- A wetland or watercourse in HEV waters.

Ground-truthed watercourse and drainage feature mapping (refer Aquatic Ecology Report (Appendix M) of EIS) was used to determine presence of watercourse vegetation and assess potential for impacts. It was found that watercourse vegetation on stream order 1 and stream order 3 were intersected by the disturbance footprint. The significant impact assessment concluded due to clearing greater than 2 ha of a sparse RE structure, and greater than 0.5 ha for a dense to mid-dense RE structure the impacts on watercourse vegetation were significant.

A summary of MSES required to be offset under Queensland Environmental Offsets Policy, and that will be addressed in this BOS, are set out in Table 4.2.

In determining the extent of MSES offset requirements under the Qld Environmental Offsets Policy, a maximum ratio of 1:4 has been set for those applicable values. This ratio has been used to support a determination as to whether the proposed offset sites have adequate areas available of MSES values until the more detailed habitat quality assessments are still being finalised.

**Table 4.2 Project MSES and those being offset**

| MSES | Description | Status NC Act/VM Act | Status EPBC Act | Total impact (ha) | Is offset required (yes/no) |
|---|---|---|---|---|---|
| **Regional ecosystems** | | | | | |
| Endangered & Of Concern REs<br>(VM Act status) | There are no Endangered or Of Concern REs impacted | | | - | No |

## Table 4.2 Project MSES and those being offset

| MSES | Description | Status NC Act/VM Act | Status EPBC Act | Total impact (ha) | Is offset required (yes/no) |
|---|---|---|---|---|---|
| **Essential habitat** | | | | | |
| Rufous Owl (Cape York subspecies) | Tapplebang Creek in the Project site is identified on Queensland government essential habitat mapping (Version 10.0) as supporting essential habitat for this species. | Near Threatened | - | 38 | No |
| Estuarine Crocodile | Vegetation within the Product Bauxite Transport Corridor is identified on Queensland government mapping as supporting essential habitat for the Estuarine Crocodile. | Vulnerable | Marine/ Migratory | 60 | No |
| Eastern Curlew | Essential habitat for the species is mapped along coastline directly adjacent to the Product Bauxite Transport Corridor. | Endangered | Critically endangered<br>Marine/ Migratory | 60 | No |
| **HEV waters and watercourse vegetation** | | | | | |
| Remnant vegetation that intersects with mapped vegetation management wetland | No vegetation management wetlands occur in the Project study area. | | | - | No |
| Wetland Protection Area or High Ecological Significance (HES) wetland | No wetlands of HES occur in Project study area. | | | - | No |
| Wetland or watercourse in High Ecological Value waters (HEV waters) | The project is likely to have a significant impact on HEV waters in Tapplebang Creek. The impact relates to construction of Tapplebang Dam, which will artificially modify the types of aquatic habitat present in the dam lake area in the upstream reaches of Tapplebang Creek.<br>The impact to HEV waters is the stream itself. | - | - | 5.76 | Yes |
| Watercourse vegetation | RE3.3.20b<br>Stream Order 1 | Least concern | | 0.32 | Yes |
| | RE3.3.20b<br>Stream Order3 | Least concern | - | 1.13 | Yes |
| | RE3.3.9a<br>Stream Order 1 | Least concern | - | 0.41 | Yes |
| | RE3.3.9a<br>Stream Order 3 | Least concern | - | 39.44 | Yes |

## Table 4.2 Project MSES and those being offset

| MSES | Description | Status NC Act/VM Act | Status EPBC Act | Total impact (ha) | Is offset required (yes/no) |
|---|---|---|---|---|---|
| | RE3.3.9b<br>Stream Order 1 | Least concern | | 0.07 | Yes |
| | RE3.3.9b<br>Stream Order 3 | Least concern | | 6.96 | Yes |
| | RE3.5.36b<br>Stream Order 1 | Least concern | | 4.08 | Yes |
| | RE3.5.36b<br>Stream Order 3 | Least concern | | 59.47 | Yes |
| **Strategic Environmental Area** | | | | | |
| Strategic Environmental Area | No SEA present in Project study area | | | - | No |
| **Protected wildlife habitat – Species habitat** | | | | | |
| Palm Cockatoo | Foraging and breeding habitat | Endangered | Vulnerable | 8,531.8 | Yes* |
| Red Goshawk | Foraging and breeding habitat | Endangered | Endangered | 8,781 | Yes* |
| Masked Owl (northern) | Foraging and breeding habitat | Vulnerable | Vulnerable | 8,781 | Yes* |
| Short-beaked Echidna | Foraging and breeding habitat | Special Least Concern | - | 6,885.1 | No |
| **Fish passage** | | | | | |
| Impacts to fish passage | A number of watercourses in Project site are mapped as providing for fish passage. | - | - | Low risk – 0.2 ha<br>High risk – 5.56 ha | No |
| **Marine plants** | | | | | |
| | No impacts to marine plants will occur as a result of project | | | - | No |
| **Connectivity** | | | | | |
| | DES's Landscape Fragmentation and Connectivity Tool (LFC tool) was applied to the project clearing area. The LFC tool determined that the project would not result in a significant impact on connectivity areas. | | | - | No |
| **Protected areas** | | | | | |
| | There are no protected areas that will be impacted by the project. | | | - | No |

### Table 4.2 Project MSES and those being offset

| MSES | Description | Status NC Act/VM Act | Status EPBC Act | Total impact (ha) | Is offset required (yes/no) |
|---|---|---|---|---|---|
| **High risk trigger mapping** | | | | | |
| | Protected plant surveys were completed in high risk trigger mapping areas and more broadly. No threatened flora species were recorded. | | | - | No |
| **Legally secured offset area** | | | | | |
| | No existing offsets occur within the Project study area | | | - | No |

*these EPBC Act listed fauna species are being offset under EPBC Act Environmental Offsets Policy

# 5 Offset delivery approach

## 5.1 Land based offsets

Upon assessment of the Project's MNES and MSES offset requirements, it is proposed that at least 90% of the total offset requirement will be delivered as land-based offsets. The largest component of the Project's offset requirements is the offsetting of impacts on habitat of threatened fauna species under the EPBC Act. Within these habitats in the offset will be areas supporting MSES values including watercourse vegetation and HEV waters. This offset approach is consistent with EPBC Act Environmental Offsets Policy, *Environmental Offsets Act 2014,* and Queensland Environmental Offsets Policy (QEOP).

The land-based offsets will be located in the Cape York bioregion, in an area known to support the target species and containing suitable habitats for each threatened species, including the ecosystem and species function that was impacted. For example, if breeding habitat is being lost, then breeding habitat will be included in the offset. The offset will also provide for habitat quality improvements to be gained over time, and threatening processes reduced.

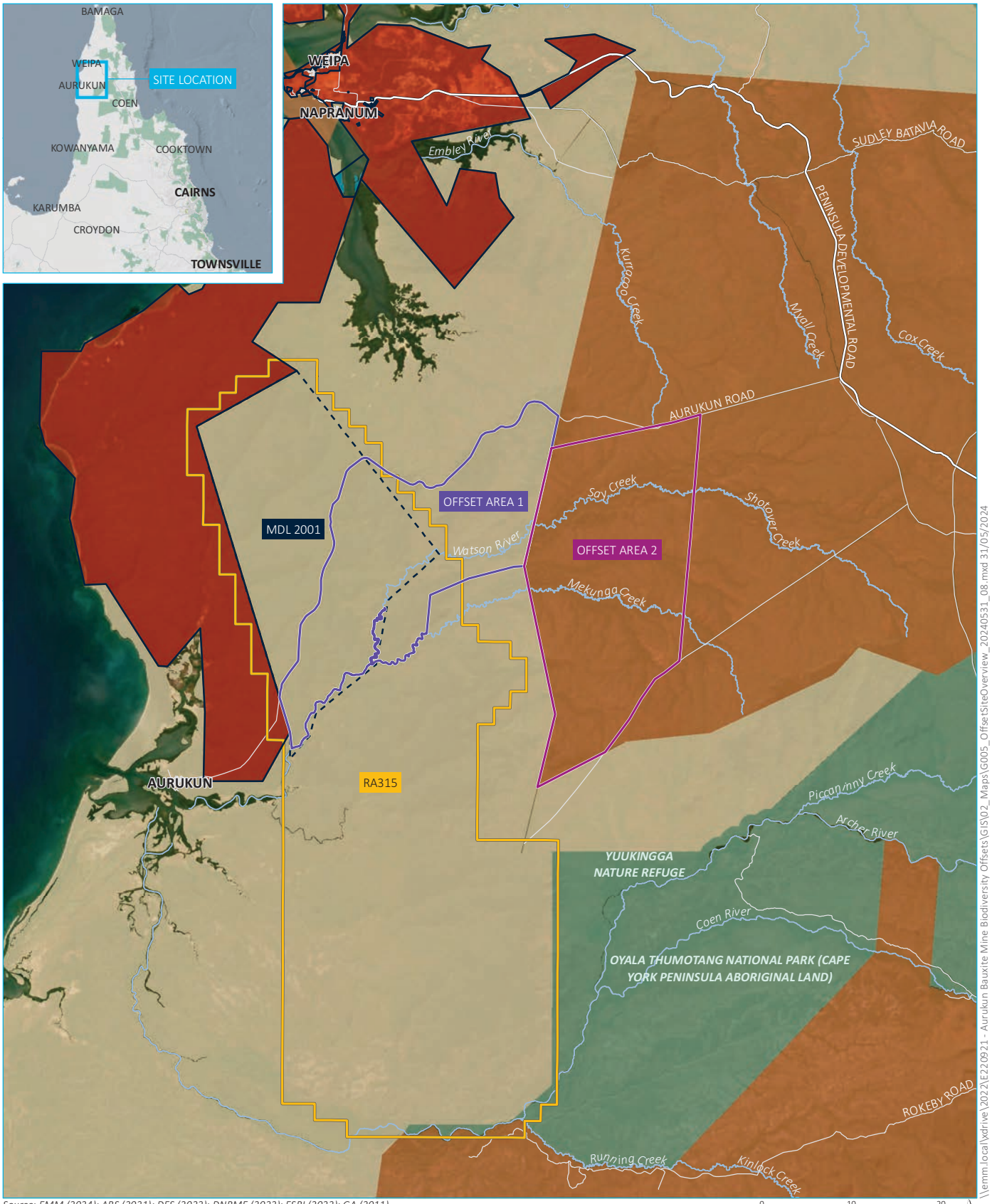
The offset land will be legally secured on title to reduce future risk of loss and be actively managed and monitored to improve its habitat quality. As Cape York is extensively covered by remnant vegetation, the offset will consist of remnant woodlands and a focus will be on habitat quality improvement, threat abatement in particular frequent and extensive bushfires, and increasing an understanding of the target species and ecosystems response to fire regimes. There is also potential for the land-based offsets to be supplemented with other compensatory measures which would help in the long-term conservation of these threatened species. This is further discussed in Section 6.3.

The proponent has identified two potential offset properties (Offset Area 1 and Offset Area 2) for further investigation as illustrated in Figure 5.1. These lands were identified as they are:

- located close to the impacted habitats of western Cape York and within known distribution of each MNES fauna species
- based on current information, have a high potential to support suitable habitat for the threatened fauna species required to be offset and also contain extensive areas of MSES offset values being watercourse vegetation and HEV waters
- subject to threatening processes (e.g. inappropriate fire regimes, feral animals, underlying resource tenements for Offset Area 1, cattle grazing) that can be reduced and managed
- have capacity to achieve habitat quality gains
- properties where landholders have expressed interest in providing a biodiversity offset on their land.

Further details regarding each potential offset property and the offset values they contain is summarised below. Offset calculator results for each MNES and each offset site is summarised in Section 5.2, offset calculators are provided in Appendix C, and offset calculator justifications in Appendix D. The calculator inputs are primarily based on desktop assessments. Further field assessments to support habitat quality scoring and undertake targeted surveys on the offset areas for the threatened species being offset, assessing habitat features and management actions have commenced; however, there are constraints that need to be taken into consideration as outlined in Section 5.4.

No staging of offsets is proposed; therefore, the total extent of impacts will be offset up-front.

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*Source: EMM (2024); ABS (2021); DES (2022); DNRME (2022); ESRI (2022); GA (2011)*

0 10 20 km

GDA 1994 MGA Zone 54

N

KEY

- Offset area 1
- Offset area 2
- Mining lease (ML 7024)
- Mineral development licence (MDL 2001)
- Restricted area (RA 315)
- Major road
- Minor road
- Major watercourse

Tenure

- Freehold
- Lands lease
- Mining
- Reserve
- Easement
- State land

INSET KEY

- Major road
- National park/nature reserve
- State forest

# Offset area 1 and 2 in proximity to the Project

Aurukun Bauxite Project
Biodiversity Offset Strategy
Figure 5.1

EMM
creating opportunities

### 5.1.1 Offset Area 1

The preferred offset area (Offset Area 1) is located on Lot 211 SP241404 which is held by Ngan Aak-Kunch Aboriginal Corporation, on behalf of the Wik and Wik Waya People, as Aboriginal freehold title under the AL Act. The property (i.e. Lot 211) extends across a large area between Weipa and south of Aurukun (refer Figure 5.3).

The lot is very large in size, consisting of 705,775 ha in total area and encompassing large tracts of *Eucalyptus tetrodonta* woodlands, Melaleuca woodlands along creeklines, watercourses, wetlands, and lagoons. The property is known to support essential habitat for a number of threatened species, including Rufous Owl, Palm Cockatoo, Red Goshawk, Black-throated finch (white-rumped subspecies) and a number of migratory species. Biodiversity values of state significance for the property are summarised in Appendix B.

Offset Area 1 is a smaller portion of the larger property, being 47,500 ha in size, and is situated adjacent to the Project site, east of Aurukun Road and the mine site (Figure 5.1). There is connectivity between the Project site (which will be managed by the proponent) and offset area providing a benefit to locally impacted species populations, and both are located on the bauxite plateau with similar ecosystems and climatic conditions.

#### i Current status

Offset Area 1 is understood to be used occasionally by both Traditional Owner and other residents of Aurukun township for various activities, including hunting.

The proposed offset area has large portions of approximately 22,931 ha within MDL 2001 (a mineral development licence held by the proponent) and approximately 29,932 ha is within Restricted Area 315 (RA315). The MDL provides the proponent an ability to apply for the area to be converted to a mining lease and mined. RA315 is an area designated under the *Mineral Resources Regulation* by the Queensland Government for the protection of the Aurukun bauxite resource as shown on Figure 5.2, and enable future mining applications to be made. Both the MDL and RA315 increase the likelihood of future clearing and development to occur on these parcels of land. The risk of loss would be higher across the MDL and RA315 designations compared to other lands in Cape York which are not.

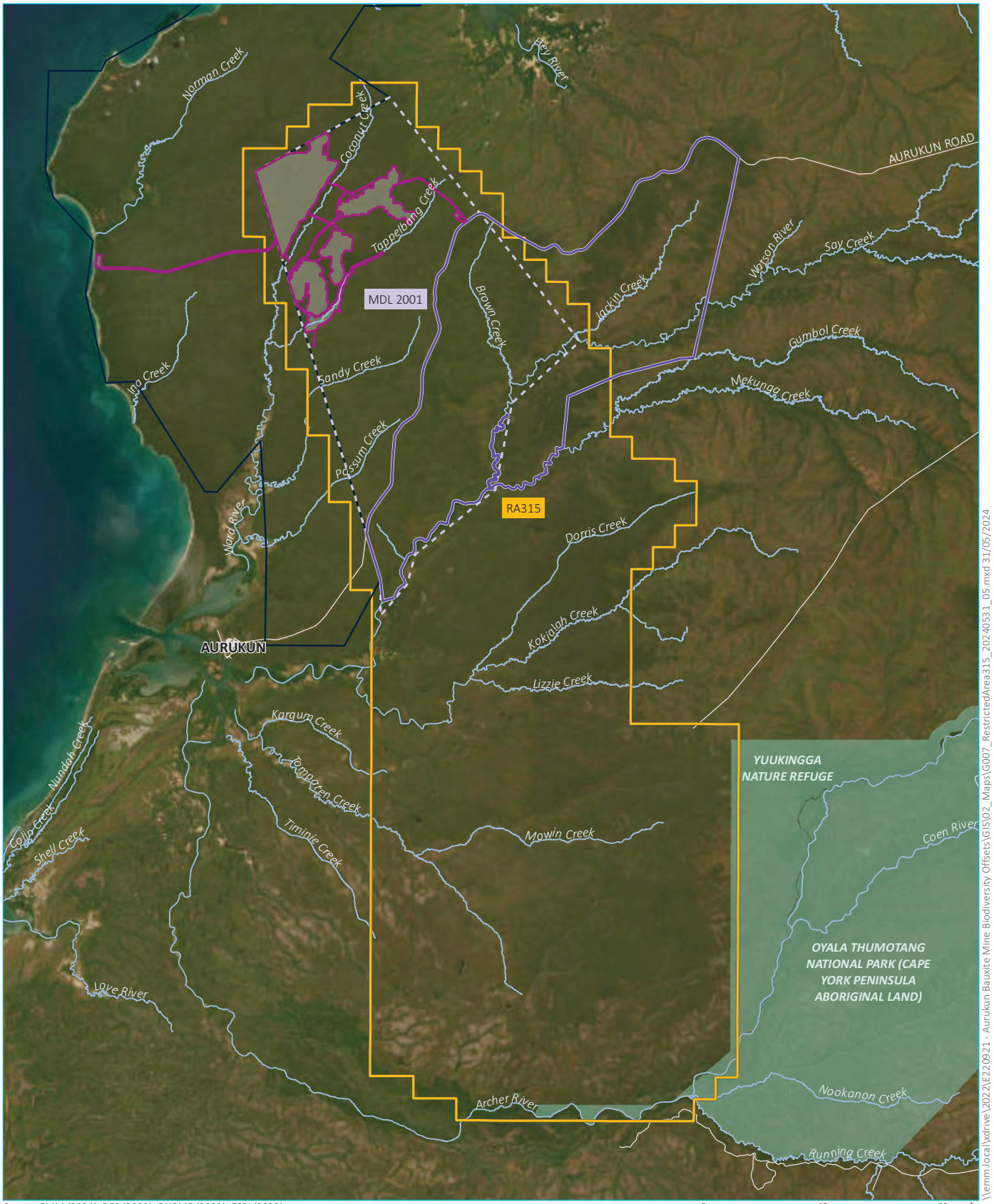
There are no exploration tenements within the nominated offset area; however, there is an exploration permit for mining (EPM17836) to the north-east. EPM 17836 is held by McKay Brook Resources Pty Ltd.

#### ii Land management

The offset area is situated on Aboriginal freehold title. This freehold title provides for some land uses and vegetation clearing to be able to occur without the need for additional permits or consents such as grazing of livestock, hunting, recreational 4WD, and clearing of vegetation for fencelines, firebreaks and understorey clearing. We are not presently aware of any active land management practices occurring in the nominated offset area by the Ngan Aak-Kunch Aboriginal Corporation such as fire, pests and weeds.

#### iii Threats

While the risk of the remnant vegetation being lost completely is low, there is a significant threatening process that is occurring in terms of wildfires which is not being managed and will continue to occur if the offset is not put in place. Due to the location of the offset area bordering the Aurukun Road to the north, and the properties close proximity from Aurukun township, high frequency and intensity bushfires are occurring. The proponent has engaged a fire and ecologist specialist to conduct a preliminary assessment of the fire threats to the offset property (Appendix G). The assessment confirmed that this parcel of land has been subject to what can only be described as a 'Wildfire regime' for at least the previous twenty years from when accurate fire mapping became available and with approximately 81% of the offset area being burnt every year, during late season fires. Further detail on this threat to MNES is provided in Section 5.1.3.

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*Source: EMM (2024); DES (2022); DNRME (2023); ESRI (2023)*

0 10 20 km

GDA 1994 MGA Zone 54

N

KEY

- Impact footprint
- Offset area 1
- Mining lease (ML 7024)
- Mineral development licence (MDL 2001)
- Restricted area (RA 315)
- Minor road
- Named watercourse
- National park/nature reserve

Restricted Area 315

Aurukun Bauxite Project
Biodiversity Offset Strategy
Figure 5.2

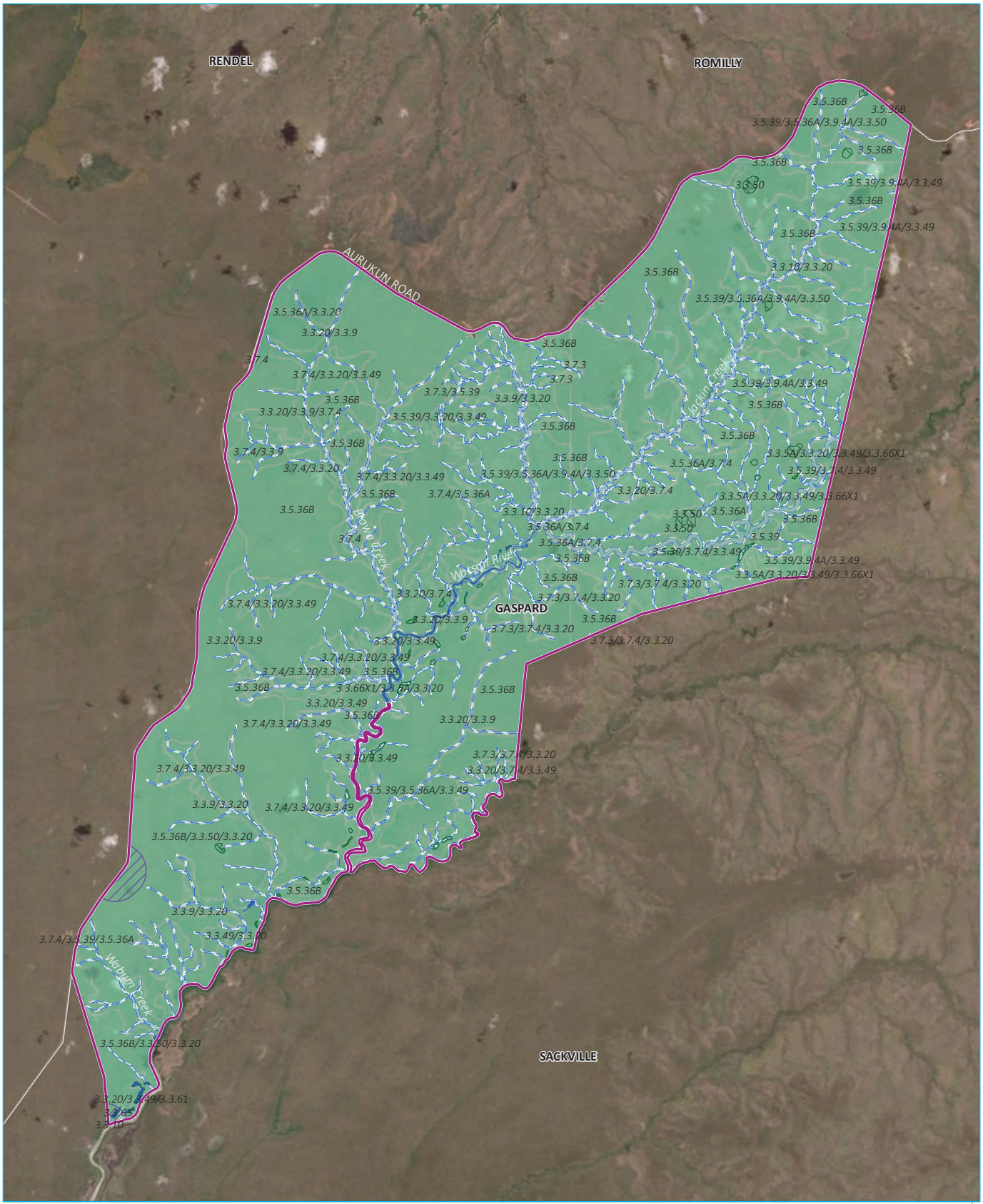
EMM
creating opportunities

### iv Environmental values

Offset Area 1 is approximately 47,500 ha and supports very similar vegetation communities, species habitats and ecological condition as the impact site. Based on regulated vegetation mapping, there is over 47,000 ha of remnant vegetation in the offset area of which approximately 35,500 ha supports *Eucalyptus tetrodonta* dominated woodlands. There is approximately 5,300 ha on alluvial plains, and over 3,800 ha of watercourse vegetation on stream orders ranging from stream order 1 to stream order 6. Database searches for the property are provided in Appendix A.

Offset Area 1 includes a number of watercourses including Brown Creek, Wabum Creek and Watson River that support HEV waters and watercourse vegetation. It is also mapped as supporting an area of HES wetland and VM wetlands (refer Figure 5.3).

The area is also mapped as supporting essential habitat for Red Goshawk and Palm Cockatoo.




Source: EMM (2024); DES (2022); DNRME (2023); ESRI (2023)

0 2.5 5 km
GDA 1994 MGA Zone 54

N

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KEY

- Offset area 1
- Minor road
- Watercourse
- Watercourse vegetation
- Essential habitat
- Vegetation management wetland
- High ecological significance wetand

Regional ecosystems (VM status)

- Remnant - least concern

# Offset area 1 environmental values

Biodiversity Offset Strategy
Figure 5.3

EMM
creating opportunities

A summary of the REs supported in Offset Area 1 based on certified mapping, and other mapped MSES values from desktop assessments, are summarised in Table 5.1 and mapped in Figure 5.3. Those highlighted in green are the same broad vegetation group as REs impacted in the Project site.

**Table 5.1 Summary of values in Offset Area 1**

| Value | General RE description | VM Status | Area available (ha) | BVG |
|---|---|---|---|---|
| RE 3.3.5a | Evergreen to semi-deciduous *notophyll* vine forest | LC | 225.92 | 4b |
| RE 3.3.9 | *Lophostemon suaveolens* woodlands on creeklines and swamps | LC | 494.13 | 22b |
| RE 3.3.10 | *Melaleuca fluviatilis* and/or *Melaleuca argentea* woodland or *M. saligna* or *M. dealbata* woodland fringing watercourses | LC | 371.60 | 22c |
| RE 3.3.20 | *Corymbia clarksoniana* or *C. novoguinensis* woodland on alluvial plains | LC | 3,142 | 9e |
| RE 3.3.49 | *Melaleuca viridiflora* +/- *Corymbia clarksoniana* low open woodland on floodplains and alluvial plains | LC | 475.83 | 21a |
| RE 3.3.50 | *Melaleuca* spp. woodland on swamps on floodplains and non-floodplain landforms | LC | 1032.76<br>63.44 | 21a |
| RE 3.3.61 | Mixed tussock grassland and sedgeland on alluvial plains | LC | 6.57 | 32a |
| RE 3.3.65 | Tussock grasslands in ephemeral lakes and lagoons | LC | 0.29 | 34d |
| RE 3.3.66 | Lakes and lagoons dominated by a variety of aquatic plants, frequently with fringing woodlands or sedgelands | LC | 322.6 | 16d |
| RE 3.5.36a | *Eucalyptus tetrodonta and Corymbia nesophila* woodland to open forest on undulating plains and remnant plateaus | LC | 2,459.42 | 14a |
| RE 3.5.36b | *Eucalyptus tetrodonta* and *Corymbia nesophila* woodland to open forest on undulating plains and remnant plateaus | LC | 21,756.33<br>2,4481.86 | 14a |
| RE 3.5.39 | *Eucalyptus tetrodonta* +/- *Corymbia clarksoniana* woodland on sand plains | LC | 9,032 | 14a |
| RE 3.7.3 | *Eucalyptus cullenii* +/- *E. tetrodonta* woodland on erosional escarpments and plains | LC | 1,759.27 | 13a |
| RE 3.7.4 | *Eucalyptus tetrodonta* and *Corymbia stockeri* woodland on ironstone knolls and slopes | LC | 4,366.67 | 14b |
| Non-remnant | | | 10.67 | |
| HES wetland | | | 152.16 | |
| Vegetation management wetlands | | | 212.92 | |
| Essential habitat (Palm cockatoo and Red Goshawk) | | | 202.84 | |
| HEV waters | | | All watercourses in offset support HEV waters | |

**Table 5.1 Summary of values in Offset Area 1**

| Value | General RE description | VM Status | Area available (ha) | BVG |
|---|---|---|---|---|
| Watercourse vegetation | Stream orders ranging from stream order 1 to stream order 6 occur in the offset investigation area.<br>Stream order 1 and 2 | | 2,372.66 | |
| | Stream order 3 and 4 | | 556.12 | |
| | Stream order 5 and 6 | | 883.50 | |

### 5.1.2 Offset Area 2

The second potential offset area (Offset Area 2) is located on Lot 1 YK4 and is a total area of approximately 89,400 ha on crown land, held on a rolling term lease for pastoral purposes.

#### i Current status

Offset Area 2 is located on a property called the Watson River Station and is located to the east of the Project site, as shown in Figure 5.1.

Various watercourses and drainage lines traverse the property, including the Watson River, Embley River, Lagoon Creek and Merkunga Creek and a number of wetlands are also present throughout the property. Several roads, including Aurukun Road, also traverse the property (refer Figure 5.4). The property is not covered by any production permits such as MLs or PLs; however, a small portion along western boundary is subject to EPM17836.

Offset Area 2 is south of Aurukun Road and is approximately 54,000 ha in area. This area was selected as it supports a number of watercourses and riparian woodlands, which are known to be an important breeding and refuge area for threatened fauna species being offset. The larger area provides greater flexibility as to where the final offset areas may be located, allowing future field survey results to be taken into consideration, and discussions with landowner to occur.

#### ii Land management

The primary land use on this property is cattle grazing, with a homestead located in the southern section of the property. The current owner of the property (Corporate Carbon) also utilises areas of the property to generate carbon credits, primarily through savanna fire management.

This offset area can be divided into two separate blocks for management purposes. The northern block, bordered by the Aurukun Road and Soy Creek, has been subject to a similar fire regime as Offset Area 1, due to the fires lit from the Aurukun Road. The southern block has more secure boundaries such as cleared fence-lines and significant watercourses. Fire scar mapping indicates these boundaries and associated land use such as grazing and savanna fire management have largely protected this area from the large single event wildfires which have affected surrounding areas.

Should this proposed Offset Area continue to be used for grazing purposes, the present fire regime may be considered suitable for ongoing habitat maintenance in the southern area of the block. If grazing regime was to be changed or removed a greater mosaic burning fire regime would need to be implemented.

Further detailed assessment would be required to confirm if the current fire regime is optimised for the specific threatened species being offset, and considering the current regime is primarily focused on early season burns for carbon credits. Perry (2016) found that shifting fire regimes from late to early dry -season fires for carbon abatement may not completely equate with terrestrial vertebrate biodiversity outcomes on Cape York, with a more nuanced species-specific monitoring approach being required to optimise biodiversity benefits than a fire frequency-based regime to minimise emissions.

### iii Environmental Values

The offset area supports similar vegetation communities and species habitats to the impact site and is mapped as supporting over 26,000 ha of *Eucalyptus tetrodonta* and Corymbia woodlands. There is over 5,000 ha of watercourse vegetation mapped and habitat modelling by DESI indicates a number of state listed species may be present (refer Appendix B).

The BVGs that are similar to the impact site are highlighted in green in Table 5.2.

In September 2022, an initial site inspection was carried out by ecologists from Eco Solutions and Management. Photos taken from the trip are shown in Photograph 5.1–Photograph 5.3. The property manager noted that Palm Cockatoos are regularly seen along the Watson River and the creeks. Evidence of Palm Cockatoos feeding along the Watson River were observed. Woodlands assessed were noted to have hollows and some of large enough size for Palm Cockatoo. As they are recorded on the property regularly, this may indicate they are breeding in the area as well.

A summary of the REs the offset area supports and other mapped MSES values are summarised in Table 5.2 and vegetation communities are illustrated in Figure 5.4.

Those highlighted in green are the same broad vegetation group as REs impacted in the Project site.

**Table 5.2 Summary of values in Offset Area 2**

| Value | General RE description | VM Status | Area available (ha) | BVG |
|---|---|---|---|---|
| RE 3.3.5a | Evergreen to semi-deciduous notophyll vine forest. | LC | 806.72 | 4b |
| RE 3.3.10 | *Melaleuca fluviatilis* and/or *Melaleuca argentea* woodland or *M. saligna* or *M. dealbata* woodland fringing watercourses. | LC | 988.67 | 22c |
| RE 3.3.20 | *Corymbia clarksoniana* or *C. novoguinensis* woodland on alluvial plains. | LC | 3,305.39 | 9e |
| RE 3.3.24 | *Eucalyptus leptophleba* +/- *Erythrophleum chlorostachys* woodland on riverine levees and alluvial plains. | LC | 957.77 | 16b |
| RE 3.3.28 | *Eucalyptus platyphylla* and *Corymbia clarksoniana* woodland on alluvial plains. | LC | 289.2 | 9b |
| RE 3.3.31a | *Eucalyptus tetrodonta* woodland +/- *Corymbia clarksoniana* +/- *Erythrophleum chlorostachys.* | LC | 253.12 | 14b |
| RE 3.3.38a | Deciduous *notophyll* and/or microphyll vine thicket *+/- Lagerstroemia archeriana* on heavy clay alluvium. | LC | 65.6 | 7b |
| RE 3.5.41 | Melaleuca viridiflora +/- Corymbia clarksoniana woodland to low open woodland on plains. | LC | 1,433.31 | 21a |
| RE 3.3.49 | *Melaleuca viridiflora* +/- *Corymbia clarksoniana* low open woodland on floodplains and alluvial plains. | LC | 5,090.15 | 21a |

**Table 5.2 Summary of values in Offset Area 2**

| Value | General RE description | VM Status | Area available (ha) | BVG |
|---|---|---|---|---|
| RE 3.3.50 | *Melaleuca* spp. woodland on swamps on floodplains and non-floodplain landforms. | LC | 397.35 | 21a |
| RE 3.3.50b | *Melaleuca* spp. woodland on swamps on floodplains and non-floodplain landforms | LC | 348.03 | 21a |
| RE 3.3.66 | Lakes and lagoons dominated by a variety of aquatic plants, frequently with fringing woodlands or sedgelands. | LC | 178.87 | 16d |
| RE 3.5.36a | *Eucalyptus tetrodonta* and *Corymbia nesophila* woodland to open forest on undulating plains and remnant plateaus. | LC | 3,797.64 | 14a |
| RE 3.5.36b | *Eucalyptus tetrodonta* and *Corymbia nesophila* woodland to open forest on undulating plains and remnant plateaus. | LC | 961.28 | 14a |
| RE 3.5.39 | *Eucalyptus tetrodonta* +/- *Corymbia clarksoniana* woodland on sand plains. | LC | 21,519.27 | 14b |
| RE 3.7.3 | *Eucalyptus cullenii* +/- *E. tetrodonta* woodland on erosional escarpments and plains. | LC | 83.14 | 13a |
| RE 3.7.4 | *Eucalyptus tetrodonta* and *Corymbia stockeri* woodland on ironstone knolls and slopes. | LC | 653.02 | 14b |
| RE 3.9.4a | *Eucalyptus leptophleba* (Molloy red box) open woodland to woodland. | LC | 12,448.34 | 18c |
| RE 3.9.5 | *Corymbia papuana* open woodland on rolling plains. | LC | 374.73 | 32b |
| Non-remnant | | | 390.65 | |
| HES wetland | | | 8.96 | |
| VM wetland | | | 513.17 | |
| Essential habitat | | | 0 | |
| HEV waters | | | All watercourses support HEV waters | |
| Total Watercourse Vegetation<br>Stream orders ranging from stream order 1 to stream order 5 occur in the offset investigation area. | | | 5,253.53 | |

### 5.1.3 Fire regimes that cause declines in biodiversity

There is now strong scientific evidence that certain fire regimes threaten the persistence of much of Australia's biodiversity. As a mechanism of ecosystem disturbance, fire can maintain or enhance biodiversity, or cause the loss of biodiversity (DAWE 2022). Inappropriate fire regimes are second only to land clearing as a threat to avifauna in Australia (Olsen, P and Weston, M. 2005).

While some fire regimes threaten species directly by reducing their survival and/or reproduction, many impacts of fire regimes on biodiversity are indirect, either because they alter habitats, disrupt dependencies among species, or exacerbate impacts of other threats. Fire regimes that threaten biodiversity may also degrade ecosystem functions, reducing the capacity of ecosystems to sustain native flora and fauna and to supply ecosystem services that support human well-being and livelihoods (DAWE 2022).

The key components of fire regimes to consider are frequency, severity, season and types.

Inappropriate fire regimes are the greatest threat to Australia's birds after direct human destruction and alteration of habitats (P. Olsen and M. Weston 2005). Contemporary fire regimes have tended to be either of two extremes: intense, extensive and uncontrolled wildfire mainly late in the driest season; or land seldom burnt. This results in loss of fire sensitive species, habitats and patchiness in intensively burnt areas, or woody thickening and loss of savanna, granivorous species and general biodiversity in areas seldom burnt.

High severity fires that consume all ground cover, particularly in riparian areas, may expose the surface to high risks of erosion if intense post-fire rainfall or wind events occur before re-establishment of groundcover vegetation. Loss of surface soil may reduce habitat suitability for terrestrial biota, but the consequential effects of sedimentation and ash inflows may have major effects on freshwater and coastal marine ecosystems and their associated species well beyond the immediate footprint of burnt areas (DAWE 2022). Fires occurring late in the dry season, burning out all groundcover, are closer to the start of the wet season and soil runoff occurring.

### 5.1.4 Current fire regimes occurring for Offset Area 1 and associated impacts

Data is showing that >60% of the proposed offset has been burnt every year for the last 13 years and, in some years, it has been as high as 94% of the total offset area. Fires are generally occurring later in dry season with peaks in September to November (NAFI 2024). These are hot and extensive bushfires, and also at a high frequency. These unmanaged fires will be having a detrimental impact on MNES species and their habitats as justified by literature below. The NAFI report summarising this information is contained in Appendix G.

Based on a bushfire expert's review, the land under study has faced regular wildfires over the past twenty years, particularly along Aurukun Road. Unauthorised roadside burning is a widespread issue across Cape York, necessitating educational efforts and a strong fire management plan (Blackman, 2024).

Data from this period shows that about 81% of the area burns annually, mostly between August and October, with a smaller amount burning from November to December, when fires are most destructive. Roadside burning starts early and continues until late October, often leaving little vegetation untouched (Blackman, 2024).

Given a recommended fire interval of 2–3 years, the ongoing impact of this fire regime on biodiversity in the area could be severe. Potential consequences include the loss of habitat trees for Palm Cockatoos and Red Goshawks, as well as the absence of late-season refuges for ground mammals (Blackman, 2024). Further information on current fire regimes is provided in some advice provided by Michael Blackman with extensive experience in bushfire management in north Queensland in Appendix G.

For species such as Red Goshawk, inappropriate fire regimes is a known threat. Preferred fire regimes would be a mosaic of fire ages across the landscape with a bias towards retention of older fire ages. In terms of intensity, occasional hot burns should occur (P. Olsen and M. Weston 2005).

The impact of increasing fire frequency on hollow- dependent fauna is likely to be greatest in forests where regeneration is inhibited, a large number of trees are removed before they form hollows, and/or where rates of collapse among trees is elevated. Forest fires are a disturbance that can elevate the mortality and collapse of trees. Higher rates of collapse among hollow-bearing trees have been observed in Australian Eucalyptus forests after wildfire and prescribed burning. In northern Australia, high frequency fire (HFF), especially of high severity fires, are related to declines in the availability of tree hollows on which many fauna species depend (Woolley et al., 2018).

Some studies have observed that the number of hollow-bearing trees that occur in stands is negatively associated with fire severity (Inions et al. 1989; Lindenmayer et al. 2018) and fire frequency (Bagne et al. 2008; Haslem et al. 2012; Salmona et al. 2018; Woolley et al. 2018). However, fire is also an agent for hollow formation. Fire can damage or kill trees, predisposing them to decay and hollow formation, and cause limbs to break, thus exposing hollows in decayed heartwood and/or excavate hollows by burning decayed heartwood (Inions et al. 1989; Gibbons and Lindenmayer 2002).

Thus, to be resilient to frequent fires, stands must always contain sufficient large trees in addition to each hollow-bearing tree. Sufficient recruitment of new trees and their protection over the long-term is therefore important and particularly applicable in forests in which natural regeneration is affected (e.g. due to over-grazing) or trees are removed before they reach an age where they begin to form hollows (e.g. due to timber harvesting) (Gibbons 2024).

While it may be considered remnant vegetation is protected from clearing, the remnant vegetation and threatened species it supports in Offset Area 1 is under significant threat from inappropriate fire regimes.

### 5.1.5 Proposed approach to fire management in the offset

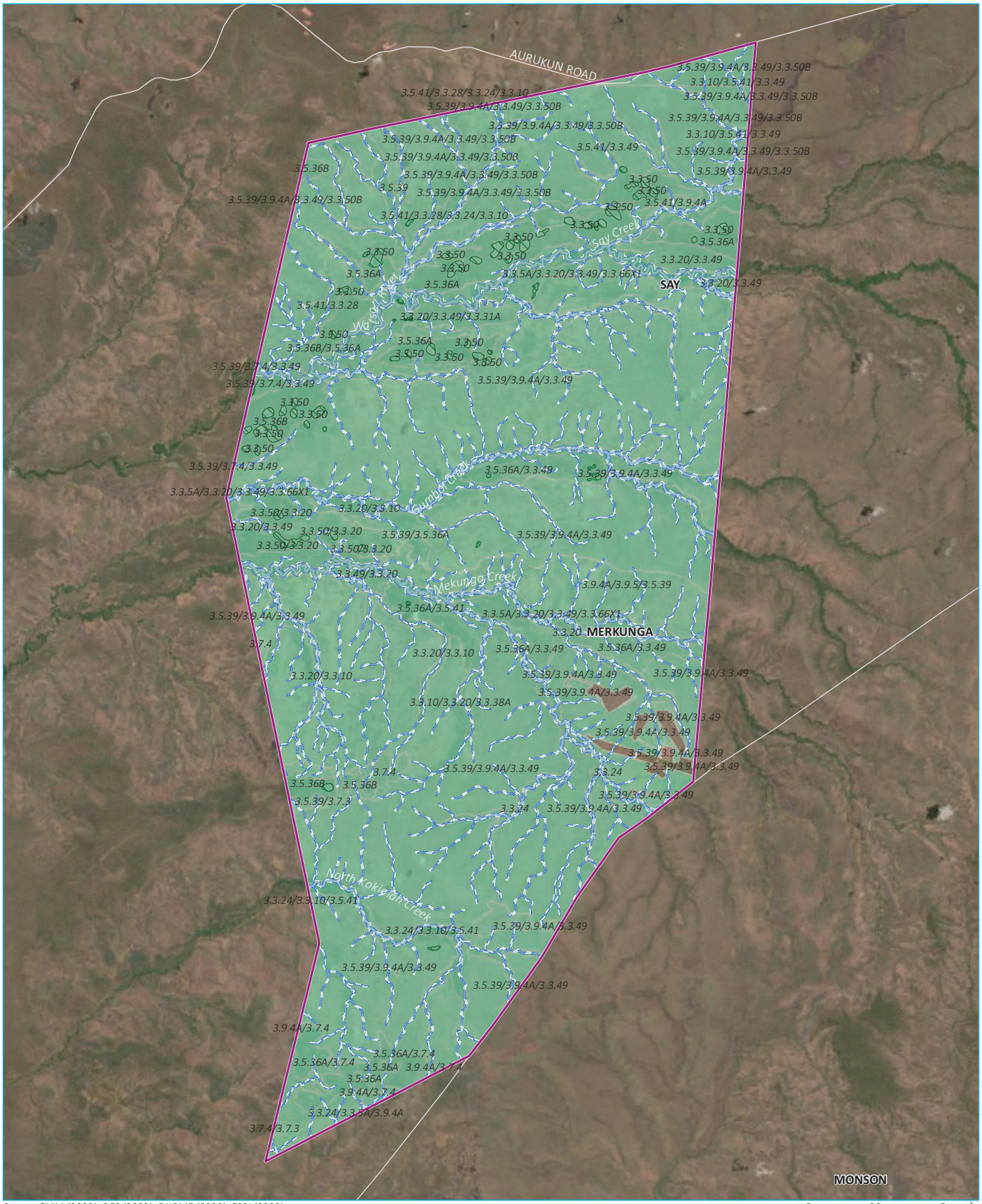
Effective fire management requires an understanding of complex environmental issues, adequate resources, and cooperation between land managers across the north. The problem is not simply one of too much fire, but a failure to manage fire. What data is showing is that in western Cape York frequent, high severity, late in dry season with large spatial coverage are occurring.

Based on advice received from Michael Blackman, experienced in fire management in Cape York to enhance fire management in the offset area, several strategies are proposed, including conducting an aerial incendiary operation about one kilometre parallel to Aurukun Road during July or August, depending on local weather conditions. This should help diminish the spread of subsequent fires and establish pockets of unburnt land for refuge (Blackman 2024). Another management plan is to promote on-ground mosaic burning patterns throughout the offset area by facilitating access and building the capabilities of Traditional Owners to undertake controlled burns. Lastly, promoting riparian vegetation growth involves strategically igniting fires near creek lines to divert fire away from these critical areas (Blackman, 2024).

Three different sectors control most of the lands of the north: conservation, pastoralism and Indigenous land use. The reasons these groups aren't controlling fire as well as they might comes down to a lack of understanding, motivation, cooperation and capacity (P. Olsen and M. Weston 2005).

Unfortunately, very little is known about how frequent and extensive prescribed fire must be to reduce the risk of wildfire, or about the impacts on biodiversity of varying prescribed fire frequencies and sizes. Such uncertainty highlights the need to record actions and then monitor the response of plants and animals. Observations would be fed back to land managers so that practices could be improved. This is called adaptive management or learning by experiment and monitoring.

At Piccaninny Plains Wildlife Sanctuary managed by Australian Wildlife Conservancy, a strategic fire management regime and burn plan has been in place since 2009. The fire management activities in 2022 included a combination of early-dry season burns and 'storm burns' (fires lit in the late dry season after the first rains). The intent being to reduce the extent, frequency, and cumulative area burnt by late-dry-season fires. This active approach to managing fire has seen the total area burnt annually decrease, burns occur in the early-dry-season and the shifts in fire patterns are expected to have positive impacts on biodiversity (AWC 2022).




Source: EMM (2023); DES (2022); DNRME (2023); ESRI (2023)

0 2.5 5 km

GDA 1994 MGA Zone 54

N

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KEY

- Offset area 2
- Minor road
- Watercourse
- Watercourse vegetation
- Vegetation management wetland
- High ecological significance wetand

Regional ecosystems (VM status)

- Remnant - least concern

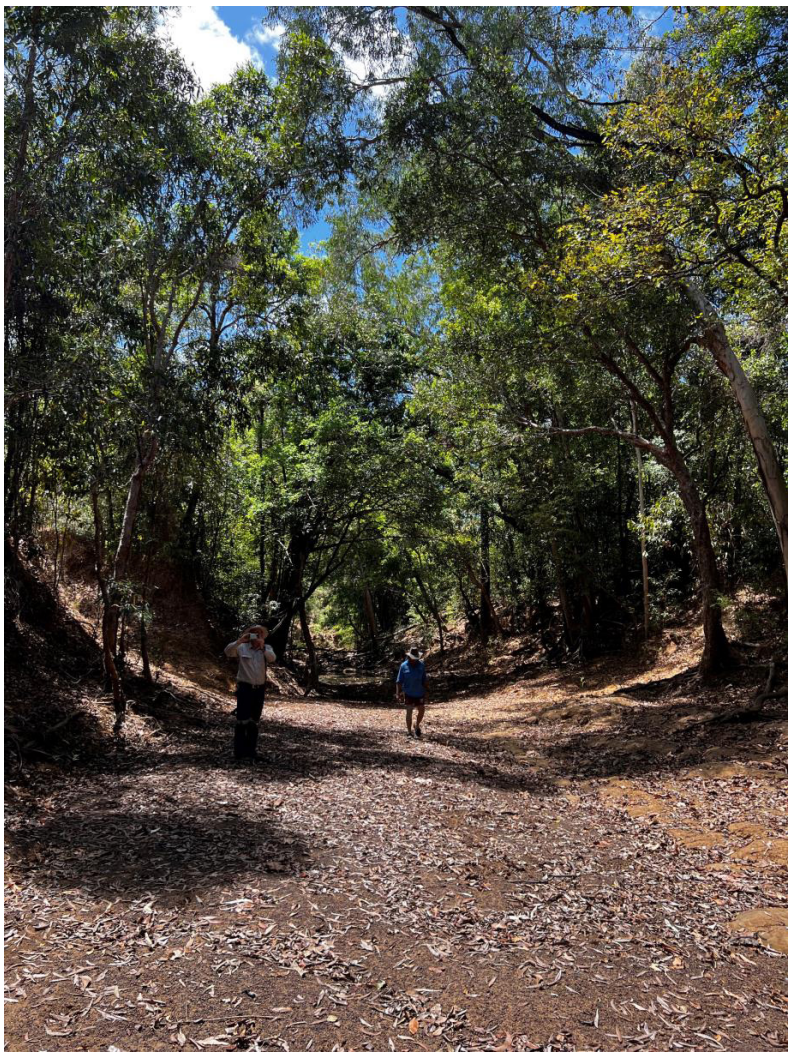
Offset area 2 environmental values

Biodiversity Offset Strategy
Figure 5.4

EMM
creating opportunities

**Photograph 5.1** Representative photo of woodlands

**Photograph 5.2** Watson River where several fruits were found that Palm Cockatoo had been foraging on



**Photograph 5.3 Mekunga Creek**

## 5.2 Legal security

The land on which an environmental offset will be delivered is required to be legally secured. Both the EPBC Act and QEOP require offset areas that are legally secured for at least the duration of the impact and once performance outcomes have been achieved.

Legal security is recognised when one of the following mechanisms are used:

- an environmental offset protection area under section 30 of the *Environmental Offsets Act 2014*
- an area declared as an area of high nature conservation value under section 19F of the *Vegetation Management Act 1999*, where it is secured for the purposes of an offset
- declared as a nature refuge under section 46 of the *Nature Conservation Act 1992*, where it is secured for the purposes of an offset
- declared as a protected area under section 29(1) of the *Nature Conservation Act 1992*, where it is secured for the purposes of an offset

- declared as a special wildlife reserve under section 43D of the *Nature Conservation Act 1992*, where it is secured for the purposes of an offset
- secured as a statutory covenant for environmental purposes under the *Land Act 1994* or *Land Title Act 1994*.

The proponent is committing to as a minimum that a voluntary declaration under the VM Act will be used to declare the offset area of high nature conservation value, and legally secure the offset area on title. It is proposed a voluntary declaration would be in place within 12 months from the date the Offset Area Management Plan (OAMP) being approved. An additional legal mechanism will then be considered such as a nature refuge under NC Act but this needs to be discussed with the landholder and an agreement reached. A nature refuge also requires quite a lengthy timeframe to be put in place whereas a voluntary declaration can be done in a shorter timeframe.

## 5.3 Offset Area Management Plan

The MNES and MSES offset values will be co-located on one offset property. Watercourse vegetation and HEV waters, for example, will be a sub-set of the threatened species habitats. Both administering agencies (DCCEEW and DESI) will be required to sign off on the Offset Area Management Plan (OAMP) that is prepared.

It is proposed the final OAMP is approved post Project approval, and prior to Project commencement. Reasons for this timing is described in Section 5.4, and timing for finalisation of Project offsets are outlined in Section 7.

The intent of the OAMP will be as follows:

- Confirm the presence of each offset value, or high likelihood the species will be present, in the nominated offset area based on field ecology surveys.
- Describe and map the offset areas for each offset value including habitat function.
- Outline and justify starting habitat quality on the impact site and offset site for each offset value.
- Predict future habitat quality for each offset value based on 20 years of active management.
- Set out five yearly milestones for each offset value to demonstrate how final conservation outcomes can be achieved.
- Detail the management actions that will occur, and frequency, to result in habitat quality improvements.
- Outline risks and corrective actions to be implemented.
- Outline monitoring and reporting requirements.

A broad summary of the intended conservation outcomes for each MNES species and management actions is provided in Table 5.3.

### 5.3.1 Predicted conservation outcomes

The following provides information on what the predicted conservation outcomes would be after at least 20 years of active management, should the proposed land-based offset be put in place for the MNES species. The extent of habitat quality gains (i.e. point increases) will depend on the starting condition of the habitat at the offset site, and the management actions implemented to result in an improvement in condition and function of habitat, as well as reduction of threatening processes. The predicted habitat gains for each MNES based on desktop information is set out in Table 6.2. Generally it is predicted a one-point gain would be achieved.

For some MNES species, a two-point gain may be achievable due to the condition thresholds starting lower and, through management, larger improvements can be achieved, such as for Red Goshawk by increasing ground cover, woody debris and species recruitment, maintaining suitable hunting grounds through changed fire management regimes, increasing number of small and medium sized native mammals, increasing number of suitable nesting trees, reduction of non-native cover and increase in canopy cover.

The following Table 5.3 provides information on what those habitat gains would consist of for each MNES.

**Table 5.3 MNES conservation outcomes**

| Species | Proposed management actions | Desired conservation outcomes |
|---|---|---|
| Palm Cockatoo | Implement a suitable **fire management regime** in the offset area that is designed to prevent high intensity bushfires coming through every year in late dry season, and moving to a mosaic of different burn intervals and intensities is proposed. | • Protection of existing hollows suitable for Palm Cockatoo from inappropriate fire regimes including high severity and high interval fires<br>• Increasing number of large trees that will form hollows in the future<br>• Protection of riparian vegetation communities and vine thickets which are refuge for Palm Cockatoo from high severity bushfires<br>• Improve availability of foraging resources for Palm Cockatoo from implementation of cooler mosaic burns<br>• Increase in ground cover, woody debris and species recruitment through changed fire management regimes<br>• Reducing likelihood of late season bushfires occurring by actively managing fuel loads, particularly adjacent to Aurukun Road where many fires start from<br>• Increasing time between burns of habitat patches to allow a mosaic of different burn intervals providing refuge for various fauna species and ensuring foraging resources aren't completely removed from large areas |
| | Implement a **feral animal management** program | • Reduction of feral pig populations<br>• Reduction of feral cat populations<br>• Improvement in habitat quality of ecosystems including watercourses and wetlands |
| | Implement a **weed management** program | • Reduction of non-native plant cover<br>• Reduction in fuel load and likelihood of hot bushfires occurring<br>• Improvement in habitat quality of ecosystems |
| | Manage **land use** | • Manage land use to ensure no damage occurs to creeks, wetlands and open woodlands such as from vehicle use<br>• Restricted access<br>• Restriction on any grazing in future<br>• Reduced likelihood of unplanned fires occurring which includes maintenance of access roads, fire breaks and managing fuel loads in key areas through planned burns<br>• No vegetation clearing unless authorised under OAMP |

**Table 5.3 MNES conservation outcomes**

| Species | Proposed management actions | Desired conservation outcomes |
|---|---|---|
| | Implement a **species monitoring program** | • Improved understanding of the active nest sites of Palm Cockatoo in the offset area so they can be better managed<br>• Increase in Palm Cockatoo populations and breeding pairs utilising the offset area from year 1 to year 20<br>• Improved understanding of species habitat utilisation, species populations and dispersal over life of offset<br>• Improved understanding of species responses to bushfire management regimes |
| Red Goshawk | Implement a suitable **fire management regime** in the offset area that is designed to prevent high intensity bushfires coming through every year in late dry season, and moving to a mosaic of different burn intervals and intensities is proposed. | • Reduced likelihood Red Goshawk will abandon any existing nests by removing or reducing occurrence of hot bushfires<br>• Protection of existing large trees that Red Goshawk may nest in from hot bushfires<br>• Improving native species canopy cover and height through changed fire management regimes<br>• Increasing ground cover, woody debris and species recruitment and maintaining suitable hunting grounds through changed fire management regimes<br>• Increasing number of small and medium sized native mammals<br>• Increase in number of large (20 m) trees from year 1 to year 20 |
| | Implement a **feral animal management** program | • Reduction of feral pig populations<br>• Reduction of feral cat populations<br>• Increase in number of small and medium sized native mammals<br>• Improvement in habitat quality of ecosystems |
| | Implement a **weed management** program | • Reduction of non-native plant cover<br>• Reduction in fuel load and likelihood of hot bushfires occurring<br>• Improvement in habitat quality of ecosystems |
| | Manage **land use** | • Manage land use to ensure no damage occurs to creeks, wetlands and open woodlands such as from vehicle use<br>• Restricted access<br>• Reduced likelihood of unplanned fires occurring<br>• No vegetation clearing unless authorised under OAMP<br>• No or restricted grazing |
| | Implement a **species monitoring program** | • Improved understanding of any active nest sites of Red Goshawk in the offset area so they can be better managed<br>• Improved understanding of species habitat utilisation and dispersal<br>• Demonstrated increase in small and medium sized mammals<br>• Improved understanding of relationship between fire regimes and small and medium sized mammal populations<br>• Improved understanding of species responses to bushfire management regimes |

## Table 5.3 MNES conservation outcomes

| Species | Proposed management actions | Desired conservation outcomes |
|---|---|---|
| Black-footed Tree Rat | Implement a suitable **fire management regime** in the offset area that is designed to prevent high intensity bushfires coming through every year in late dry season, and moving to a mosaic of different burn intervals and intensities is proposed. | • Protection of existing hollows from hot bushfires<br>• Increasing number of large trees that will form hollows in the future<br>• Improve availability of foraging resources for Black-footed Tree Rat from implementation of cooler mosaic burns<br>• Increase in ground cover, woody debris and species recruitment through changed fire management regimes<br>• Reducing likelihood of late season bushfires occurring by actively managing fuel loads, particularly adjacent to Aurukun Road where many fires start from<br>• Increasing time between burns of habitat patches to allow a mosaic of different burn intervals providing refuge for various fauna species and ensuring foraging resources aren't completely removed from large areas |
| | Implement a **feral animal management** program | • Reduction of feral pig populations<br>• Reduction of feral cat populations<br>• Improvement in habitat quality of ecosystems |
| | Implement a **weed management** program | • Reduction of non-native plant cover<br>• Reduction in fuel load and likelihood of hot bushfires occurring<br>• Improvement in habitat quality of ecosystems |
| | Manage **land use** | • Manage land use to ensure no damage occurs to creeks, wetlands and open woodlands such as from vehicle use<br>• Restricted access<br>• Reduced likelihood of unplanned fires occurring<br>• No vegetation clearing unless authorised under OAMP<br>• No or restricted grazing |
| | Implement a **species monitoring program** | • Improved understanding of species habitat utilisation and dispersal<br>• Increase in Black-footed Tree Rat populations utilising the offset area from year 1 to year 20<br>• Improved understanding of species responses to bushfire management regimes |
| Masked Owl | Implement a suitable **fire management regime** in the offset area that is designed to prevent high intensity bushfires coming through every year in late dry season, and moving to a mosaic of different burn intervals and intensities is proposed. | • Protection of existing hollows from hot bushfires<br>• Increasing number of large trees that will form hollows in the future<br>• Increasing number of small and medium sized native mammals<br>• Increase in ground cover, woody debris and species recruitment through changed fire management regimes<br>• Reducing likelihood of late season bushfires occurring by actively managing fuel loads, particularly adjacent to Aurukun Road where many fires start from<br>• Increasing time between burns of habitat patches to allow a mosaic of different burn intervals providing refuge for various fauna species and ensuring foraging resources aren't completely removed from large areas |
| | Implement a **feral animal management** program | • Reduction of feral pig populations<br>• Reduction of feral cat populations<br>• Improvement in habitat quality of ecosystems<br>• Increasing number of small and medium sized native mammals |

**Table 5.3 MNES conservation outcomes**

| Species | Proposed management actions | Desired conservation outcomes |
|---|---|---|
| | Implement a **weed management** program | • Reduction of non-native plant cover<br>• Reduction in fuel load and likelihood of hot bushfires occurring<br>• Improvement in habitat quality of ecosystems |
| | Manage **land use** | • Manage land use to ensure no damage occurs to creeks, wetlands and open woodlands such as from vehicle use<br>• Restricted access<br>• Reduced likelihood of unplanned fires occurring<br>• No vegetation clearing unless authorised under OAMP<br>• No or restricted grazing |
| | Implement a **species monitoring program** | • Targeted surveys over 20 years to detect presence of species.<br>• Confirm any active roost sites<br>• Demonstrated increase in small and medium sized mammals<br>• Improved understanding of relationship between fire regimes and small and medium sized mammal populations<br>• Improved understanding of species responses to bushfire management regimes |

Conservation outcomes sought to be achieved for MSES will be the protection, active management and improvement of habitat quality of watercourse vegetation. Habitat quality gains will be achieved through management actions such as pest animal control, weed control and bushfire management. The prevention of intense and frequent bushfires occurring that can impact on watercourse vegetation and increase sediment runoff into watercourses is a primary objective. Water quality of HEV waters is likely to see improvement as a result of protection of watercourse vegetation to stabilise banks, reduction in feral pigs which will prevent sediment runoff into watercourses, and bushfire management that will retain ground cover and woody vegetation to prevent sediment runoff in wet season.

## 5.4 Constraints for offset assessment

Timing for ecological assessments of the offset area, such as gathering BioCondition data, conducting targeted species surveys and confirming management actions is currently restricted to the dry season. Access is subject to the regions weather conditions and can depend on the severity of the wet season on the Cape York peninsula. Access may only be possible over a six-month period each year. Bushfires also need to be taken into consideration from both a safety perspective for field ecologists, and data gathering point of view, as ecosystems look very different after a fire has gone through an area, and for some species such as Palm Cockatoo, contemporary survey methods cannot be used immediately following fires. It is also preferable that BioCondition data is collected post wet, and prior to bushfires, limiting that survey window even further.

Additional constraints for timing of baseline offset site assessments that need to be highlighted are as follows:

- The offset areas are remote, and access can be limited depending on terrain, availability and condition of access tracks, river height, and safety considerations such as crocodiles.
- There is a lack of available RE benchmarks from the Qld Herbarium for REs in the impact site and offset site. As of 24 April 2024 only nine Cape York REs have benchmarks available. For example, on the impact site, three REs have benchmarks available to use.

- If benchmarks are unavailable or if BioCondition assessments are undertaken when conditions are sub-optimal e.g. during drought or post fire, it is recommended that local reference sites are assessed at the same time, to account for spatial and temporal (seasonal and annual) variability.

- The proponent will need to include time to identify suitable reference sites and collect this benchmark data.

- The size of the offset areas are large and it will take time to complete surveys to inform habitat quality scoring and the OAMP.

# 6 Offset calculators

To support an understanding of where suitable offsets can be found, and the quantum of offset area that may be needed, preliminary MNES offset calculators have been prepared for each MNES in connection with the Impact Area as well as both Offset Area 1 and Offset Area 2. These are summarised in sections below.

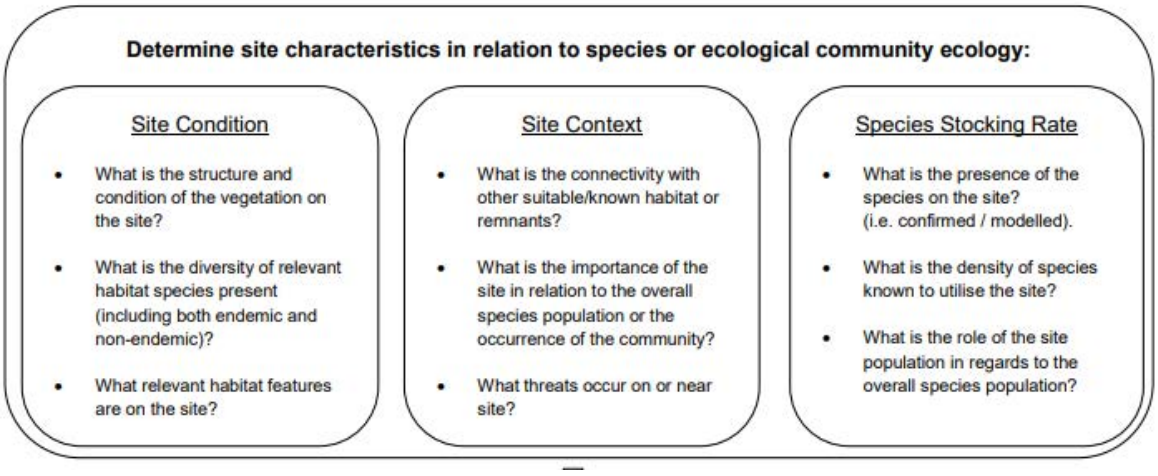
The preliminary calculators have been developed by reference to the EPBC Act *How to use the Offsets Assessment Guide* which is used to assist in determining the suitability of an offset proposal.

The quality score for an area of habitat is a measure of how well a particular site supports a particular threatened species and contributes to its ongoing viability. The habitat quality scoring system involves scores out of 10, whereby a maximum score of 10 represents a fully intact system, scores of 4, 5 and 6 may indicate good quality regrowth or medium value habitat, and a minimum score of 0 would indicate a totally cleared or uninhabitable area.

There are three components that contribute to the calculation of habitat quality:

- site condition
- site context
- species stocking rates.

Key considerations for each component are shown in the figure below; however, the weighting given to each component is dependent on the ecological requirements of the impacted species or ecological community.




In all cases, habitat quality needs to be assessed consistently on both the impact and offset sites. For the purposes of the preliminary calculations the following weighting was adopted:

- site condition (out of 4 points)
- site context (out of 3 points)
- species stocking rates (out of 3 points).

Further habitat quality scoring is proposed to occur on the Impact Area and the selected Offset Area, adopting the methodology for determining habitat quality as outlined in the *Guide to determining terrestrial habitat quality -Methods for assessing habitat quality under the Queensland Environmental Offsets Policy* (v1.3) (DES 2020).

Targeted species surveys, habitat mapping, BioCondition assessments and species attribute scoring for assigned assessment units in accordance with the guide will be completed across the proposed offset area to finalise calculators and the OAMP.

## 6.1 Impact Area

An assessment of habitat quality for each of the MNES species was undertaken for the Impact Area as summarised in Table 6.1 below.

**Table 6.1 Impact Area: Habitat Quality – MNES species**

| Species | Area of habitat impacted (ha) | Habitat quality score | | | | Quantum of impact |
|---|---|---|---|---|---|---|
| | | Total score | Site condition | Site context | Stocking rate | |
| Palm Cockatoo | 8,531.8 | 7/10 | 2/4 | 2/3 | 3/3 | 5,971 |
| Red Goshawk | 8,781 | 7/10 | 2/4 | 2/3 | 3/3 | 6,146 |
| Black-footed Tree-rat | 6,885.1 | 7/10 | 2/4 | 2/3 | 3/3 | 4,819 |
| Masked Owl | 8,781 | 5/10 | 2/4 | 2/3 | 1/3 | 4,390 |

A justification of each of the scores is set out for each species in Appendix D.1.

## 6.2 Offset Areas

An assessment of habitat quality for each of the MNES species was undertaken for each Offset Area. This is primarily a desktop assessment that has informed an estimation of offset area quantum required to meet the minimum percentage of impact offset.

Based on the offset calculator inputs, the required offset areas for each MNES species are summarised below, for both proposed offset areas. The full calculators for each offset area are included in Appendix C and justifications for scoring in Appendix D.2 and D.3.

For MSES assessments, habitat quality is reliant on BioCondition data which hasn't been gathered at this time. Therefore, the maximum ratio of 1:4 has been applied to watercourse vegetation and HEV waters to determine the total offset area that may be required. For watercourse vegetation, this is a total offset area of 447.52 ha and HEV waters 23.04 ha.

**Table 6.2 Offset Areas: preliminary calculation – MNES species**

| Species | Area of impact (ha) | Offset Area | | Habitat quality | | | Risk of Loss | NPV (adj ha) | % offset |
|---|---|---|---|---|---|---|---|---|---|
| | | No. | Area | Start | Future (no offset) | Future (w/offset) | | | |
| Palm Cockatoo | 8,531.8 | #1 | 38,000 | 7 | 6 | 8 | 1% | 6,017 | 100% |
| | | #2 | 38,000 | 7 | 6 | 8 | 1% | 6,018 | 100% |
| Red Goshawk | 8,781 | #1 | 47,500 | 7 | 6 | 8 | 1% | 6,166 | 100% |
| | | #2 | 38,000 | 6 | 5 | 8 | 1% | 6,415 | 104% |

**Table 6.2 Offset Areas: preliminary calculation – MNES species**

| Species | Area of impact (ha) | Offset Area | | Habitat quality | | | Risk of Loss | NPV (adj ha) | % offset |
|---|---|---|---|---|---|---|---|---|---|
| | | No. | Area | Start | Future (no offset) | Future (w/offset) | | | |
| Black-footed Tree-rat | 6,885.1 | #1 | 31,000 | 7 | 6 | 8 | 1% | 4,908 | 102% |
| | | #2 | 24,000 | 5 | 4 | 7 | 1% | 4,923 | 102% |
| Masked Owl | 8,781 | #1 | 28,000 | 5 | 4 | 6 | 1% | 4,390 | 100% |
| | | #2 | 28,000 | 5 | 4 | 6 | 1% | 4,391 | 100% |

## 6.3 Supplementary offset measures

The proponent is investigating the potential to utilise up to 10% of the offset package being a supplementary measure or mix of measures. This may be compensatory measures which are actions that do not directly offset the impacts on the protected matter but are anticipated to lead to benefits for the impacted protected matter.

Assessments and consultation with DCCEEW, DESI, and other key stakeholders will be undertaken to identify if any of those threatened species being offset have a demonstrated lack of understanding on the species, or clear need for additional research. The action/s would be targeted to the species and attribute being impacted, be consistent with available literature and knowledge on the species, and would ensure that it would result in tangible benefits for the species. Information and learnings gained would be published and put in the public domain so others can gain from this information.

Potential areas for supplementary measures are outlined below.

### 6.3.1 Palm Cockatoo

Palm Cockatoo Conservation Advice Statement (TSSC 2015) identifies priority areas of research, including the following:

- Identify appropriate fire management regimes for the species.
- Conduct genetic studies to understand population connectivity across Cape York.
- Identify what woodland habitat traits are required to support successful breeding.
- Develop techniques to characterise the age structure of the subspecies' populations.

There is potential for monitoring and research to be applied on the land-based offset to gain more information about the species, its habitat utilisation, threats, and effectiveness of management measures, including fire management. This could include monitoring impacts of fire on hollow-bearing trees and use of those hollows by Palm Cockatoo.

### 6.3.2 Red Goshawk

The Red Goshawk EPBC Act listing status was recently upgraded from Vulnerable to Endangered, as of March 2023. This was due to finding that the population is estimated to be low (1,340 mature individuals in the wild) with a declining trend (high reliability), and all individuals exist in one subpopulation spread over an extremely large area. There has also been a large contraction of the breeding range since 1980 (DCCEEW 2023).

The revised conservation advice (DCCEEW 2023) now identifies priority areas of research, including the following:

- Characterise habitat critical to the survival of the Red Goshawk, particularly breeding habitat requirements.
- Develop a better understanding of how habitat changes (e.g. through clearing, fire regimes, restoration) and degradation (e.g. through grazing pressure) affect the prey populations (species composition, diversity, and abundance) needed to support Red Goshawks.
- Support Aboriginal communities to research, revive and document (where culturally appropriate) their connections, knowledge and land management practices and stories.

There is potential for research to be undertaken on the land-based offset and impact site to gain more information on the breeding habitat requirements of the species, as well as understanding the effects of habitat changes on prey populations from pressures such as fire and clearing. This could include monitoring of suitable nesting habitat and existing nests, as well as monitoring the population of prey before and after differing fire regimes.

### 6.3.3 Strategic fire management

All of the MNES species required to be offset have potential to be negatively impacted by inappropriate fire regimes. Hot bushfires and too frequent bushfires can destroy existing hollow bearing trees, can prevent tree growth and formation of hollows in future, can kill small mammals which are a food source for Masked Owl and Red Goshawk, and degrade riparian vegetation which is known to be an important refuge and breeding place for these species. Early in the dry season first fires are cooler and patchy, going out in a few hours. As the dry season progresses, fires burn hotter and longer with a build up of fuel load and decline of moisture levels, with late dry season fires sometimes covering thousands of square kilometres (Crowley G.M. 1995). Early fires tend to self-extinguish, but late fires are difficult to contain, and there is general concern that increasing areas of northern Australia are being subjected to annual extensive late dry season fires.

Fire regimes have the potential to be a positive for ecosystems and biodiversity or can be detrimental to ecosystems and biodiversity. Severe fires can open up the rainforests and allow the invasion of grasses and other non-rainforest species. Mild fire regimes permit rainforest species to extend their ranges into eucalypt woodlands. Changes in fire regime over the last century may have caused a thickening-up of the understorey through the woodlands of the Peninsula (Crowley G.M 1995). Animals are also affected by fire. Some will be killed, and others disadvantaged by a fire-altered habitat, but many species require fires of various periodicities to provide their habitats. The responses of individual species are related to their requirement for food, shelter and breeding habitat, and their ability to disperse and establish territories after the disturbance of fire. A diversity of burning histories appears to be the most effective way to conserve the diversity of animal species found on the Peninsula.

Of major concern to most people with an interest in Cape York is the prevalence of widespread late dry season fires (Crowley G.M. 1995).

In northern Australia, fire patterns are strongly influenced by the prevailing monsoonal climate – characterised by a dramatic high-rainfall ‘wet season’ (November–February), followed by a low-rainfall ‘dry season’ over the winter months. The wet season drives rapid growth in the grassy understorey, which subsequently cures, leading to high fuel loads heading into in the dry season. The early dry season is, therefore, a critical time for managing fire in northern Australian savannah ecosystems (AWC 2023).

At the 2022 North Australia Savanna Fire Forum, there was discussion on threats that are occurring to biodiversity from bushfires, particularly those that are occurring in the late dry season. Thousands of hectares are being burnt each year and they are having negative impacts on Cape York's biodiversity. Arson was raised as an issue and a call put out asking for regional collaboration and better responses to fire fighting. Regional collaboration was believed to be key to reducing the impacts of unplanned fires that threaten the Cape's unique ecosystems, critical habitats and local wildlife (https://capeyorkweekly.com.au/collaboration-required-to-reduce-arson-attacks-in-cape-york/1021/).

An animal's response to fire is influenced by its ability to survive the blaze and then subsequently to survive predators and competitors and to find food, shelter and breeding habitat (Andersen 1991; Friend 1993). Animals may persist through a fire by hiding in protected environments, such as tree hollows or soil fissures (Braithwaite 1987; Kerle 1985), or by fleeing to other areas. Tree-dwelling mammals will be most severely affected when canopies are scorched. After a fire, survivors may remain or return, or seek a new home range in unburnt country. It has been argued that the biodiversity of the savannas of northern Australia, and of other Australian ecosystems, will be maintained by using a diversity of fire regimes to maximize habitat heterogeneity (Burbidge 1985; Braithwaite 1991). This is supported by many of the studies cited in this report that show most of the more vulnerable species will be protected by a burning regime which ensures small areas being burnt throughout much of the year in order to create a fine mosaic of vegetation patterns. Mammal diversity was related to habitat diversity at both canopy and ground level (Braithwaite 1994), thus maintenance of habitat diversity with diverse fire regimes appears necessary for maintaining mammal biodiversity (Braithwaite in press 1994).

Of particular concern is the effect of fires on tree hollows used for nesting. The wet eucalypt open forests and woodlands that require hot fires for their maintenance provide nesting habitats for hollow nesting birds including threatened species such as the Red-cheeked Parrot (*Geoffroyus geophroyi aruensis*), the Eclectus Parrot (*Eclectus roratus macgillivrayi*), the Palm Cockatoo (*Probosciger aterrimus aterrimus*), the Masked Owl (*Tyto novaehollandiae kimberli meesi*) and the Rufous Owl (*Ninox rufa*) (Garnett 1992). On the one hand, fires may be required to allow the formation of hollows (Braithwaite et al. 1985; Perry et al. 1985; Inions et al. 1989; Garnett and Loyn in press) on the other, fires have been recorded destroying nests and young as well as nesting trees (Young 1991). Where the area burnt is large and the intervals between fires is great, this may lead to a decline in abundance of hollow-bearing trees (Lindenmayer et al. 1990). Proposals to minimise damage to tree hollows and their occupants are to burn such areas only when fuel moisture is high (Stanton 1991) and to burn away litter from known or significant nesting trees early in the dry season (Roberts 1994). These recommendations would also apply to the vulnerable Red Goshawk whose nesting trees on the edge of riparian rainforests are sometimes destroyed by late dry season fires.

There is potential for Glencore as the proponent to work closely with Traditional Owners in their Project region, and other stakeholders to progress strategic planning, improve fire response, and implement best practice bushfire management to deliver conservation outcomes for the target MNES values.

Wildfires are an inevitable occurrence; they are part of the Northern Australia fire landscape, but a fire regime of mosaic or continuous burning throughout the fire season should result in 'filtered wildfire' where late season wildfires cannot develop large fronts due to the smaller patch burns throughout the landscape. A fire regime where approximately 30–50% of an estate is burnt in any given year is a desired outcome. A figure of 70% burnt in any year *including wildfire* should be considered the maximum limit (Blackman 2024). Refer to Appendix G for further information on bushfire history in the region.

The Australian Wildlife Conservancy (AWC) carry out Australia's largest non-government prescribed burning program which has reduced destructive wildfire by 50% across their northern sanctuaries. The extent of wildfire has been reduced by 64% on Piccaninny Plains Wildlife Sanctuary in Cape York, which is confirmed to support Red Goshawk and Black-footed Tree Rat. This is an example of what could be achieved on the offset site for the Bauxite Mine project if active fire management and prescribed burning is implemented. In the early dry season, vegetation is green and retains a lot of moisture, so fires at this time tend to burn at relatively low intensity and tend not to cover vast areas. Burns are implemented in such a way to create a pattern of fire breaks, and to reduce the fuel load across the landscape. The effect is to limit the spread of destructive late dry season wildfires, and, crucially, to maintain patches of old-growth (or 'long-unburned') vegetation in the landscape, which provide shelter and food for wildlife (AWC 2023 -https://www.australianwildlife.org/where-we-work/piccaninny-plains/).

For the offset, a fire regime that is tailored to the ecosystems and threatened species being offset will be required, in particular to maximise the retention of hollow-bearing trees, ability to develop new hollows, to maintain availability of foraging resources and provide refuge in bushfire events.

The Cape York Peninsula Sustainable Fire Project has been successful at convincing increasing numbers of landholders to undertake preventive fire management, assisting them with the information, skills and resources to do so.

# 7 Timing of next actions

The following Table 7.1 provides a summary of remaining actions to finalise the required biodiversity offsets, and timing of those actions in relation to Project approvals and commencement.

**Table 7.1 Schedule to finalise project offsets**

| Biodiversity offset action | Description | Timing |
|---|---|---|
| Landholder and stakeholder engagement | Progress landholder discussions on the two potential offset areas regarding the provision of offset areas and commercial arrangements.<br>This may include discussion on land management, legal security and compensation.<br>Progress consultation with government agencies to discuss suitable offset delivery approaches. | Prior to Project approval |
| Field assessments of preferred Offset Area 1 | Field surveys will commence in dry season of 2024. These surveys will include:<br>• ground-truthing regional ecosystems<br>• BioCondition transects<br>• targeted fauna surveys including looking for evidence of their presence<br>• Habitat assessments including confirmation of hollow bearing trees, looking for Red Goshawk nests etc.<br>• MNES species habitat mapping.<br>During these surveys, additional information will also be gathered including:<br>• habitat attributes and foraging resources present<br>• fire history<br>• assess for threats such as weeds and feral animals<br>• access tracks and fire breaks<br>• land management practices such as grazing, fire, recreational activities.<br>The proponent may not be able to gather all information required in the dry season of 2024 to complete the habitat quality scoring for the impact and offset areas. It will depend on how long access is available, bushfires and progress of surveys. | Prior to Project approval |
| Establish RE benchmarks | • It is proposed some RE benchmarks will be collected in dry season of 2024.<br>• Priority will be for the impact area RE's.<br>• Consultation will occur with the Qld Herbarium on suitable locations for reference sites.<br>• Depending on timing it may not be possible for all RE reference sites to be completed, and may extend into 2025 | |
| Impact area<br>Habitat Quality assessments | • BioCondition transects have been completed for the impact footprint<br>• Reference sites need to be completed in dry season of 2024 to provide benchmarks for all impacted REs<br>• Habitat quality scoring can't be completed until those benchmarks are gathered.<br>• Complete HQ assessments across the impact areas applying the Queensland Guide to determining terrestrial habitat quality: A toolkit for assessing land based offsets under the Queensland Environmental Offsets Policy. | Prior to Project approval |

## Table 7.1 Schedule to finalise project offsets

| Biodiversity offset action | Description | Timing |
|---|---|---|
| Offset Area<br>Habitat Quality Assessments | Complete HQ assessments across the proposed offset area applying the Queensland Guide to determining terrestrial habitat quality: A toolkit for assessing land based offsets under the Queensland Environmental Offsets Policy.<br>Seek to undertake BioCondition transects at similar seasonal times on impact site and offset site to improve comparison. Post wet is required as it has highest likelihood for improved condition such as ground cover and species diversity. However, conditions can change quite a lot between wet and dry seasons or post fire. Seek feedback from DCCEEW on scoring before finalisation and Qld Herbarium on setting suitable benchmarks for REs. Benchmarks will need to be obtained by the proponent for some REs. | Post approval |
| Finalise offset calculators and offset package | Based on HQ scores, finalise calculators for each MNES and MSES to confirm offset area needed.<br>The proponent would also determine at this time if any supplementary measures were to be included in the offset package and further details as to what that was. | Post approval |
| Finalise Offset Area Management Plan (OAMP) | Finalise an Offset Area Management Plan that details the specific management and monitoring measures to be carried out over life of the Project. OAMP will meet conditions of approval.<br>Further field assessments of the offset will be conducted to inform the management plan to finalise management actions and performance outcomes.<br>OAMP must be approved prior to Project commencement. | Post Project approval<br>**DCCEEW approval of OAMP prior to Project commencement** |
| Prepare Offset Delivery Plan | Prepare Offset Delivery Plan for MSES values.<br>Offset Delivery Plan must be approved prior to Project commencement. | Post Project approval<br>**DESI approval prior to Project commencement** |
| Legally secure offset | Prepare documentation to legally secure offset area/s and have registered | 12 months from Project commencement |
| Active management and monitoring of offset | Commence the identified management measures in the approved OAMP.<br>Management will occur for specified duration in the OAMP. It will be for a minimum of 20 years and likely for duration of Project if >20 years. | Post approval of OAMP |

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# Appendix A
## Database searches for Offset Area 1

EMM
creating opportunities

# 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: 14-Mar-2023

# 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: | None |
| Listed Threatened Species: | 19 |
| Listed Migratory Species: | 19 |

## 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: | 24 |
| 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: | None |
| Regional Forest Agreements: | None |
| Nationally Important Wetlands: | 1 |
| EPBC Act Referrals: | 4 |
| 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 Species | | [ Resource Information ] |
|---|---|---|
| Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.<br>Number is the current name ID. | | |
| Scientific Name | Threatened Category | Presence Text |
| BIRD | | |
| Calidris canutus | | |
| Red Knot, Knot [855] | Endangered | Species or species habitat may occur within area |
| Calidris ferruginea | | |
| Curlew Sandpiper [856] | Critically Endangered | Species or species habitat likely to occur within area |
| Charadrius leschenaultii | | |
| Greater Sand Plover, Large Sand Plover [877] | Vulnerable | Species or species habitat may occur within area |
| Erythrotriorchis radiatus | | |
| Red Goshawk [942] | Vulnerable | Species or species habitat likely to occur within area |
| Limosa lapponica baueri | | |
| Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit [86380] | Vulnerable | Species or species habitat may occur within area |
| Neochmia phaeton evangelinae | | |
| Crimson Finch (white-bellied), White-bellied Crimson Finch [64443] | Endangered | Species or species habitat may occur within area |
| Numenius madagascariensis | | |
| Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat likely to occur within area |
| Probosciger aterrimus macgillivrayi | | |
| Palm Cockatoo (Australian) [67033] | Vulnerable | Species or species habitat likely to occur within area |

| Scientific Name | Threatened Category | Presence Text |
|---|---|---|
| [Rostratula australis](#)<br>Australian Painted Snipe [77037] | Endangered | Species or species habitat may occur within area |
| [Tyto novaehollandiae kimberli](#)<br>Masked Owl (northern) [26048] | Vulnerable | Species or species habitat may occur within area |
| MAMMAL | | |
| [Dasyurus hallucatus](#)<br>Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331] | Endangered | Species or species habitat may occur within area |
| [Macroderma gigas](#)<br>Ghost Bat [174] | Vulnerable | Species or species habitat may occur within area |
| [Mesembriomys gouldii rattoides](#)<br>Black-footed Tree-rat (north Queensland), Shaggy Rabbit-rat [87620] | Vulnerable | Species or species habitat may occur within area |
| [Saccolaimus saccolaimus nudicluniatus](#)<br>Bare-rumped Sheath-tailed Bat, Bare-rumped Sheathtail Bat [66889] | Vulnerable | Species or species habitat may occur within area |
| [Xeromys myoides](#)<br>Water Mouse, False Water Rat, Yirrkoo [66] | Vulnerable | Species or species habitat likely to occur within area |
| PLANT | | |
| [Dendrobium bigibbum](#)<br>Cooktown Orchid [10306] | Vulnerable | Species or species habitat likely to occur within area |
| [Vappodes phalaenopsis](#)<br>Cooktown Orchid [78894] | Vulnerable | Species or species habitat likely to occur within area |
| REPTILE | | |
| [Egernia rugosa](#)<br>Yakka Skink [1420] | Vulnerable | Species or species habitat may occur within area |
| SHARK | | |

| Scientific Name | Threatened Category | Presence Text |
|---|---|---|
| Pristis pristis<br>Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756] | Vulnerable | Species or species habitat may occur within area |

## Listed Migratory Species [ Resource Information ]

| Scientific Name | Threatened Category | Presence Text |
|---|---|---|
| **Migratory Marine Birds** | | |
| Apus pacificus<br>Fork-tailed Swift [678] | | Species or species habitat likely to occur within area |
| **Migratory Marine Species** | | |
| Crocodylus porosus<br>Salt-water Crocodile, Estuarine Crocodile [1774] | | Species or species habitat likely to occur within area |
| Pristis pristis<br>Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756] | Vulnerable | Species or species habitat may occur within area |
| **Migratory Terrestrial Species** | | |
| Cecropis daurica<br>Red-rumped Swallow [80610] | | Species or species habitat may occur within area |
| Cuculus optatus<br>Oriental Cuckoo, Horsfield's Cuckoo [86651] | | Species or species habitat may occur within area |
| Hirundo rustica<br>Barn Swallow [662] | | Species or species habitat may occur within area |
| Myiagra cyanoleuca<br>Satin Flycatcher [612] | | Species or species habitat known to occur within area |
| Rhipidura rufifrons<br>Rufous Fantail [592] | | Species or species habitat may occur within area |
| Symposiachrus trivirgatus as Monarcha trivirgatus<br>Spectacled Monarch [83946] | | Species or species habitat may occur within area |
| **Migratory Wetlands Species** | | |

| Scientific Name | Threatened Category | Presence Text |
| --- | --- | --- |
| Actitis hypoleucos<br>Common Sandpiper [59309] | | Species or species habitat likely to occur within area |
| Calidris acuminata<br>Sharp-tailed Sandpiper [874] | | Species or species habitat may occur within area |
| Calidris canutus<br>Red Knot, Knot [855] | Endangered | Species or species habitat may occur within area |
| Calidris ferruginea<br>Curlew Sandpiper [856] | Critically Endangered | Species or species habitat likely to occur within area |
| Calidris melanotos<br>Pectoral Sandpiper [858] | | Species or species habitat may occur within area |
| Charadrius leschenaultii<br>Greater Sand Plover, Large Sand Plover [877] | Vulnerable | Species or species habitat may occur within area |
| Gallinago hardwickii<br>Latham's Snipe, Japanese Snipe [863] | | Species or species habitat may occur within area |
| Limosa lapponica<br>Bar-tailed Godwit [844] | | Species or species habitat may occur within area |
| Numenius madagascariensis<br>Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat likely to occur within area |
| Tringa nebularia<br>Common Greenshank, Greenshank [832] | | Species or species habitat likely to occur within area |

## Other Matters Protected by the EPBC Act

| Listed Marine Species | | [ Resource Information ] |
|---|---|---|
| Scientific Name | Threatened Category | Presence Text |
| Bird | | |
| Actitis hypoleucos<br>Common Sandpiper [59309] | | Species or species habitat likely to occur within area |
| Anseranas semipalmata<br>Magpie Goose [978] | | Species or species habitat may occur within area overfly marine area |
| Apus pacificus<br>Fork-tailed Swift [678] | | Species or species habitat likely to occur within area overfly marine area |
| Bubulcus ibis as Ardea ibis<br>Cattle Egret [66521] | | Species or species habitat may occur within area overfly marine area |
| Calidris acuminata<br>Sharp-tailed Sandpiper [874] | | Species or species habitat may occur within area |
| Calidris canutus<br>Red Knot, Knot [855] | Endangered | Species or species habitat may occur within area overfly marine area |
| Calidris ferruginea<br>Curlew Sandpiper [856] | Critically Endangered | Species or species habitat likely to occur within area overfly marine area |
| Calidris melanotos<br>Pectoral Sandpiper [858] | | Species or species habitat may occur within area overfly marine area |

| Scientific Name | Threatened Category | Presence Text |
| --- | --- | --- |
| Cecropis daurica as Hirundo daurica | | |
| Red-rumped Swallow [80610] | | Species or species habitat may occur within area overfly marine area |
| Chalcites osculans as Chrysococcyx osculans | | |
| Black-eared Cuckoo [83425] | | Species or species habitat may occur within area overfly marine area |
| Charadrius leschenaultii | | |
| Greater Sand Plover, Large Sand Plover [877] | Vulnerable | Species or species habitat may occur within area |
| Gallinago hardwickii | | |
| Latham's Snipe, Japanese Snipe [863] | | Species or species habitat may occur within area overfly marine area |
| Haliaeetus leucogaster | | |
| White-bellied Sea-Eagle [943] | | Species or species habitat likely to occur within area |
| Hirundo rustica | | |
| Barn Swallow [662] | | Species or species habitat may occur within area overfly marine area |
| Limosa lapponica | | |
| Bar-tailed Godwit [844] | | Species or species habitat may occur within area |
| Merops ornatus | | |
| Rainbow Bee-eater [670] | | Species or species habitat may occur within area overfly marine area |
| Myiagra cyanoleuca | | |
| Satin Flycatcher [612] | | Species or species habitat known to occur within area overfly marine area |
| Numenius madagascariensis | | |
| Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat likely to occur within area |

| Scientific Name | Threatened Category | Presence Text |
|---|---|---|
| Rhipidura rufifrons | | |
| Rufous Fantail [592] | | Species or species habitat may occur within area overfly marine area |
| Rostratula australis as Rostratula benghalensis (sensu lato) | | |
| Australian Painted Snipe [77037] | Endangered | Species or species habitat may occur within area overfly marine area |
| Symposiachrus trivirgatus as Monarcha trivirgatus | | |
| Spectacled Monarch [83946] | | Species or species habitat may occur within area overfly marine area |
| Tringa nebularia | | |
| Common Greenshank, Greenshank [832] | | Species or species habitat likely to occur within area overfly marine area |
| Reptile | | |
| Crocodylus johnstoni | | |
| Freshwater Crocodile, Johnston's Crocodile, Johnstone's Crocodile [1773] | | Species or species habitat may occur within area |
| Crocodylus porosus | | |
| Salt-water Crocodile, Estuarine Crocodile [1774] | | Species or species habitat likely to occur within area |

## Extra Information

### Nationally Important Wetlands [ Resource Information ]

| Wetland Name | State |
|---|---|
| Archer Bay Aggregation | QLD |

### EPBC Act Referrals [ Resource Information ]

| Title of referral | Reference | Referral Outcome | Assessment Status |
|---|---|---|---|
| Controlled action | | | |
| Aurukun Bauxite Mine Project | 2007/3764 | Controlled Action | Completed |
| Aurukun Bauxite Project | 2020/8624 | Controlled Action | Assessment Approach |
| South of the Embley Bauxite Mine Extension, including Construction of Port and Infrastructure | 2008/4435 | Controlled Action | Completed |

| Title of referral | Reference | Referral Outcome | Assessment Status |
|---|---|---|---|
| Controlled action | | | |
| South of the Embley Bauxite Mining Project | 2010/5642 | Controlled Action | Post-Approval |

# 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 are 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

## 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

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

## 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
- 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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# Vegetation management report

For Lot: 211 Plan: SP241404

08/03/2023

Queensland Government

This publication has been compiled by Operations Support, Department of Resources.



# Recent changes

Updated mapping

Updated vegetation mapping was released on 8 September 2022 and includes the most recent Queensland Herbarium scientific updates to the Regulated Vegetation Management Map, regional ecosystems, wetland, high-value regrowth and essential habitat mapping.

The Department of Environment and Science have also updated their protected plant and koala protection mapping to align with the Queensland Herbarium scientific updates.

# Overview

Based on the lot on plan details you have supplied, this report provides the following detailed information:

***Property details*** - information about the specified Lot on Plan, lot size, local government area, bioregion(s), subregion(s) and catchment(s);

***Vegetation management framework*** - an explanation of the application of the framework and contact details for the Department of Resources who administer the framework;

***Vegetation management framework details for the specified Lot on Plan*** including:

- the vegetation management categories on the property;
- the vegetation management regional ecosystems on the property;
- vegetation management watercourses or drainage features on the property;
- vegetation management wetlands on the property;
- vegetation management essential habitat on the property;
- whether any area management plans are associated with the property;
- whether the property is coastal or non-coastal; and
- whether the property is mapped as Agricultural Land Class A or B;

***Protected plant framework*** - an explanation of the application of the framework and contact details for the Department of Environment and Science who administer the framework, including:

- high risk areas on the protected plant flora survey trigger map for the property;

***Koala protection framework*** - an explanation of the application of the framework and contact details for the Department of Environment and Science who administer the framework; and

***Koala protection framework details for the specified Lot on Plan*** including:

- the koala district the property is located in;
- koala priority areas on the property;
- core and locally refined koala habitat areas on the property;
- whether the lot is located in an identified koala broad-hectare area; and
- koala habitat regional ecosystems on the property for core koala habitat areas.

This information will assist you to determine your options for managing vegetation under:

**-** the vegetation management framework, which may include:

- exempt clearing work;
- accepted development vegetation clearing code;
- an area management plan;
- a development approval;

**-** the protected plant framework, which may include:

- the need to undertake a flora survey;
- exempt clearing;
- a protected plant clearing permit;

**-** the koala protection framework, which may include:

- exempted development;
- a development approval;
- the need to undertake clearing sequentially and in the presence of a koala spotter.

# Other laws

The clearing of native vegetation is regulated by both Queensland and Australian legislation, and some local governments also regulate native vegetation clearing. You may need to obtain an approval or permit under another Act, such as the Commonwealth Government's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Section 8 of this guide provides contact details of other agencies you should confirm requirements with, before commencing vegetation clearing.

# Table of Contents

# 1. Property details

## 1.1 Tenure and title area

All of the lot, plan, tenure and title area information associated with property Lot: 211 Plan: SP241404, are listed in Table 1.

**Table 1: Lot, plan, tenure and title area information for the property**

| Lot | Plan | Tenure | Property title area (sq metres) |
|---|---|---|---|
| 211 | SP241404 | Freehold | 7,064,000,000.0 |
| BR | SP331541 | Easement | 186 |

The tenure of the land may affect whether clearing is considered exempt clearing work or may be carried out under an accepted development vegetation clearing code.

**Does this property have a freehold tenure and is in the Wet Tropics of Queensland World Heritage Area?**

No, this property is not located in the Wet Tropics of Queensland World Heritage Area.

## 1.2 Property location

Table 2 provides a summary of the locations for property Lot: 211 Plan: SP241404, in relation to natural and administrative boundaries.

**Table 2: Property location details**

| Local Government(s) |
|---|
| Aurukun Shire |

| Bioregion(s) | Subregion(s) |
|---|---|
| Cape York Peninsula | Northern Holroyd Plain |
| Cape York Peninsula | Coastal Plains |
| Cape York Peninsula | Weipa Plateau |

| Catchment(s) |
|---|
| Holroyd |
| Archer |
| Watson |
| Embley |
| Arafura Sea |

# 2. Vegetation management framework (administered by the Department of Resources)

The *Vegetation Management Act 1999* (VMA), the Vegetation Management Regulation 2012, the *Planning Act 2016* and the Planning Regulation 2017, in conjunction with associated policies and codes, form the Vegetation Management Framework.

The VMA does not apply to all land tenures or vegetation types. State forests, national parks, forest reserves and some tenures under the *Forestry Act 1959* and *Nature Conservation Act 1992* are not regulated by the VMA. Managing or clearing vegetation on these tenures may require approvals under these laws.

The following native vegetation is not regulated under the VMA but may require permit(s) under other laws:

- grass or non-woody herbage;
- a plant within a grassland regional ecosystem prescribed under Schedule 5 of the Vegetation Management Regulation 2012; and
- a mangrove.

## 2.1 Exempt clearing work

Exempt clearing work is an activity for which you do not need to notify the Department of Resources or obtain an approval under the vegetation management framework. Exempt clearing work was previously known as exemptions.

In areas that are mapped as Category X (white in colour) on the regulated vegetation management map (see section 4.1), and where the land tenure is freehold, indigenous land and leasehold land for agriculture and grazing purposes, the clearing of vegetation is considered exempt clearing work and does not require notification or development approval under the vegetation management framework. For all other land tenures, contact the Department of Resources before commencing clearing to ensure that the proposed activity is exempt clearing work.

A range of routine property management activities are considered exempt clearing work. A list of exempt clearing work is available at
https://www.qld.gov.au/environment/land/management/vegetation/clearing-approvals/exemptions.

Exempt clearing work may be affected if the proposed clearing area is subject to development approval conditions, a covenant, an environmental offset, an exchange area, a restoration notice, or an area mapped as Category A. Exempt clearing work may require approval under other Commonwealth, State or Local Government laws, or local government planning schemes. Contact the Department of Resources prior to clearing in any of these areas.

## 2.2 Accepted development vegetation clearing codes

Some clearing activities can be undertaken under an accepted development vegetation clearing code. The codes can be downloaded at
https://www.qld.gov.au/environment/land/management/vegetation/clearing-approvals/codes

If you intend to clear vegetation under an accepted development vegetation clearing code, you must notify the Department of Resources before commencing. The information in this report will assist you to complete the online notification form.

You can complete the online form at
https://apps.dnrm.qld.gov.au/vegetation/

## 2.3 Area management plans

Area Management Plans (AMP) provide an alternative approval system for vegetation clearing under the vegetation management framework. They list the purposes and clearing conditions that have been approved for the areas covered by the plan. It is not necessary to use an AMP, even when an AMP applies to your property.

On 8 March 2020, AMPs ended for fodder harvesting, managing thickened vegetation and managing encroachment. New notifications cannot be made for these AMPs. You will need to consider options for fodder harvesting, managing thickened vegetation or encroachment under a relevant accepted development vegetation clearing code or apply for a development approval.

New notifications can be made for all other AMPs. These will continue to apply until their nominated end date.

If an Area Management Plan applies to your property for which you can make a new notification, it will be listed in Section 3.6 of this report. Before clearing under one of these AMPs, you must first notify the Department of Resources and then follow the conditions and requirements listed in the AMP.
https://www.qld.gov.au/environment/land/management/vegetation/clearing-approvals/area-management-plans

## 2.4 Development approvals

If under the vegetation management framework your proposed clearing is not exempt clearing work, or is not permitted under an accepted development vegetation clearing code, or an AMP, you may be able to apply for a development approval. Information on how to apply for a development approval is available at
https://www.qld.gov.au/environment/land/management/vegetation/clearing-approvals/development

## 2.5. Contact information for the Department of Resources

For further information on the vegetation management framework:
**Phone** 135VEG (135 834)
**Email** vegetation@resources.qld.gov.au
**Visit** https://www.resources.qld.gov.au/?contact=vegetation to submit an online enquiry.

# 3. Vegetation management framework for Lot: 211 Plan: SP241404

## 3.1 Vegetation categories

The vegetation categories on your property are shown on the regulated vegetation management map in section 4.1 of this report. A summary of vegetation categories on the subject lot are listed in Table 3. Descriptions for these categories are shown in Table 4.

**Table 3: Vegetation categories for subject property. Total area: 706210.79ha**

| Vegetation category | Area (ha) |
|---|---|
| Category B | 705775.4 |
| Category Water | 349.7 |
| Category X | 85.7 |

**Table 4: Description of vegetation categories**

| Category | Colour on Map | Description | Requirements / options under the vegetation management framework |
|---|---|---|---|
| A | red | Compliance areas, environmental offset areas and voluntary declaration areas | Special conditions apply to Category A areas. Before clearing, contact the Department of Resources to confirm any requirements in a Category A area. |
| B | dark blue | Remnant vegetation areas | Exempt clearing work, or notification and compliance with accepted development vegetation clearing codes, area management plans or development approval. |
| C | light blue | High-value regrowth areas | Exempt clearing work, or notification and compliance with managing Category C regrowth vegetation accepted development vegetation clearing code. |
| R | yellow | Regrowth within 50m of a watercourse or drainage feature in the Great Barrier Reef catchment areas | Exempt clearing work, or notification and compliance with managing Category R regrowth accepted development vegetation clearing code or area management plans. |
| X | white | Clearing on freehold land, indigenous land and leasehold land for agriculture and grazing purposes is considered exempt clearing work under the vegetation management framework. Contact the Department of Resources to clarify whether a development approval is required for other State land tenures. | No permit or notification required on freehold land, indigenous land and leasehold land for agriculture and grazing. A development approval may be required for some State land tenures. |

**Property Map of Assessable Vegetation (PMAV)**

There is no Property Map of Assessable Vegetation (PMAV) present on this property.

## 3.2 Regional ecosystems

The endangered, of concern and least concern regional ecosystems on your property are shown on the vegetation management supporting map in section 4.2 and are listed in Table 5.

A description of regional ecosystems can be accessed online at https://www.qld.gov.au/environment/plants-animals/plants/ecosystems/descriptions/

**Table 5: Regional ecosystems present on subject property**

| Regional Ecosystem | VMA Status | Category | Area (Ha) | Short Description | Structure Category |
|---|---|---|---|---|---|
| 3.1.1 | Least concern | B | 2,079.16 | Rhizophora stylosa and/or Bruguiera spp. closed forest | Dense |
| 3.1.2 | Least concern | B | 1,567.81 | Avicennia marina low open forest | Mid-dense |
| 3.1.3 | Least concern | B | 2,010.55 | Ceriops tagal and/or C. australis +/- Avicennia marina low open forest | Mid-dense |
| 3.1.4 | Of concern | B | 35.39 | Excoecaria agallocha +/- Aegiceras corniculatum low open forest | Mid-dense |
| 3.1.5 | Least concern | B | 5,371.46 | Sporobolus virginicus closed tussock grassland on coastal plains | Grassland Sch 4 |
| 3.1.6 | Least concern | B | 9,337.27 | Sparse herbland or bare saltpans on salt plains and saline flats | None |
| 3.1.7 | Of concern | B | 1,447.58 | Intermittent dry season saltflats and wet season freshwater swamps. | Grassland Sch 5 |
| 3.10.6 | Least concern | B | 3.63 | Eucalyptus tetrodonta +/- Corymbia stockeri subsp. stockeri woodland on sandstone plateaus | Sparse |
| 3.12.4 | Of concern | B | 1.62 | Notophyll vine forest of Welchiodendron longivalve and Acacia polystachya on low hills and rises on igneous hills | Dense |
| 3.2.10 | Least concern | B | 619.85 | Eucalyptus tetrodonta and Corymbia clarksoniana +/- E. brassiana or Erythrophleum chlorostachys woodland on stabilised dunes | Sparse |
| 3.2.2 | Least concern | B | 12,344.20 | Semi-deciduous vine thicket to vine forest on beach dunes and ridges | Dense |
| 3.2.24 | Least concern | B | 1,602.73 | Mixed open tussock grassland and open forblands or shrublands on exposed foredunes and islands | Sparse |
| 3.2.27 | Least concern | B | 9,218.63 | Sedgelands fringing perennial lakes in coastal dunefields | Other |
| 3.2.3 | Least concern | B | 10,556.70 | Melaleuca dealbata or Lophostemon suaveolens open forest in dune swales | Mid-dense |
| 3.2.4 | Of concern | B | 738.23 | Melaleuca spp. open forest in dune swales and swampy areas | Mid-dense |
| 3.2.5 | Least concern | B | 3,082.46 | Acacia crassicarpa on coastal dunes and beach ridges, woodland to open forest | Sparse |
| 3.2.6 | Of concern | B | 308.92 | Casuarina equisetifolia woodland to open forest on foredunes on mainland and islands | Sparse |
| 3.2.7 | Least concern | B | 1,892.65 | Corymbia novoguinensis and/or C. clarksoniana woodland in coastal areas | Sparse |

| Regional Ecosystem | VMA Status | Category | Area (Ha) | Short Description | Structure Category |
|---|---|---|---|---|---|
| 3.3.10 | Least concern | B | 3,635.40 | Melaleuca fluviatilis and/or Melaleuca argentea woodland or M. saligna or M. dealbata woodland fringing watercourses | Mid-dense |
| 3.3.16 | Least concern | B | 758.62 | Eucalyptus chlorophylla +/- Corymbia clarksoniana woodland on alluvial plains | Sparse |
| 3.3.20 | Least concern | B | 56,324.67 | Corymbia clarksoniana or C. novoguinensis woodland on alluvial plains | Sparse |
| 3.3.24 | Least concern | B | 1,547.67 | Eucalyptus leptophleba +/- Erythrophleum chlorostachys woodland on riverine levees and alluvial plains | Sparse |
| 3.3.31 | Least concern | B | 5.06 | Eucalyptus tetrodonta +/- Corymbia spp. woodland on coastal plains | Sparse |
| 3.3.34 | Of concern | B | 69.06 | Corypha utan open woodland on alluvial plains | Very sparse |
| 3.3.37 | Least concern | B | 2,486.16 | Eucalyptus microtheca +/- Corymbia papuana open woodland on floodplains | Very sparse |
| 3.3.38 | Least concern | B | 1,010.88 | Deciduous notophyll and/or microphyll vine thicket +/- Lagerstroemia archeriana on heavy clay alluvium | Dense |
| 3.3.47 | Least concern | B | 72.00 | Melaleuca citrolens +/- M. foliolosa low open woodland along drainage lines | Very sparse |
| 3.3.49 | Least concern | B | 35,261.85 | Melaleuca viridiflora +/- Corymbia clarksoniana low open woodland on floodplains and alluvial plains | Very sparse |
| 3.3.5 | Least concern | B | 1,929.16 | Evergreen to semi-deciduous notophyll vine forest on alluvia on major watercourses | Dense |
| 3.3.50 | Least concern | B | 26,224.41 | Melaleuca spp. woodland on swamps on floodplains and non-floodplain landforms | Sparse |
| 3.3.51 | Of concern | B | 759.02 | Melaleuca acacioides +/- Hakea pedunculata tall shrubland on coastal plains | Sparse |
| 3.3.56 | Least concern | B | 8,066.16 | Aristida spp. and/or Eriachne spp. tussock grassland in drainage depressions | Grassland Sch 4 |
| 3.3.58 | Least concern | B | 8,580.91 | Oryza spp. closed tussock grassland +/- Eleocharis spp. +/- Echinochloa spp. in seasonally inundated depressions on coastal plains | Grassland Sch 4 |
| 3.3.6 | Of concern | B | 8.85 | Evergreen notophyll vine forest with Melaleuca leucadendra on swamps | Dense |
| 3.3.61 | Least concern | B | 27,404.53 | Mixed tussock grassland and sedgeland on alluvial plains | Grassland Sch 4 |
| 3.3.63 | Least concern | B | 2,731.92 | Eleocharis spp. open sedgeland swamps | Other |
| 3.3.64 | Least concern | B | 415.93 | Baloskion tetraphyllum subsp. meiostachyum and/or Leptocarpus spp. and/or Dapsilanthus spathaceus open sedgeland in drainage swamps | Other |
| 3.3.65 | Least concern | B | 6,114.69 | Tussock grasslands in ephemeral lakes and lagoons | Grassland Sch 4 |
| 3.3.66 | Least concern | B | 2,137.54 | Lakes and lagoons dominated by a variety of aquatic plants, frequently with fringing woodlands or sedgelands | Other |

| Regional Ecosystem | VMA Status | Category | Area (Ha) | Short Description | Structure Category |
|---|---|---|---|---|---|
| 3.3.9 | Least concern | B | 17,091.94 | Lophostemon suaveolens woodlands on creeklines and swamps | Mid-dense |
| 3.5.36 | Least concern | B | 271,164.92 | Eucalyptus tetrodonta and Corymbia nesophila woodland to open forest on undulating plains and remnant plateaus | Sparse |
| 3.5.37 | Least concern | B | 15,563.63 | Eucalyptus tetrodonta +/- Corymbia stockeri woodland to tall open forest on erosional plains and remnant plateaus | Sparse |
| 3.5.39 | Least concern | B | 88,120.67 | Eucalyptus tetrodonta +/- Corymbia clarksoniana woodland on sand plains | Sparse |
| 3.5.4 | Least concern | B | 110.49 | Semi-deciduous notophyll vine forest in small patches on northern plateaus | Dense |
| 3.5.40 | Least concern | B | 517.28 | Melaleuca stenostachya +/- Eucalyptus chlorophylla woodland +/- M. viridiflora shrub layer on outwash plains | Sparse |
| 3.5.41 | Least concern | B | 9,713.44 | Melaleuca viridiflora +/- Corymbia clarksoniana woodland to low open woodland on plains | Sparse |
| 3.5.6 | Least concern | B | 0.25 | Eucalyptus phoenicea woodland on sandy outwash plains | Sparse |
| 3.5.9 | Least concern | B | 24,750.51 | Eucalyptus tetrodonta, Corymbia stockeri +/- C. setosa woodland on sand plains | Sparse |
| 3.7.3 | Least concern | B | 7,332.51 | Eucalyptus cullenii +/- E. tetrodonta woodland on erosional escarpments and plains | Sparse |
| 3.7.4 | Least concern | B | 12,617.63 | Eucalyptus tetrodonta and Corymbia stockeri woodland on ironstone knolls and slopes | Sparse |
| 3.7.6 | Least concern | B | 271.03 | Melaleuca stenostachya +/- Acacia leptostachya woodland on lateritic erosional slopes | Sparse |
| 3.9.4 | Least concern | B | 10,757.79 | Eucalyptus leptophleba +/- Corymbia dallachiana or Eucalyptus platyphylla open woodland on rolling plains | Very sparse |
| non-rem | None | X | 85.72 | None | None |
| water | None | Water | 349.68 | None | None |

Please note:

1. All area and area derived figures included in this table have been calculated via reprojecting relevant spatial features to Albers equal-area conic projection (central meridian = 146, datum Geocentric Datum of Australia 1994). As a result, area figures may differ slightly if calculated for the same features using a different co-ordinate system.

2. If Table 5 contains a Category 'plant', please be aware that this refers to 'plantations' such as forestry, and these areas are considered non-remnant under the VMA.

The VMA status of the regional ecosystem (whether it is endangered, of concern or least concern) also determines if any of the following are applicable:

- exempt clearing work;
- accepted development vegetation clearing codes;
- performance outcomes in State Code 16 of the State Development Assessment Provisions (SDAP).

## 3.3 Watercourses

Vegetation management watercourses and drainage features for this property are shown on the vegetation management supporting map in section 4.2.

## 3.4 Wetlands

Vegetation management wetlands are present on this property and are shown on the vegetation management supporting map in section 4.2 of this report.

## 3.5 Essential habitat

Under the VMA, essential habitat for protected wildlife is native wildlife prescribed under the *Nature Conservation Act 1992* (NCA) as critically endangered, endangered, vulnerable or near-threatened wildlife.

Essential habitat for protected wildlife includes suitable habitat on the lot, or where a species has been known to occur up to 1.1 kilometres from a lot on which there is assessable vegetation. These important habitat areas are protected under the VMA.

Any essential habitat on this property will be shown as blue hatching on the vegetation supporting map in section 4.2.

If essential habitat is identified on the lot, information about the protected wildlife species is provided in Table 6 below. The numeric labels on the vegetation management supporting map can be cross referenced with Table 6 to outline the essential habitat factors for that particular species. There may be essential habitat for more than one species on each lot, and areas of Category A, Category B and Category C can be mapped as Essential Habitat.

Essential habitat is compiled from a combination of species habitat models and buffered species records. Regional ecosystem is a mandatory essential habitat factor, unless otherwise stated. Essential habitat, for protected wildlife, means an area of vegetation shown on the Regulated Vegetation Management Map -

1) that has at least 3 essential habitat factors for the protected wildlife that must include any essential habitat factors that are stated as mandatory for the protected wildlife in the essential habitat database. Essential habitat factors are comprised of - regional ecosystem (mandatory for most species), vegetation community, altitude, soils, position in landscape; or

2) in which the protected wildlife, at any stage of its life cycle, is located.

If there is no essential habitat mapping shown on the vegetation management supporting map for this lot, and there is no table in the sections below, it confirms that there is no essential habitat on the lot.

**Category A and/or Category B and/or Category C**

**Table 6: Essential habitat in Category A and/or Category B and/or Category C**

| Label | Scientific Name | Common Name | NCA Status | Vegetation Community | Altitude | Soils | Position in Landscape |
|---|---|---|---|---|---|---|---|
| 29 | Natator depressus | flatback turtle | V | Turbid, shallow tropical inshore waters (coast & bays) over soft-bottomed habitats away from reefs; no records beyond continental shelf. Nests dug in sandy area well up beach (on or behind dune, on dune slope), occasionally to tree line. | Sea level to 50m. | Sandy substrates. | Beach. |
| 39 | Eretmochelys imbricata | hawksbill turtle | E | Tropical and warm temperate seas, at certain size recruit to tidal and sub-tidal coral and rocky reef habitats; especially outer edges with complex vertical surfaces rather than flat areas. Nests in sandy beach above high tide, often in vegetated area (under trees). | Sea level to 50m. | Sandy substrates. | Beach. |
| 41 | Lepidochelys olivacea | olive ridley turtle | E | Tropical seas in relatively deep, protected waters (80-100m) over soft-bottomed (e.g. mud near mangroves) habitats, also coral reefs. Nests dug above high tidemark. | Sea level to 50m. | Sandy substrates. | Beach. |

| Label | Scientific Name | Common Name | NCA Status | Vegetation Community | Altitude | Soils | Position in Landscape |
|---|---|---|---|---|---|---|---|
| 584 | Crocodylus porosus | estuarine crocodile | V | Estuaries and major rivers, billabongs and swamps in dry season; freshwater swamps in wet season, occasionally found in open sea; also in dune swale swamps and dams; mostly within 40-50km of coastline (some breeding populations up to 100km from sea). Nest sites vegetated areas (preference for Melaleuca swamp forest with Thoracostachyum or Scleria sedgeswamp &/or Stenoclaena fern) near permanent freshwater (<100-200m), often on north-west banks, prime areas associated with productive deepwater estuaries; will also use marginal sites, e.g. grassy areas (Imperata, Ischaemum, Themeda, Sorghum) near forest edge or with sparse eucalypt, riverbank/fringe forest (Melaleuca, Corypha, Acacia), mangrove fringe, salt meadow behind mangrove, and sparse short (<40cm) sedgeland/swamp. | Sea level to 100m. | None | Near and in waterbodies. |
| 1104 | Ninox rufa meesi | rufous owl (Cape York subspecies) | NT | Lowland rainforest (e.g. semi-deciduous mesophyll vine forest; gallery vine forest), dense swamp (including Melaleuca leucadendron), and along edge of mangroves; most hunting in rainforest and adjoining open sclerophyll (eucalypt) woodland. | Sea level to 500m. | None | None |
| 1175 | Probosciger aterrimus macgillivrayi | palm cockatoo | E | Rainforest, gallery forest and adjacent open grassy forest/woodland (eucalypt) and swamp woodland (melaleuca or palm) (up to at least 1km), especially when enriched with Pandanus and Nonda plums Parinari with shrubby acacia understorey over grass; preference for ecotone but will retreat into rainforest during hottest part of day. Nest in vertical hollow 15-60cm diameter, 0.5-1.5m deep and 0.5-45m (mostly 4-12m) above ground; most nests in open forest eucalypts (Eucalyptus tetradonta, Corymbia sp.), also use Melaleuca, Alstonia, Lophostemon & Ficus spp. (mean DBH = 60cm), near rainforest (40-60m away) and rarely in rainforest. | Sea level to 200m. | None | None |
| 1365 | Poephila cincta cincta | black-throated finch (white-rumped subspecies) | E | Grassy open woodland dominated by Eucalyptus, Acacia and Melaleuca spp. (e.g. E. platyphylla, E. erythrophloia, E. melanophloia, E. brownii, E. whitei, E. similis, E. camaldulensis, Corymbia plena, C. dallachiana, C. setosa, M. viridiflora, M. leucodendra) with high diversity ground cover of perennial grasses (e.g. Heteropogon, Themeda, Bothriochloa, Eulalia, Enneapogon, Triodia, Triopogon, Chrysopogon, Aristida) and shrub layer usually sparse or absent. Nest in topmost twiggy branches of eucalypt, occasionally in tree hollow or termite mound, up to 12m above ground. | 50-350m. | None | None |
| 1370 | Neochmia phaeton evangelinae | crimson finch (white-bellied subspecies) | E | Riparian vegetation, especially eucalypt/melaleuca woodland with dense long grasses and pandanus near watercourses, dune swales and swamps; will use vine forest as fire refuge. Nest in bulky domed nest built between fronds of trees with palm-like leaves (e.g. Pandanus & Corypha spp.) 2-16m above ground, often over water and occasionally in hollows or buildings. | Sea level to 250m. | None | None |

| Label | Scientific Name | Common Name | NCA Status | Vegetation Community | Altitude | Soils | Position in Landscape |
|---|---|---|---|---|---|---|---|
| 1728 | Erythrotriorchis radiatus | red goshawk | E | Tall open forest to open forest (Eucalyptus saligna, E. pilularis, Corymbia citriodora), edge of rainforest/vine thicket (especially Araucarian notophyll vine forest), tall woodland (including savannah/semi-open woodland, e.g. E. alba, and open riparian E. camaldulensis in dry areas), and along forested rivers (including Melaleuca swamp forest and riparian Casuarina sp.) and near wetlands; preference for a mosaic of tall vegetation types (forest/woodland) with permanent water, high bird (prey) density; often in remote terrain (gorge/escarpment country). Nest in tall eucalypt or melaleuca (7-40m above ground) in undisturbed forest/woodland; restricted to trees >20m tall within 1km of permanent watercourse or wetland. | Sea level to 550m. | None | None |
| 1843 | Numenius madagascariensis | eastern curlew | E | Foraging on soft, intertidal mudflat, with a preference for broad flats, often in sheltered areas near mangroves and estuaries/creeks, also on sandflats and occasionally ocean beaches, rock platforms and coral reefs. Roost on saltflat, saltmarsh, mangroves, reef flat, sandy spits and grassland near water. | Sea level to 100m. | Sand, sandy mud and mud substrates. | Associated with coastlines and wetlands. |
| 1856 | Calidris tenuirostris | great knot | CE | Foraging on intertidal mudflat/sandflat in sheltered coastal areas, exposed reef, rock platform, mangrove, near coastal swamp/lagoon and salt lake. Roost on sandy beach, mudflat and coastal claypan . | Sea level to 100m. | Mud and sand substrates. | Associated with coastlines and wetlands. |
| 1936 | Charadrius mongolus | lesser sand plover | E | Foraging on sandy beach, intertidal mudflat/sandflat and mangrove mudflat of coastal bays and estuaries. Also inland at lakes and soaks. Roost on beach, banks, sand/shell spits, rocky spits and exposed reef. | Sea level to 100m. | Sand and mud substrates. | Associated with coastlines and coastal and inland wetlands. |
| 1948 | Charadrius leschenaultii | greater sand plover | V | Foraging on intertidal mudflats, sandbank, sandy/shelly/muddy beaches, rock platforms, coral reefs and tidal lagoons. Roost on sandspit, beach, lagoons edge, rocky points, coastal saltmarsh and claypan. | Sea level to 100m. | Sand and mud substrates. | Associated with coastlines and wetlands. |
| 13977 | Dendrobium bigibbum | Cooktown orchid | V | low closed shrubland/heathland; vine thicket; semi-deciduous notophyll vine forest; woodland with Eucalyptus drepanophylla/ E. crebra; woodland with Eucalyptus tereticornis, Corymbia tessellaris and Erythrophleum chlorostachys | 0 to 1000 m | no soil information, lithophyte or epiphyte (grows on trees and boulders) | rocky creek bank, steep talus slope, ridge line, hill slope, sand ridge and swale of consolidated beach dune, coastal sandy plain, beach ridge |
| 29734 | Emydura subglobosa worrelli | diamond head turtle | NT | Large tropical rivers, permanent lakes and lagoons; and shallow temporary areas. | Sea level to 350m. | None | In and near watercourses. |
| 33787 | Crudia abbreviata | None | NT | gallery/riparian rainforest | 0 to 100 m | alluvium: sand, sandy red earth, silty loam | watercourse |

| Label | Regional Ecosystem (mandatory unless otherwise specified) |
|---|---|
| 29 | All regional ecosystems adjacent to beach. |
| 39 | All regional ecosystems adjacent to beach. |
| 41 | All regional ecosystems adjacent to beach. |
| 584 | All regional ecosystems within the stream/wetland buffer as determined by VMA code. |

| Label | Regional Ecosystem (mandatory unless otherwise specified) |
|---|---|
| 1104 | 3.1.1, 3.1.3, 3.2.1, 3.2.2, 3.2.11, 3.2.12, 3.2.13, 3.2.17, 3.2.21, 3.2.28, 3.2.29, 3.2.30, 3.3.1, 3.3.2, 3.3.4, 3.3.5, 3.3.6, 3.3.7, 3.3.38, 3.3.39, 3.3.40, 3.3.54, 3.3.68, 3.5.3, 3.5.4, 3.5.19, 3.5.20, 3.5.33, 3.5.42, 3.7.1, 3.8.1, 3.8.2, 3.8.5, 3.10.1, 3.10.2, 3.10.3, 3.10.5, 3.10.13, 3.11.1, 3.11.2, 3.11.3, 3.12.1, 3.12.2, 3.12.3, 3.12.4, 3.12.5, 3.12.6, 3.12.20, 3.12.21, 3.12.22, 3.12.23, 3.12.35 |
| 1175 | 3.1.1, 3.2.1, 3.2.2, 3.2.3, 3.2.4, 3.2.11, 3.2.12, 3.2.13, 3.2.21, 3.2.28, 3.3.1, 3.3.2, 3.3.4, 3.3.5, 3.3.6, 3.3.7, 3.3.8, 3.3.9, 3.3.10, 3.3.11, 3.3.12, 3.3.13, 3.3.17, 3.3.39, 3.3.68, 3.3.70, 3.5.3, 3.5.4, 3.5.20, 3.5.21, 3.5.32, 3.5.33, 3.7.1, 3.7.2, 3.7.6, 3.8.1, 3.8.2, 3.8.3, 3.8.5, 3.10.1, 3.10.2, 3.10.3, 3.10.5, 3.10.13, 3.11.1, 3.11.2, 3.11.3, 3.11.4, 3.11.6, 3.12.1, 3.12.3, 3.12.4, 3.12.5, 3.12.6, 3.12.7, 3.12.8, 3.12.9, 3.12.20, 3.12.21, 3.12.22, 3.12.23, 3.12.35, 3.12.36, 3.12.44 |
| 1365 | 9.3.1, 9.3.2, 9.3.3, 9.3.4, 9.3.5, 9.3.6, 9.3.7, 9.3.8, 9.3.9, 9.3.10, 9.3.11, 9.3.13, 9.3.14, 9.3.15, 9.3.16, 9.3.17, 9.3.18, 9.3.19, 9.3.20, 9.3.21, 9.3.22, 9.3.23, 9.4.1, 9.4.2, 9.4.3, 9.5.3, 9.5.4, 9.5.5, 9.5.6, 9.5.7, 9.5.8, 9.5.9, 9.5.10, 9.5.11, 9.5.12, 9.5.14, 9.5.16, 9.7.1, 9.7.2, 9.7.3, 9.7.5, 9.7.6, 9.8.1, 9.8.2, 9.8.4, 9.8.5, 9.8.6, 9.8.9, 9.8.10, 9.8.11, 9.10.1, 9.10.3, 9.10.6, 9.10.7, 9.10.8, 9.11.1, 9.11.2, 9.11.3, 9.11.4, 9.11.5, 9.11.7, 9.11.10, 9.11.11, 9.11.12, 9.11.13, 9.11.15, 9.11.16, 9.11.17, 9.11.18, 9.11.19, 9.11.21, 9.11.23, 9.11.24, 9.11.26, 9.11.28, 9.11.29, 9.11.31, 9.11.32, 9.12.1, 9.12.3, 9.12.4, 9.12.5, 9.12.6, 9.12.7, 9.12.10, 9.12.11, 9.12.12, 9.12.13, 9.12.14, 9.12.15, 9.12.16, 9.12.17, 9.12.18, 9.12.19, 9.12.20, 9.12.21, 9.12.22, 9.12.23, 9.12.24, 9.12.25, 9.12.26, 9.12.27, 9.12.28, 9.12.29, 9.12.30, 9.12.31, 9.12.33, 9.12.35, 9.12.37, 9.12.39, 10.3.1, 10.3.2, 10.3.3, 10.3.4, 10.3.5, 10.3.6, 10.3.9, 10.3.10, 10.3.11, 10.3.12, 10.3.13, 10.3.14, 10.3.15, 10.3.16, 10.3.17, 10.3.19, 10.3.20, 10.3.21, 10.3.22, 10.3.23, 10.3.25, 10.3.27, 10.3.28, 10.3.30, 10.3.31, 10.4.1, 10.4.2, 10.4.3, 10.4.4, 10.4.5, 10.4.6, 10.4.9, 10.5.1, 10.5.2, 10.5.4, 10.5.5, 10.5.7, 10.5.8, 10.5.9, 10.5.10, 10.5.11, 10.5.12, 10.7.1, 10.7.2, 10.7.3, 10.7.4, 10.7.5, 10.7.6, 10.7.7, 10.7.8, 10.7.9, 10.7.10, 10.7.11, 10.7.12, 10.9.1, 10.9.2, 10.9.3, 10.9.5, 10.9.6, 10.9.8, 10.10.1, 10.10.2, 10.10.3, 10.10.4, 10.10.5, 10.10.7, 11.2.1, 11.2.5, 11.3.1, 11.3.2, 11.3.3, 11.3.4, 11.3.6, 11.3.8, 11.3.9, 11.3.10, 11.3.12, 11.3.13, 11.3.14, 11.3.15, 11.3.16, 11.3.17, 11.3.18, 11.3.19, 11.3.20, 11.3.23, 11.3.25, 11.3.27, 11.3.28, 11.3.29, 11.3.30, 11.3.32, 11.3.33, 11.3.35, 11.3.36, 11.3.37, 11.3.39, 11.4.2, 11.4.3, 11.4.5, 11.4.8, 11.4.10, 11.4.12, 11.4.13, 11.5.1, 11.5.2, 11.5.3, 11.5.4, 11.5.5, 11.5.8, 11.5.9, 11.5.12, 11.5.13, 11.5.14, 11.5.17, 11.5.20, 11.5.21, 11.7.1, 11.7.2, 11.7.3, 11.7.4, 11.7.6, 11.8.2, 11.8.4, 11.8.5, 11.8.8, 11.8.9, 11.8.11, 11.8.12, 11.8.14, 11.8.15, 11.9.2, 11.9.3, 11.9.7, 11.9.9, 11.9.14, 11.10.1, 11.10.4, 11.10.6, 11.10.7, 11.10.11, 11.10.12, 11.10.13, 11.11.1, 11.11.2, 11.11.3, 11.11.4, 11.11.6, 11.11.7, 11.11.8, 11.11.9, 11.11.10, 11.11.11, 11.11.12, 11.11.15, 11.11.16, 11.11.17, 11.11.19, 11.11.20, 11.12.1, 11.12.2, 11.12.3, 11.12.5, 11.12.6, 11.12.7, 11.12.8, 11.12.9, 11.12.10, 11.12.11, 11.12.12, 11.12.13, 11.12.14, 11.12.17, 11.12.20 |
| 1370 | 2.2.1, 2.2.7, 2.3.1, 2.3.5, 2.3.6, 2.3.7, 2.3.8, 2.3.9, 2.3.10, 2.3.11, 2.3.12, 2.3.13, 2.3.15, 2.3.17, 2.3.18, 2.3.19, 2.3.20, 2.3.21, 2.3.22, 2.3.23, 2.3.24, 2.3.25, 2.3.26, 2.3.27, 2.3.28, 2.3.29, 2.3.30, 2.3.31, 2.3.33, 2.3.34, 2.3.35, 2.3.36, 2.3.37, 2.3.39, 2.3.40, 2.3.41, 2.3.42, 2.3.43, 2.3.44, 2.3.45, 2.3.46, 2.3.47, 2.3.49, 2.3.50, 2.3.51, 2.3.52, 2.3.53, 2.3.54, 2.3.55, 2.3.56, 2.3.57, 2.3.58, 2.3.59, 2.3.60, 2.3.61, 2.3.62, 2.3.63, 2.3.64, 2.3.65, 2.3.66, 2.3.68, 2.3.69, 2.3.70, 2.3.71, 2.3.72, 2.4.3, 2.4.4, 2.4.5, 2.5.1, 2.5.2, 2.5.3, 2.5.4, 2.5.5, 2.5.6, 2.5.7, 2.5.9, 2.5.10, 2.5.11, 2.5.12, 2.5.13, 2.5.14, 2.5.15, 2.5.17, 2.5.18, 2.5.19, 2.5.20, 2.5.21, 2.5.22, 2.5.23, 2.5.24, 2.5.25, 2.5.26, 2.5.27, 2.5.28, 2.5.29, 2.5.30, 2.5.31, 2.5.32, 2.5.33, 2.5.34, 2.5.35, 2.5.36, 2.5.37, 2.5.38, 2.5.39, 2.5.40, 2.5.41, 2.7.1, 2.7.2, 2.7.3, 2.7.4, 2.7.5, 2.7.6, 2.7.7, 2.8.1, 2.9.1, 2.9.2, 2.9.3, 2.9.4, 2.9.5, 2.9.6, 2.9.7, 2.10.1, 2.10.2, 2.10.4, 2.10.5, 2.10.6, 2.10.7, 2.11.1, 2.12.1 |

| Label | Regional Ecosystem (mandatory unless otherwise specified) |
|---|---|
| 1728 | 2.2.7, 2.3.5, 2.3.6, 2.3.7, 2.3.10, 2.3.11, 2.3.12, 2.3.15, 2.3.17, 2.3.19, 2.3.20, 2.3.21, 2.3.22, 2.3.23, 2.3.24, 2.3.25, 2.3.26, 2.3.27, 2.3.28, 2.3.29, 2.3.30, 2.3.33, 2.3.34, 2.3.35, 2.3.37, 2.3.39, 2.3.40, 2.3.42, 2.3.43, 2.3.44, 2.3.45, 2.3.47, 2.3.49, 2.3.50, 2.3.51, 2.3.52, 2.3.53, 2.3.54, 2.3.55, 2.3.56, 2.3.57, 2.3.58, 2.3.59, 2.3.60, 2.3.61, 2.3.62, 2.3.63, 2.3.64, 2.3.65, 2.3.66, 2.3.68, 2.3.69, 2.3.70, 2.3.71, 2.3.72, 2.4.4, 2.5.3, 2.5.4, 2.5.5, 2.5.6, 2.5.7, 2.5.8, 2.5.9, 2.5.10, 2.5.11, 2.5.13, 2.5.14, 2.5.15, 2.5.17, 2.5.18, 2.5.19, 2.5.20, 2.5.21, 2.5.23, 2.5.24, 2.5.25, 2.5.26, 2.5.27, 2.5.28, 2.5.29, 2.5.30, 2.5.33, 2.5.36, 2.5.37, 2.5.38, 2.5.41, 2.7.1, 2.7.2, 2.7.3, 2.7.4, 2.7.5, 2.7.6, 2.7.7, 2.8.1, 2.9.3, 2.9.6, 2.9.7, 2.10.1, 2.10.2, 2.10.3, 2.10.5, 2.10.7, 2.11.1, 2.12.1, 3.2.3, 3.2.4, 3.2.5, 3.2.6, 3.2.7, 3.2.8, 3.2.9, 3.2.10, 3.2.15, 3.2.17, 3.3.8, 3.3.9, 3.3.10, 3.3.11, 3.3.12, 3.3.13, 3.3.14, 3.3.15, 3.3.16, 3.3.17, 3.3.18, 3.3.19, 3.3.20, 3.3.21, 3.3.22, 3.3.23, 3.3.24, 3.3.25, 3.3.26, 3.3.27, 3.3.28, 3.3.29, 3.3.30, 3.3.31, 3.3.32, 3.3.33, 3.3.34, 3.3.35, 3.3.36, 3.3.37, 3.3.40, 3.3.69, 3.3.70, 3.5.1, 3.5.2, 3.5.5, 3.5.6, 3.5.7, 3.5.8, 3.5.9, 3.5.10, 3.5.11, 3.5.12, 3.5.13, 3.5.21, 3.5.22, 3.5.23, 3.5.24, 3.5.25, 3.5.26, 3.5.31, 3.5.34, 3.5.35, 3.5.36, 3.5.37, 3.5.38, 3.5.39, 3.5.41, 3.5.42, 3.7.2, 3.7.3, 3.7.4, 3.7.5, 3.7.6, 3.8.3, 3.9.2, 3.9.4, 3.9.5, 3.9.6, 3.10.6, 3.10.7, 3.10.8, 3.10.9, 3.10.10, 3.10.11, 3.10.15, 3.10.21, 3.11.4, 3.11.6, 3.11.7, 3.11.8, 3.11.9, 3.11.10, 3.11.11, 3.11.12, 3.11.13, 3.11.14, 3.11.15, 3.11.17, 3.11.18, 3.11.20, 3.11.21, 3.12.7, 3.12.8, 3.12.9, 3.12.10, 3.12.11, 3.12.12, 3.12.13, 3.12.14, 3.12.15, 3.12.16, 3.12.17, 3.12.18, 3.12.19, 3.12.26, 3.12.40, 3.12.41, 3.12.42, 3.12.44, 3.12.45, 3.12.46, 3.12.47, 6.3.1, 6.3.2, 6.3.3, 6.3.4, 6.3.5, 6.3.8, 6.3.9, 6.3.16, 6.3.17, 6.3.18, 6.3.24, 6.3.25, 6.4.2, 6.4.3, 6.5.1, 6.5.2, 6.5.3, 6.5.5, 6.5.17, 6.5.19, 6.7.2, 6.7.5, 6.7.6, 7.2.3, 7.2.4, 7.2.7, 7.2.8, 7.2.9, 7.2.10, 7.2.11, 7.3.5, 7.3.6, 7.3.7, 7.3.8, 7.3.9, 7.3.12, 7.3.13, 7.3.14, 7.3.16, 7.3.19, 7.3.20, 7.3.21, 7.3.25, 7.3.26, 7.3.34, 7.3.35, 7.3.39, 7.3.40, 7.3.42, 7.3.43, 7.3.44, 7.3.45, 7.3.46, 7.3.47, 7.3.48, 7.3.49, 7.3.50, 7.5.1, 7.5.2, 7.5.3, 7.5.4, 7.8.4, 7.8.7, 7.8.8, 7.8.10, 7.8.15, 7.8.16, 7.8.17, 7.8.18, 7.8.19, 7.11.5, 7.11.6, 7.11.8, 7.11.10, 7.11.13, 7.11.14, 7.11.16, 7.11.18, 7.11.19, 7.11.20, 7.11.21, 7.11.26, 7.11.31, 7.11.32, 7.11.33, 7.11.34, 7.11.35, 7.11.37, 7.11.38, 7.11.40, 7.11.41, 7.11.42, 7.11.43, 7.11.44, 7.11.45, 7.11.46, 7.11.47, 7.11.48, 7.11.49, 7.11.50, 7.11.51, 7.12.4, 7.12.5, 7.12.9, 7.12.12, 7.12.17, 7.12.21, 7.12.22, 7.12.23, 7.12.24, 7.12.25, 7.12.26, 7.12.27, 7.12.28, 7.12.29, 7.12.30, 7.12.33, 7.12.34, 7.12.35, 7.12.37, 7.12.51, 7.12.52, 7.12.53, 7.12.54, 7.12.55, 7.12.56, 7.12.57, 7.12.58, 7.12.59, 7.12.60, 7.12.61, 7.12.62, 7.12.63, 7.12.65, 7.12.66, 7.12.69, 8.2.1, 8.2.3, 8.2.4, 8.2.6, 8.2.7, 8.2.8, 8.2.12, 8.2.13, 8.2.14, 8.3.2, 8.3.3, 8.3.5, 8.3.6, 8.3.8, 8.3.11, 8.3.13, 8.5.1, 8.5.2, 8.5.3, 8.5.5, 8.5.6, 8.9.1, 8.11.1, 8.11.3, 8.11.4, 8.11.5, 8.11.6, 8.11.8, 8.12.4, 8.12.5, 8.12.6, 8.12.7, 8.12.8, 8.12.9, 8.12.12, 8.12.14, 8.12.20, 8.12.22, 8.12.23, 8.12.25, 8.12.26, 8.12.27, 8.12.31, 8.12.32, 9.4.3, 10.3.1, 10.3.2, 10.3.3, 10.3.4, 10.3.5, 10.3.6, 10.3.9, 10.3.10, 10.3.11, 10.3.12, 10.3.13, 10.3.14, 10.3.15, 10.3.19, 10.3.20, 10.3.27, 10.3.28, 10.3.30, 10.3.31, 10.4.3, 10.4.7, 10.5.1, 10.5.2, 10.5.4, 10.5.5, 10.5.7, 10.5.9, 10.5.10, 10.5.11, 10.5.12, 10.7.2, 10.7.3, 10.7.5, 10.7.11, 10.7.12, 10.9.1, 10.9.2, 10.9.3, 10.9.5, 10.10.1, 10.10.3, 10.10.4, 10.10.5, 10.10.7, 11.2.1, 11.2.2, 11.2.5, 11.3.1, 11.3.2, 11.3.3, 11.3.4, 11.3.6, 11.3.7, 11.3.8, 11.3.9, 11.3.10, 11.3.12, 11.3.13, 11.3.14, 11.3.15, 11.3.16, 11.3.17, 11.3.18, 11.3.19, 11.3.23, 11.3.25, 11.3.26, 11.3.27, 11.3.28, 11.3.29, 11.3.30, 11.3.35, 11.3.36, 11.3.37, 11.3.38, 11.3.39, 11.4.2, 11.4.3, 11.4.5, 11.4.7, 11.4.8, 11.4.9, 11.4.10, 11.4.12, 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| 1843 | 2.1.1, 2.1.2, 2.1.3, 2.1.4, 2.1.5, 3.1.1, 3.1.2, 3.1.3, 3.1.4, 3.1.5, 3.1.6, 7.1.1, 7.1.2, 7.1.3, 8.1.1, 8.1.2, 8.1.3, 8.1.4, 11.1.1, 11.1.2, 11.1.3, 11.1.4, 12.1.2, 12.1.3 |
| 1856 | 2.1.1, 2.1.2, 2.1.3, 2.1.5, 3.1.1, 3.1.2, 3.1.3, 3.1.4, 7.1.1, 7.1.3, 8.1.2, 11.1.2, 11.1.4, 12.1.3. |
| 1936 | 2.1.1, 2.1.2, 2.1.3, 2.1.5, 3.1.1, 3.1.2, 3.1.3, 3.1.4, 7.1.1, 7.1.3, 8.1.2, 11.1.2, 11.1.4, 12.1.3. |
| 1948 | 2.1.1, 2.1.4, 2.1.5, 3.1.6, 7.1.2, 7.1.3, 8.1.2, 8.1.3, 8.1.4, 11.1.1, 11.1.2, 11.1.3, 12.1.2, 12.1.3. |
| 13977 | 3.2.2, 3.2.5, 3.2.12, 3.2.13, 3.2.17, 3.2.18, 3.2.21, 3.2.22, 3.2.26, 3.3.5, 3.3.10, 3.3.38, 3.3.39, 3.3.49, 3.3.50, 3.3.53, 3.3.67, 3.5.4, 3.5.5, 3.5.19, 3.5.33, 3.5.42, 3.10.1, 3.10.5, 3.11.7, 3.11.20, 3.12.4, 3.12.10, 3.12.21, 3.12.28, 3.12.34, 7.3.40, 7.11.20, 7.12.7, 7.12.6, 7.12.38, 7.12.61, 7.12.55, 7.12.69, 9.8.7, 9.11.8 |
| 29734 | All regional ecosystems within the stream/wetland buffer as determined by VMA code. |
| 33787 | 3.3.5, 3.3.38, 3.3.50, 3.3.65 |

# 3.6 Area Management Plan(s)

Nil

# 3.7 Coastal or non-coastal

**For the purposes of the accepted development vegetation clearing codes and State Code 16 of the State Development Assessment Provisions (SDAP), this property is regarded as***

Non Coastal

*See also Map 4.3

## 3.8 Agricultural Land Class A or B

The following can be used to identify Agricultural Land Class A or B areas under the "Managing regulated regrowth vegetation" accepted development vegetation clearing code:

**Does this lot contain land that is mapped as Agricultural Land Class A or B in the State Planning Interactive Mapping System?**

Class A (with urban areas masked as per SPP): 16159.03ha

Class B (with urban areas masked as per SPP): 285672.2ha

Note - This confirms Agricultural Land Classes as per the State Planning Interactive Mapping System only. This response does not include Agricultural Land Classes identified under local government planning schemes. For further information, check the Planning Scheme for your local government area.

See Map 4.4 to identify the location and extent of Class A and/or Class B Agricultural land on Lot: 211 Plan: SP241404.

# 4. Vegetation management framework maps

Vegetation management maps included in this report may also be requested individually at:
https://www.resources.qld.gov.au/qld/environment/land/vegetation/vegetation-map-request-form

**Regulated vegetation management map**

The regulated vegetation management map shows vegetation categories needed to determine clearing requirements. These maps are updated monthly to show new property maps of assessable vegetation (PMAV).

**Vegetation management supporting map**

The vegetation management supporting map provides information on regional ecosystems, wetlands, watercourses and essential habitat.

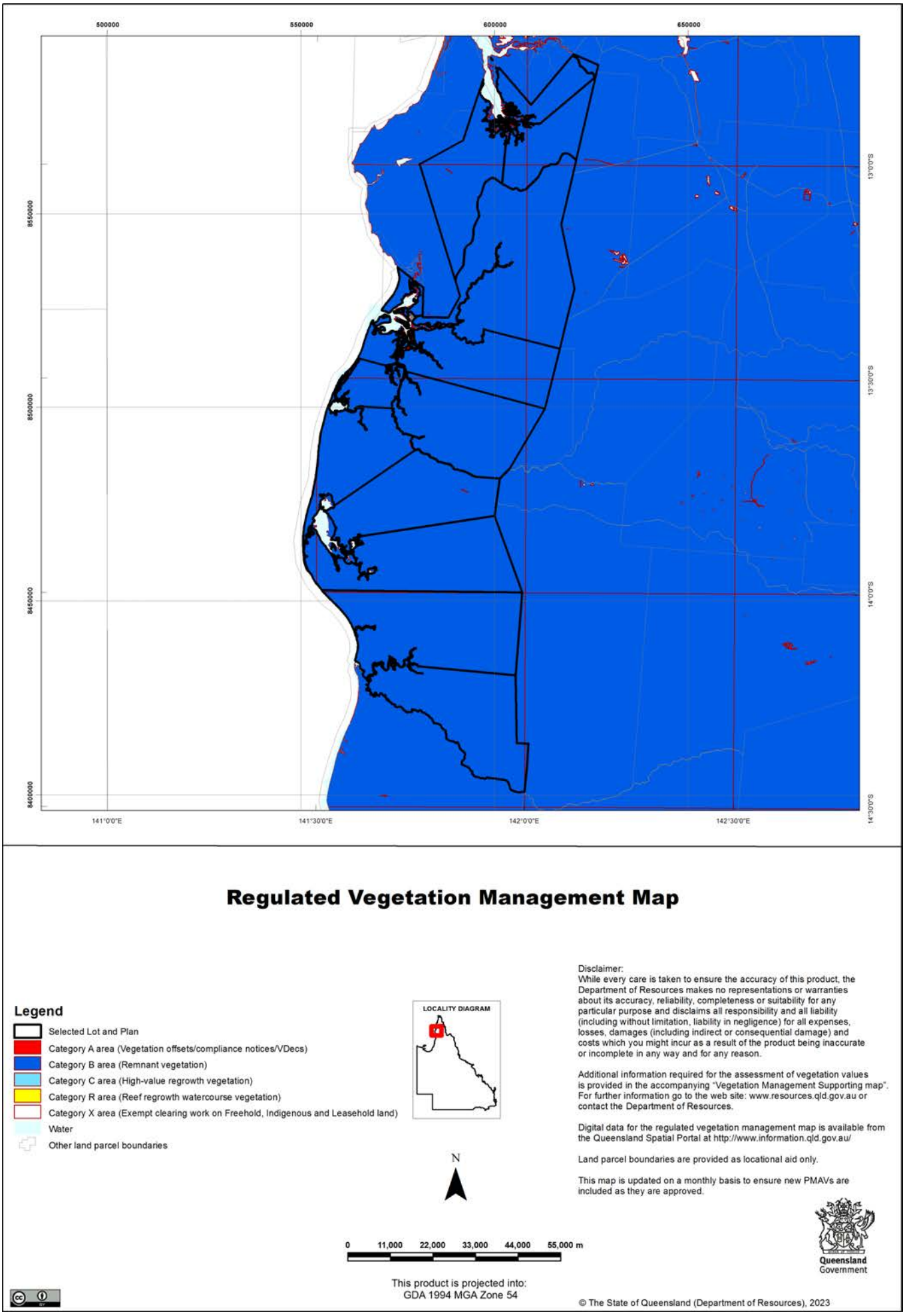
**Coastal/non-coastal map**

The coastal/non-coastal map confirms whether the lot, or which parts of the lot, are considered coastal or non-coastal for the purposes of the accepted development vegetation clearing codes and State Code 16 of the State Development Assessment Provisions (SDAP).

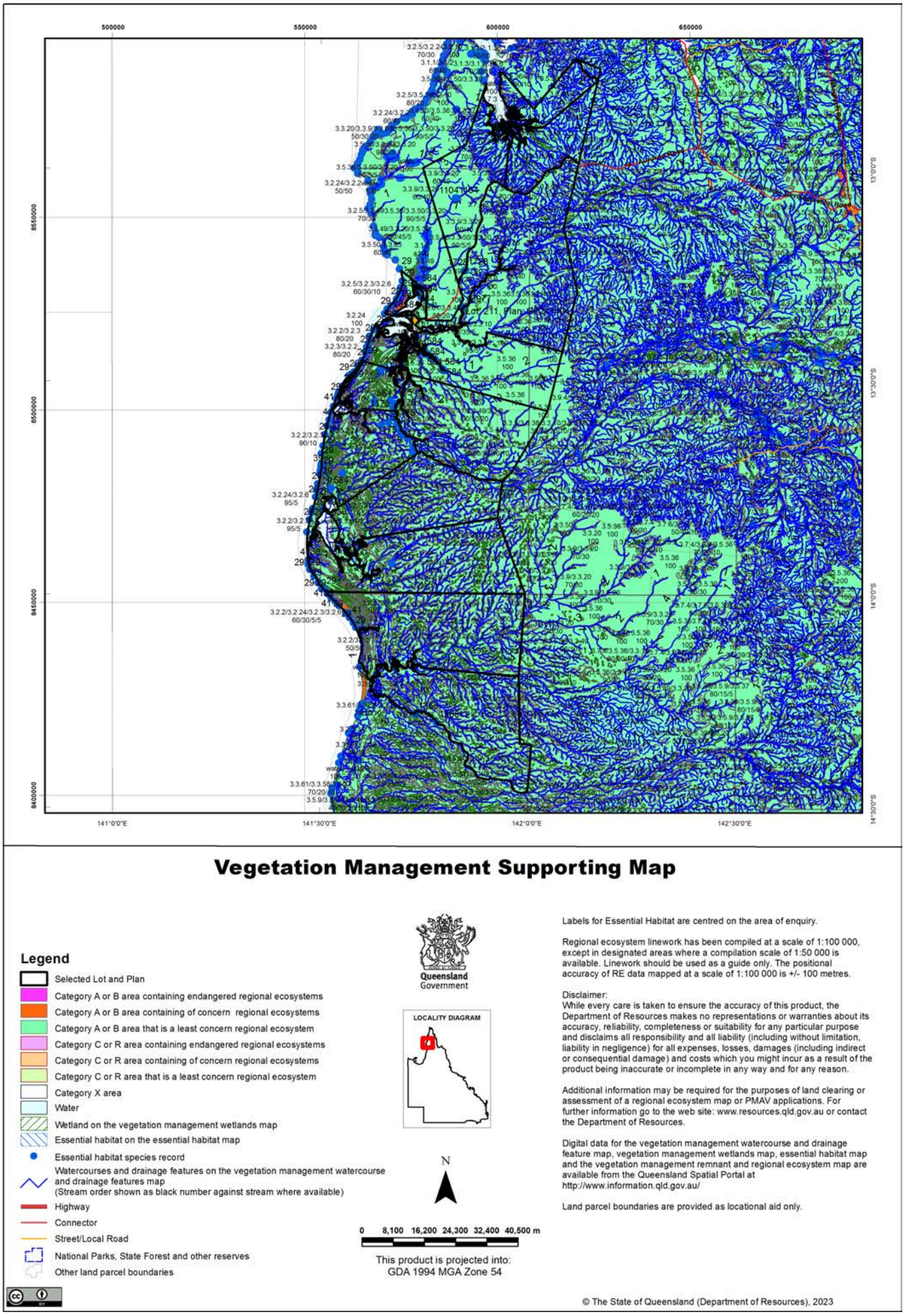
**Agricultural Land Class A or B as per State Planning Policy: State Interest for Agriculture**

The Agricultural Land Class map confirms the location and extent of land mapped as Agricultural Land Classes A or B as identified on the State Planning Interactive Mapping System. Please note that this map does not include areas identified as Agricultural Land Class A or B in local government planning schemes. This map can be used to identify Agricultural Land Class A or B areas under the "Managing regulated regrowth vegetation" accepted development vegetation clearing code.

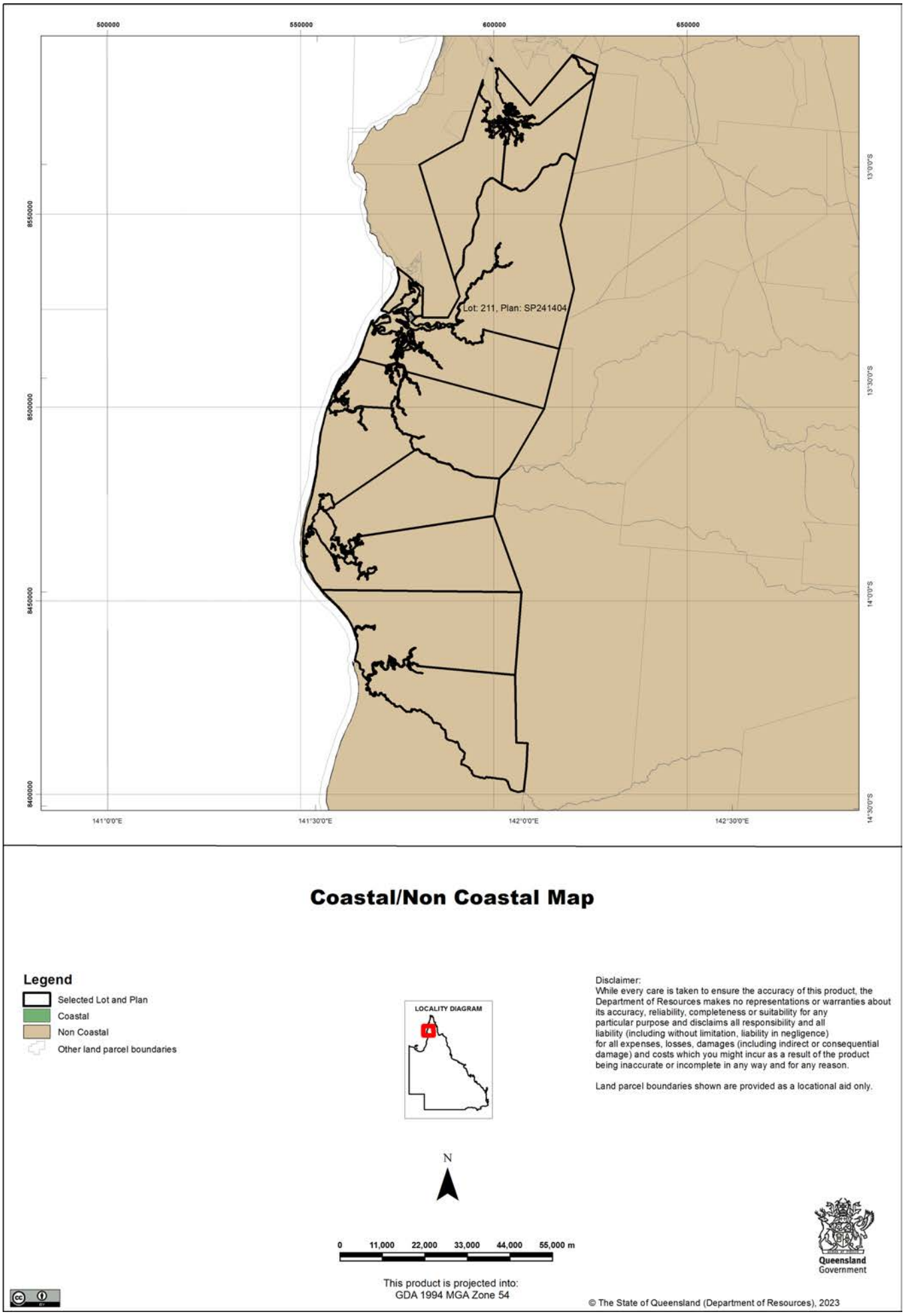
# 4.1 Regulated vegetation management map



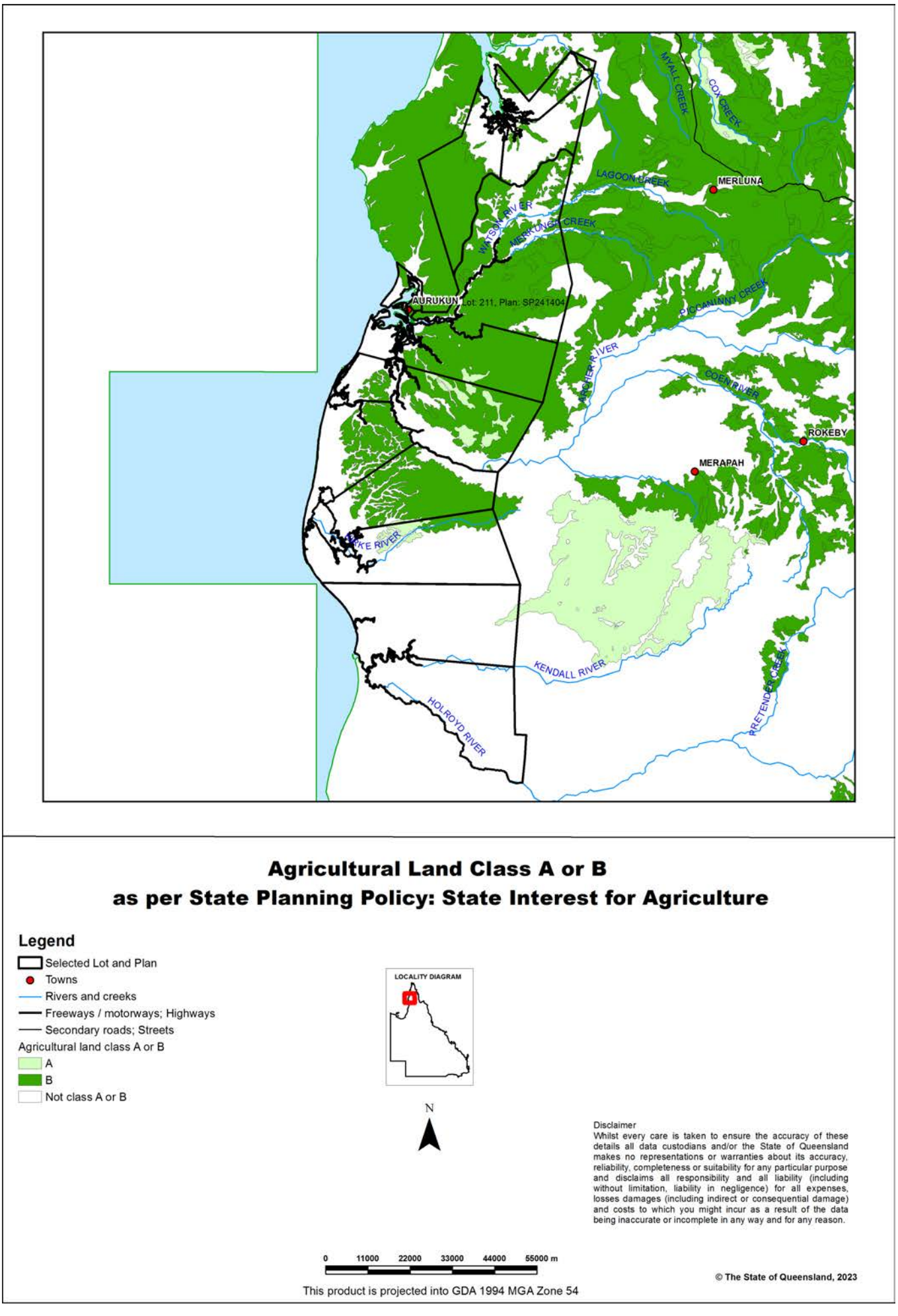
# 4.2 Vegetation management supporting map



## 4.3 Coastal/non-coastal map



## 4.4 Agricultural Land Class A or B as per State Planning Policy: State Interest for Agriculture



# 5. Protected plants framework (administered by the Department of Environment and Science (DES))

In Queensland, all plants that are native to Australia are protected plants under the *Nature Conservation Act 1992* (NCA). The NCA regulates the clearing of protected plants 'in the wild' (see Operational policy: When a protected plant in Queensland is considered to be 'in the wild') that are listed as critically endangered, endangered, vulnerable or near threatened under the Act.

Please note that the protected plant clearing framework applies irrespective of the classification of the vegetation under the *Vegetation Management Act 1999* and any approval or exemptions given under another Act, for example, the *Vegetation Management Act 1999* or *Planning Regulation 2017*.

## 5.1 Clearing in high risk areas on the flora survey trigger map

The flora survey trigger map identifies high-risk areas for threatened and near threatened plants. These are areas where threatened or near threatened plants are known to exist or are likely to exist based on the habitat present. The flora survey trigger map for this property is provided in section 5.5.

If you are proposing to clear an area shown as high risk on the flora survey trigger map, a flora survey of the clearing impact area must be undertaken by a suitably qualified person in accordance with the Flora survey guidelines. The main objective of a flora survey is to locate any threatened or near threatened plants that may be present in the clearing impact area.

If the flora survey identifies that threatened or near threatened plants are not present within the clearing impact area or clearing within 100m of a threatened or near threatened plant can be avoided, the clearing activity is exempt from a permit. An exempt clearing notification form must be submitted to the Department of Environment and Science, with a copy of the flora survey report, at least one week prior to clearing.

If the flora survey identifies that threatened or near threatened plants are present in, or within 100m of, the area to be cleared, a clearing permit is required before any clearing is undertaken. The flora survey report, as well as an impact management report, must be submitted with the clearing permit application form.

## 5.2 Clearing outside high risk areas on the flora survey trigger map

In an area other than a high risk area, a clearing permit is only required where a person is, or becomes aware that threatened or near threatened plants are present in, or within 100m of, the area to be cleared. You must keep a copy of the flora survey trigger map for the area subject to clearing for five years from the day the clearing starts. If you do not clear within the 12 month period that the flora survey trigger map was printed, you need to print and check a new flora survey trigger map.

## 5.3 Exemptions

Many activities are 'exempt' under the protected plant clearing framework, which means that clearing of native plants that are in the wild can be undertaken for these activities with no need for a flora survey or a protected plant clearing permit. The Information sheet - General exemptions for the take of protected plants provides some of these exemptions.

Some exemptions under the NCA are the same as exempt clearing work (formerly known as exemptions) under the *Vegetation Management Act 1999* (i.e. listed in Schedule 21 of the Planning Regulations 2017) while some are different.

## 5.4 Contact information for DES

For further information on the protected plants framework:
**Phone** 1300 130 372 (and select option four)
**Email** palm@des.qld.gov.au
**Visit** https://www.qld.gov.au/environment/plants-animals/plants/protected-plants

# 5.5 Protected plants flora survey trigger map

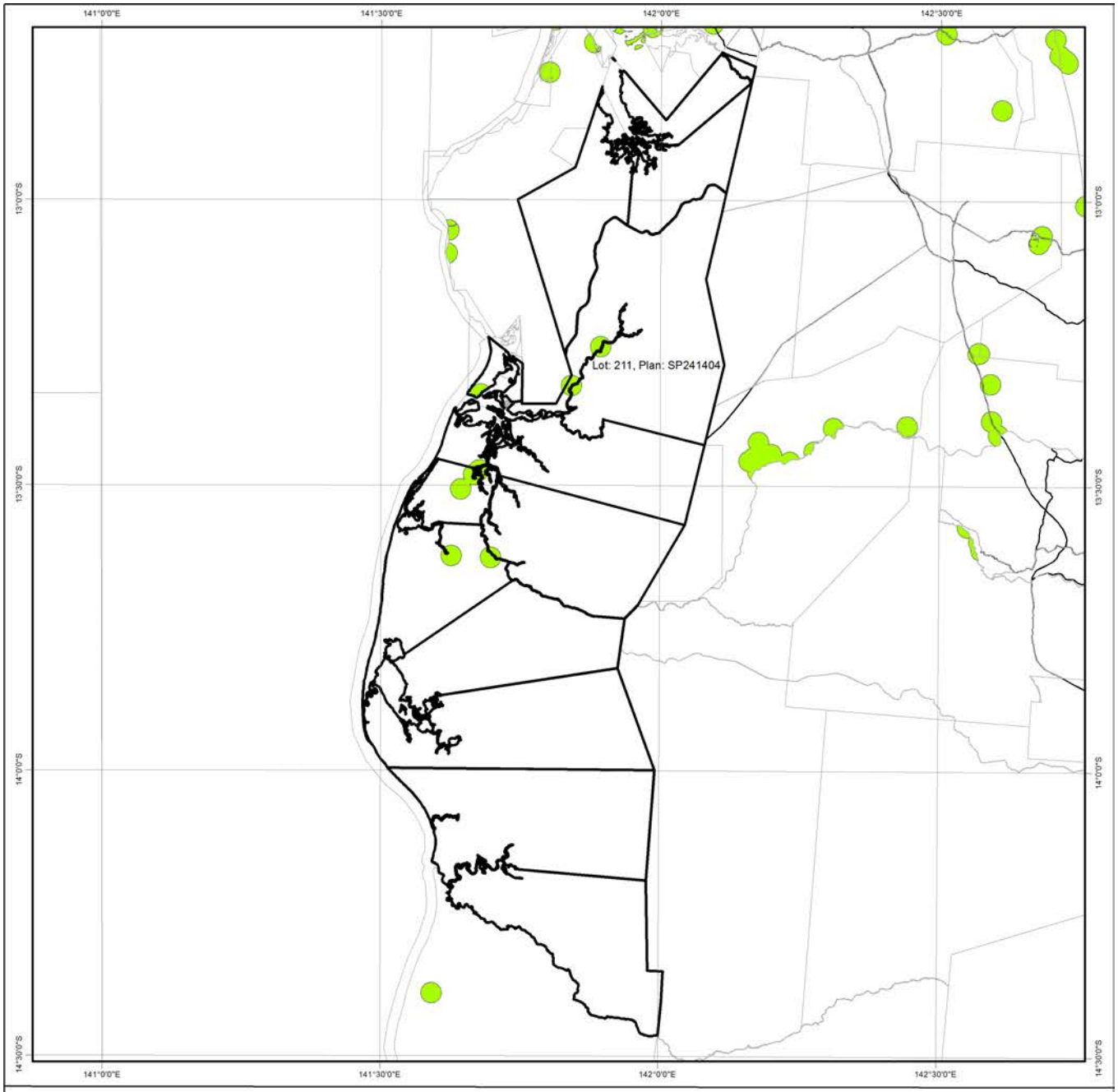
This map included may also be requested individually at: https://apps.des.qld.gov.au/map-request/flora-survey-trigger/.

**Updates to the data informing the flora survey trigger map**

The flora survey trigger map will be reviewed, and updated if necessary, at least every 12 months to ensure the map reflects the most up-to-date and accurate data available.

**Species information**

Please note that flora survey trigger maps do not identify species associated with 'high risk areas'. While some species information may be publicly available, for example via the Queensland Spatial Catalogue, the Department of Environment and Science does not provide species information on request. Regardless of whether species information is available for a particular high risk area, clearing plants in a high risk area may require a flora survey and/or clearing permit. Please see the Department of Environment and Science webpage on the clearing of protected plants for more information.




# Protected Plants Flora Survey Trigger Map

## Legend

- Selected Lot and Plan
- High risk area
- Other land parcel boundaries
- Freeways / motorways / highways
- Secondary roads / streets


N

0 7,500 15,000 22,500 30,000 37,500 m

This product is projected into:
GDA 1994 MGA Zone 54

This map shows areas where particular provisions of the Nature Conservation Act 1992 apply to the clearing of protected plants.

Land parcel boundaries are provided as locational aid only.

This map is produced at a scale relevant to the size of the area selected and should be printed as A4 size in portrait orientation.

For further information or assistance with interpretation of this product, please contact the Department of Environment and Science at palm@des.qld.gov.au

Disclaimer:
While every care is taken to ensure the accuracy of the data used to generate this product, the Queensland Government makes no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaim all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damages) and costs which might be incurred as a consequence of reliance on the data, or as a result of the data being inaccurate or incomplete in any way and for any reason.

# 6. Koala protection framework (administered by the Department of Environment and Science (DES))

The koala (*Phascolarctos cinereus*) is listed in Queensland as endangered by the Queensland Government under *Nature Conservation Act 1992* and by the Australian Government under the *Environment Protection and Biodiversity Conservation Act 1999*.

The Queensland Government's koala protection framework is comprised of the *Nature Conservation Act 1992*, the Nature Conservation (Animals) Regulation 2020, the Nature Conservation (Koala) Conservation Plan 2017, the *Planning Act 2016* and the Planning Regulation 2017.

## 6.1 Koala mapping

### 6.1.1 Koala districts

The parts of Queensland where koalas are known to occur has been divided into three koala districts - koala district A, koala district B and koala district C. Each koala district is made up of areas with comparable koala populations (e.g. density, extent and significance of threatening processes affecting the population) which require similar management regimes.

Section 7.1 identifies which koala district your property is located in.

### 6.1.2 Koala habitat areas

Koala habitat areas are areas of vegetation that have been determined to contain koala habitat that is essential for the conservation of a viable koala population in the wild based on the combination of habitat suitability and biophysical variables with known relationships to koala habitat (e.g. landcover, soil, terrain, climate and ground water). In order to protect this important koala habitat, clearing controls have been introduced into the Planning Regulation 2017 for development in koala habitat areas.

Please note that koala habitat areas only exist in koala district A which is the South East Queensland "Shaping SEQ" Regional Plan area. These areas include the local government areas of Brisbane, Gold Coast, Logan, Lockyer Valley, Ipswich, Moreton Bay, Noosa, Redland, Scenic Rim, Somerset, Sunshine Coast and Toowoomba (urban extent).

There are two different categories of koala habitat area (core koala habitat area and locally refined koala habitat), which have been determined using two different methodologies. These methodologies are described in the document Spatial modelling in South East Queensland.

Section 7.2 shows any koala habitat area that exists on your property.

Under the Nature Conservation (Koala) Conservation Plan 2017, an owner of land (or a person acting on the owner's behalf with written consent) can request to make, amend or revoke a koala habitat area determination if they believe, on reasonable grounds, that the existing determination for all or part of their property is incorrect.

More information on requests to make, amend or revoke a koala habitat area determination can be found in the document Guideline - Requests to make, amend or revoke a koala habitat area determination.

The koala habitat area map will be updated at least annually to include any koala habitat areas that have been made, amended or revoked.

Changes to the koala habitat area map which occur between annual updates because of a request to make, amend or revoke a koala habitat area determination can be viewed on the register of approved requests to make, amend or revoke a koala habitat area available at: https://environment.des.qld.gov.au/wildlife/animals/living-with/koalas/mapping/koalamaps. The register includes the lot on plan for the change, the date the decision was made and the map issued to the landholder that shows areas determined to be koala habitat areas.

### 6.1.3 Koala priority areas

Koala priority areas are large, connected areas that have been determined to have the highest likelihood of achieving conservation outcomes for koalas based on the combination of habitat suitability, biophysical variables with known relationships to koala habitat (e.g. landcover, soil, terrain, climate and ground water) and a koala conservation cost benefit analysis.

Conservation efforts will be prioritised in these areas to ensure the conservation of viable koala populations in the wild including a focus on management (e.g. habitat protection, habitat restoration and threat mitigation) and monitoring. This includes a prohibition on clearing in koala habitat areas that are in koala priority areas under the Planning Regulation 2017 (subject to some exemptions).

Please note that koala priority areas only exist in koala district A which is the South East Queensland "Shaping SEQ" Regional Plan area. These areas include the local government areas of Brisbane, Gold Coast, Logan, Lockyer Valley,

Ipswich, Moreton Bay, Noosa, Redland, Scenic Rim, Somerset, Sunshine Coast and Toowoomba (urban extent).

Section 7.2 identifies if your property is in a koala priority area.

#### 6.1.4 Identified koala broad-hectare areas

There are seven identified koala broad-hectare areas in SEQ. These are areas of koala habitat that are located in areas committed to meet development targets in the SEQ Regional Plan to accommodate SEQ's growing population including bring-forward Greenfield sites under the Queensland Housing Affordability Strategy and declared master planned areas under the repealed *Sustainable Planning Act 2009* and the repealed *Integrated Planning Act 1997*.

Specific assessment benchmarks apply to development applications for development proposed in identified koala broad-hectare areas to ensure koala conservation measures are incorporated into the proposed development.

Section 7.2 identifies if your property is in an identified koala broad-hectare area.

## 6.2 Koala habitat planning controls

On 7 February 2020, the Queensland Government introduced new planning controls to the Planning Regulation 2017 to strengthen the protection of koala habitat in South East Queensland (i.e. koala district A).

More information on these planning controls can be found here:
https://environment.des.qld.gov.au/wildlife/animals/living-with/koalas/mapping/legislation-policy.

As a high-level summary, the koala habitat planning controls make:

- development that involves interfering with koala habitat (defined below) in an area that is both a koala priority area and a koala habitat area, prohibited development (i.e. development for which a development application cannot be made);
- development that involves interfering with koala habitat (defined below) in an area that is a koala habitat area but is not a koala priority area, assessable development (i.e. development for which development approval is required); and
- development that is for extractive industries where the development involves interfering with koala habitat (defined below) in an area that is both a koala habitat area and a key resource area, assessable development (i.e. development for which development approval is required).

**Interfering with koala habitat** means:

1) Removing, cutting down, ringbarking, pushing over, poisoning or destroying in anyway, including by burning, flooding or draining native vegetation in a koala habitat area; but
2) Does not include destroying standing vegetation by stock or lopping a tree.

However, these planning controls do not apply if the development is exempted development as defined in Schedule 24 of the Planning Regulation 2017. More information on exempted development can be found here:
https://environment.des.qld.gov.au/wildlife/animals/living-with/koalas/mapping/legislation-policy.

There are also assessment benchmarks that apply to development applications for:

- building works, operational works, material change of use or reconfiguration of a lot where:
  - the local government planning scheme makes the development assessable;
  - the premises includes an area that is both a koala priority area and a koala habitat area; and
  - the development does not involve interfering with koala habitat (defined above); and

- development in identified koala broad-hectare areas.

The Guideline - Assessment Benchmarks in relation to Koala Habitat in South East Queensland assessment benchmarks outlines these assessment benchmarks, the intent of these assessment benchmarks and advice on how proposed development may meet these assessment benchmarks.

## 6.3 Koala Conservation Plan clearing requirements

Section 10 and 11 of the Nature Conservation (Koala) Conservation Plan 2017 prescribes requirements that must be met when clearing koala habitat in koala district A and koala district B.

These clearing requirements are independent to the koala habitat planning controls introduced into the Planning Regulation 2017, which means they must be complied with irrespective of any approvals or exemptions offered under other legislation.

Unlike the clearing controls prescribed in the Planning Regulation 2017 that are to protect koala habitat, the clearing requirements prescribed in the Nature Conservation (Koala) Conservation Plan 2017 are in place to prevent the injury or death of koalas when koala habitat is being cleared.

## 6.4 Contact information for DES

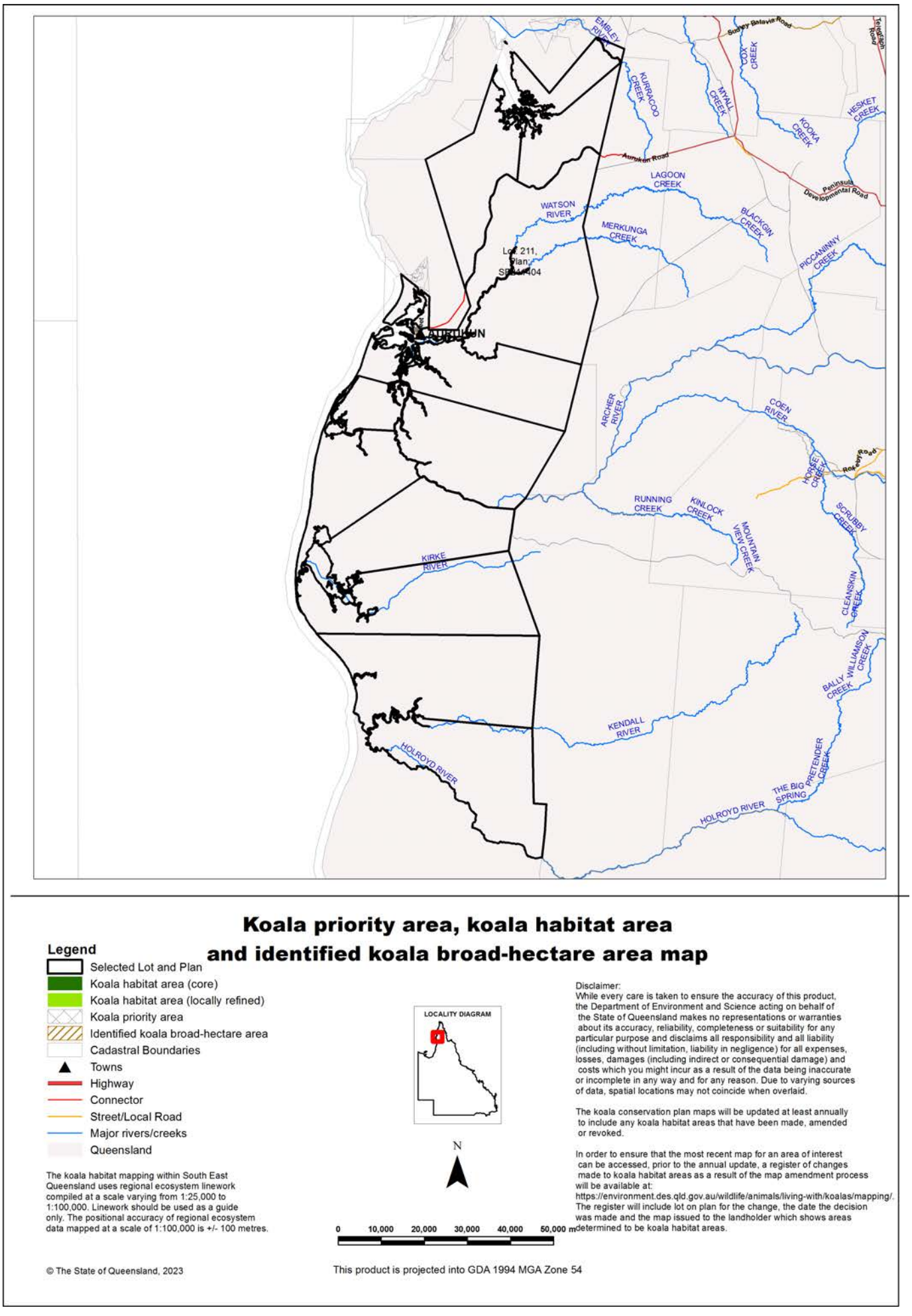
For further information on the koala protection framework:
**Phone** 13 QGOV (13 74 68)
**Email** koala.assessment@des.qld.gov.au
**Visit** https://environment.des.qld.gov.au/wildlife/animals/living-with/koalas/mapping

# 7. Koala protection framework details for Lot: 211 Plan: SP241404

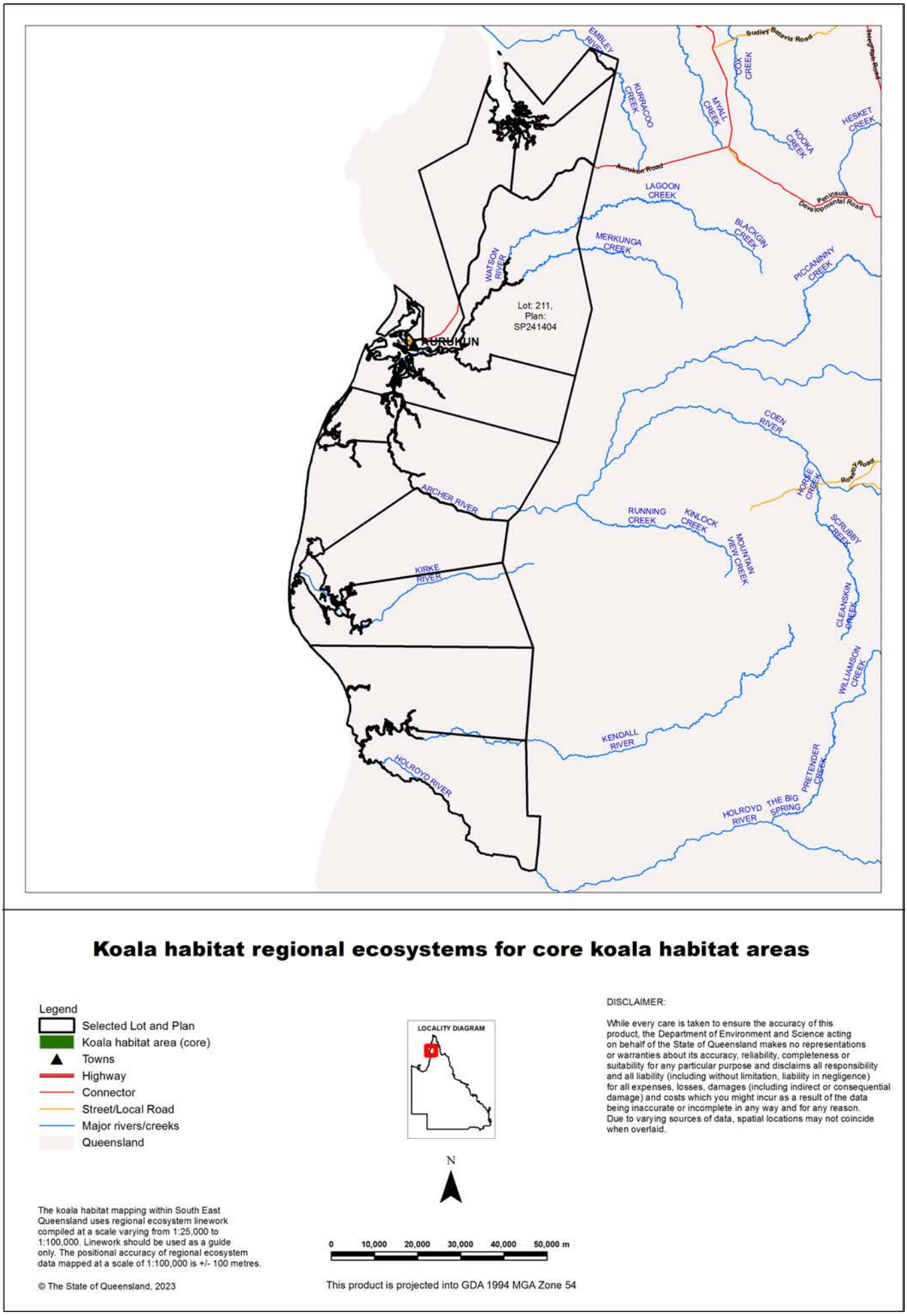
## 7.1 Koala districts

(no results)

## 7.2 Koala priority area, koala habitat area and identified koala broad-hectare area map



# 7.3 Koala habitat regional ecosystems for core koala habitat areas



# 8. Other relevant legislation contacts list

| Activity | Legislation | Agency | Contact details |
|---|---|---|---|
| • Interference with overland flow<br>• Earthworks, significant disturbance | *Water Act 2000*<br>*Soil Conservation Act 1986* | Department of Regional Development, Manufacturing and Water<br>(Queensland Government)<br>Department of Resources<br>(Queensland Government) | Ph: 13 QGOV (13 74 68)<br>www.rdmw.qld.gov.au<br>www.resources.qld.gov.au |
| • Indigenous Cultural Heritage | *Aboriginal Cultural Heritage Act 2003*<br>*Torres Strait Islander Cultural Heritage Act 2003* | Department of Seniors, Disability Services and Aboriginal and Torres Strait Islander Partnerships | Ph: 13 QGOV (13 74 68)<br>www.datsip.qld.gov.au |
| • Mining and environmentally relevant activities<br>• Infrastructure development (coastal)<br>• Heritage issues | *Environmental Protection Act 1994*<br>*Coastal Protection and Management Act 1995*<br>*Queensland Heritage Act 1992* | Department of Environment and Science<br>(Queensland Government) | Ph: 13 QGOV (13 74 68)<br>www.des.qld.gov.au |
| • Protected plants and protected areas | *Nature Conservation Act 1992* | Department of Environment and Science<br>(Queensland Government) | Ph: 1300 130 372 (option 4)<br>palm@des.qld.gov.au<br>www.des.qld.gov.au |
| • Koala mapping and regulations | *Nature Conservation Act 1992* | Department of Environment and Science<br>(Queensland Government) | Ph: 13 QGOV (13 74 68)<br>Koala.assessment@des.qld.gov.au |
| • Interference with fish passage in a watercourse, mangroves<br>• Forestry activities on State land tenures | *Fisheries Act 1994*<br>*Forestry Act 1959* | Department of Agriculture and Fisheries<br>(Queensland Government) | Ph: 13 QGOV (13 74 68)<br>www.daf.qld.gov.au |
| • Matters of National Environmental Significance including listed threatened species and ecological communities | *Environment Protection and Biodiversity Conservation Act 1999* | Department of Agriculture, Water and the Environment<br>(Australian Government) | Ph: 1800 803 772<br>www.environment.gov.au |
| • Development and planning processes | *Planning Act 2016*<br>*State Development and Public Works Organisation Act 1971* | Department of State Development, Infrastructure, Local Government and Planning<br>(Queensland Government) | Ph: 13 QGOV (13 74 68)<br>www.dsdmip.qld.gov.au |
| • Local government requirements | *Local Government Act 2009*<br>*Planning Act 2016* | Department of State Development, Infrastructure, Local Government and Planning<br>(Queensland Government) | Ph: 13 QGOV (13 74 68)<br>Your relevant local government office |
| • Harvesting timber in the Wet Tropics of Qld World Heritage area | *Wet Tropics World Heritage Protection and Management Act 1993* | Wet Tropics Management Authority | Ph: (07) 4241 0500<br>www.wettropics.gov.au |

# Appendix B

## Database searches for Offset Area 2

EMM
creating opportunities

# 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: 14-Mar-2023

# 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: | None |
| Listed Threatened Species: | 27 |
| Listed Migratory Species: | 29 |

## 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: | 31 |
| 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: | None |
| Regional Forest Agreements: | None |
| Nationally Important Wetlands: | None |
| EPBC Act Referrals: | 3 |
| 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 Species | | [ Resource Information ] |
|---|---|---|
| Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.<br>Number is the current name ID. | | |
| Scientific Name | Threatened Category | Presence Text |
| BIRD | | |
| Calidris ferruginea<br>Curlew Sandpiper [856] | Critically Endangered | Species or species habitat may occur within area |
| Charadrius leschenaultii<br>Greater Sand Plover, Large Sand Plover [877] | Vulnerable | Species or species habitat may occur within area |
| Erythrotriorchis radiatus<br>Red Goshawk [942] | Vulnerable | Species or species habitat likely to occur within area |
| Limosa lapponica baueri<br>Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit [86380] | Vulnerable | Species or species habitat may occur within area |
| Numenius madagascariensis<br>Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat may occur within area |
| Probosciger aterrimus macgillivrayi<br>Palm Cockatoo (Australian) [67033] | Vulnerable | Species or species habitat likely to occur within area |
| Rostratula australis<br>Australian Painted Snipe [77037] | Endangered | Species or species habitat may occur within area |
| Tyto novaehollandiae kimberli<br>Masked Owl (northern) [26048] | Vulnerable | Species or species habitat may occur within area |
| MAMMAL | | |

| Scientific Name | Threatened Category | Presence Text |
|---|---|---|
| Dasyurus hallucatus<br>Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331] | Endangered | Species or species habitat may occur within area |
| Macroderma gigas<br>Ghost Bat [174] | Vulnerable | Species or species habitat may occur within area |
| Mesembriomys gouldii rattoides<br>Black-footed Tree-rat (north Queensland), Shaggy Rabbit-rat [87620] | Vulnerable | Species or species habitat likely to occur within area |
| Rhinolophus robertsi<br>Large-eared Horseshoe Bat, Greater Large-eared Horseshoe Bat [87639] | Vulnerable | Species or species habitat may occur within area |
| Saccolaimus saccolaimus nudicluniatus<br>Bare-rumped Sheath-tailed Bat, Bare-rumped Sheathtail Bat [66889] | Vulnerable | Species or species habitat may occur within area |
| PLANT | | |
| Calophyllum bicolor<br>[11371] | Vulnerable | Species or species habitat may occur within area |
| Dendrobium bigibbum<br>Cooktown Orchid [10306] | Vulnerable | Species or species habitat likely to occur within area |
| Vappodes phalaenopsis<br>Cooktown Orchid [78894] | Vulnerable | Species or species habitat likely to occur within area |
| REPTILE | | |
| Caretta caretta<br>Loggerhead Turtle [1763] | Endangered | Species or species habitat may occur within area |
| Chelonia mydas<br>Green Turtle [1765] | Vulnerable | Species or species habitat known to occur within area |
| Dermochelys coriacea<br>Leatherback Turtle, Leathery Turtle, Luth [1768] | Endangered | Species or species habitat may occur within area |

| Scientific Name | Threatened Category | Presence Text |
|---|---|---|
| Egernia rugosa | | |
| Yakka Skink [1420] | Vulnerable | Species or species habitat may occur within area |
| Eretmochelys imbricata | | |
| Hawksbill Turtle [1766] | Vulnerable | Species or species habitat known to occur within area |
| Lepidochelys olivacea | | |
| Olive Ridley Turtle, Pacific Ridley Turtle [1767] | Endangered | Species or species habitat known to occur within area |
| Natator depressus | | |
| Flatback Turtle [59257] | Vulnerable | Congregation or aggregation known to occur within area |
| SHARK | | |
| Glyphis glyphis | | |
| Speartooth Shark [82453] | Critically Endangered | Species or species habitat may occur within area |
| Pristis clavata | | |
| Dwarf Sawfish, Queensland Sawfish [68447] | Vulnerable | Species or species habitat known to occur within area |
| Pristis pristis | | |
| Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756] | Vulnerable | Species or species habitat may occur within area |
| Sphyrna lewini | | |
| Scalloped Hammerhead [85267] | Conservation Dependent | Species or species habitat likely to occur within area |

| Listed Migratory Species | | [ Resource Information ] |
|---|---|---|
| Scientific Name | Threatened Category | Presence Text |
| Migratory Marine Birds | | |
| Apus pacificus | | |
| Fork-tailed Swift [678] | | Species or species habitat likely to occur within area |
| Calonectris leucomelas | | |
| Streaked Shearwater [1077] | | Species or species habitat may occur within area |

| Scientific Name | Threatened Category | Presence Text |
|---|---|---|
| Phaethon lepturus<br>White-tailed Tropicbird [1014] | | Species or species habitat may occur within area |
| **Migratory Marine Species** | | |
| Caretta caretta<br>Loggerhead Turtle [1763] | Endangered | Species or species habitat may occur within area |
| Chelonia mydas<br>Green Turtle [1765] | Vulnerable | Species or species habitat known to occur within area |
| Crocodylus porosus<br>Salt-water Crocodile, Estuarine Crocodile [1774] | | Species or species habitat likely to occur within area |
| Dermochelys coriacea<br>Leatherback Turtle, Leathery Turtle, Luth [1768] | Endangered | Species or species habitat may occur within area |
| Eretmochelys imbricata<br>Hawksbill Turtle [1766] | Vulnerable | Species or species habitat known to occur within area |
| Lepidochelys olivacea<br>Olive Ridley Turtle, Pacific Ridley Turtle [1767] | Endangered | Species or species habitat known to occur within area |
| Mobula alfredi as Manta alfredi<br>Reef Manta Ray, Coastal Manta Ray [90033] | | Species or species habitat may occur within area |
| Mobula birostris as Manta birostris<br>Giant Manta Ray [90034] | | Species or species habitat may occur within area |
| Natator depressus<br>Flatback Turtle [59257] | Vulnerable | Congregation or aggregation known to occur within area |
| Pristis clavata<br>Dwarf Sawfish, Queensland Sawfish [68447] | Vulnerable | Species or species habitat known to occur within area |

| Scientific Name | Threatened Category | Presence Text |
|---|---|---|
| Pristis pristis | | |
| Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756] | Vulnerable | Species or species habitat may occur within area |
| **Migratory Terrestrial Species** | | |
| Cecropis daurica | | |
| Red-rumped Swallow [80610] | | Species or species habitat may occur within area |
| Cuculus optatus | | |
| Oriental Cuckoo, Horsfield's Cuckoo [86651] | | Species or species habitat may occur within area |
| Hirundo rustica | | |
| Barn Swallow [662] | | Species or species habitat may occur within area |
| Myiagra cyanoleuca | | |
| Satin Flycatcher [612] | | Species or species habitat known to occur within area |
| Rhipidura rufifrons | | |
| Rufous Fantail [592] | | Species or species habitat may occur within area |
| Symposiachrus trivirgatus as Monarcha trivirgatus | | |
| Spectacled Monarch [83946] | | Species or species habitat may occur within area |
| **Migratory Wetlands Species** | | |
| Actitis hypoleucos | | |
| Common Sandpiper [59309] | | Species or species habitat may occur within area |
| Calidris acuminata | | |
| Sharp-tailed Sandpiper [874] | | Species or species habitat may occur within area |
| Calidris ferruginea | | |
| Curlew Sandpiper [856] | Critically Endangered | Species or species habitat may occur within area |
| Calidris melanotos | | |
| Pectoral Sandpiper [858] | | Species or species habitat may occur within area |

| Scientific Name | Threatened Category | Presence Text |
|---|---|---|
| Charadrius leschenaultii<br>Greater Sand Plover, Large Sand Plover [877] | Vulnerable | Species or species habitat may occur within area |
| Gallinago hardwickii<br>Latham's Snipe, Japanese Snipe [863] | | Species or species habitat may occur within area |
| Limosa lapponica<br>Bar-tailed Godwit [844] | | Species or species habitat may occur within area |
| Numenius madagascariensis<br>Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat may occur within area |
| Pandion haliaetus<br>Osprey [952] | | Species or species habitat likely to occur within area |

## Other Matters Protected by the EPBC Act

| Listed Marine Species | | [ Resource Information ] |
|---|---|---|
| Scientific Name | Threatened Category | Presence Text |
| Bird | | |
| Actitis hypoleucos<br>Common Sandpiper [59309] | | Species or species habitat may occur within area |
| Anseranas semipalmata<br>Magpie Goose [978] | | Species or species habitat may occur within area overfly marine area |
| Apus pacificus<br>Fork-tailed Swift [678] | | Species or species habitat likely to occur within area overfly marine area |
| Bubulcus ibis as Ardea ibis<br>Cattle Egret [66521] | | Species or species habitat may occur within area overfly marine area |

| Scientific Name | Threatened Category | Presence Text |
| --- | --- | --- |
| Calidris acuminata<br>Sharp-tailed Sandpiper [874] | | Species or species habitat may occur within area |
| Calidris ferruginea<br>Curlew Sandpiper [856] | Critically Endangered | Species or species habitat may occur within area overfly marine area |
| Calidris melanotos<br>Pectoral Sandpiper [858] | | Species or species habitat may occur within area overfly marine area |
| Calonectris leucomelas<br>Streaked Shearwater [1077] | | Species or species habitat may occur within area |
| Cecropis daurica as Hirundo daurica<br>Red-rumped Swallow [80610] | | Species or species habitat may occur within area overfly marine area |
| Chalcites osculans as Chrysococcyx osculans<br>Black-eared Cuckoo [83425] | | Species or species habitat may occur within area overfly marine area |
| Charadrius leschenaultii<br>Greater Sand Plover, Large Sand Plover [877] | Vulnerable | Species or species habitat may occur within area |
| Gallinago hardwickii<br>Latham's Snipe, Japanese Snipe [863] | | Species or species habitat may occur within area overfly marine area |
| Haliaeetus leucogaster<br>White-bellied Sea-Eagle [943] | | Species or species habitat likely to occur within area |
| Hirundo rustica<br>Barn Swallow [662] | | Species or species habitat may occur within area overfly marine area |

| Scientific Name | Threatened Category | Presence Text |
| --- | --- | --- |
| Limosa lapponica<br>Bar-tailed Godwit [844] | | Species or species habitat may occur within area |
| Merops ornatus<br>Rainbow Bee-eater [670] | | Species or species habitat may occur within area overfly marine area |
| Myiagra cyanoleuca<br>Satin Flycatcher [612] | | Species or species habitat known to occur within area overfly marine area |
| Numenius madagascariensis<br>Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat may occur within area |
| Pandion haliaetus<br>Osprey [952] | | Species or species habitat likely to occur within area |
| Phaethon lepturus<br>White-tailed Tropicbird [1014] | | Species or species habitat may occur within area |
| Rhipidura rufifrons<br>Rufous Fantail [592] | | Species or species habitat may occur within area overfly marine area |
| Rostratula australis as Rostratula benghalensis (sensu lato)<br>Australian Painted Snipe [77037] | Endangered | Species or species habitat may occur within area overfly marine area |
| Symposiachrus trivirgatus as Monarcha trivirgatus<br>Spectacled Monarch [83946] | | Species or species habitat may occur within area overfly marine area |
| Reptile | | |
| Caretta caretta<br>Loggerhead Turtle [1763] | Endangered | Species or species habitat may occur within area |

| Scientific Name | Threatened Category | Presence Text |
|---|---|---|
| Chelonia mydas<br>Green Turtle [1765] | Vulnerable | Species or species habitat known to occur within area |
| Crocodylus johnstoni<br>Freshwater Crocodile, Johnston's Crocodile, Johnstone's Crocodile [1773] | | Species or species habitat may occur within area |
| Crocodylus porosus<br>Salt-water Crocodile, Estuarine Crocodile [1774] | | Species or species habitat likely to occur within area |
| Dermochelys coriacea<br>Leatherback Turtle, Leathery Turtle, Luth [1768] | Endangered | Species or species habitat may occur within area |
| Eretmochelys imbricata<br>Hawksbill Turtle [1766] | Vulnerable | Species or species habitat known to occur within area |
| Lepidochelys olivacea<br>Olive Ridley Turtle, Pacific Ridley Turtle [1767] | Endangered | Species or species habitat known to occur within area |
| Natator depressus<br>Flatback Turtle [59257] | Vulnerable | Congregation or aggregation known to occur within area |

## Extra Information

| EPBC Act Referrals | | | [ Resource Information ] |
|---|---|---|---|
| Title of referral | Reference | Referral Outcome | Assessment Status |
| Controlled action | | | |
| Aurukun Bauxite Mine Project | 2007/3764 | Controlled Action | Completed |
| Aurukun Bauxite Project | 2020/8624 | Controlled Action | Assessment Approach |
| South of the Embley Bauxite Mining Project | 2010/5642 | Controlled Action | Post-Approval |

# 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 are 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

## 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

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

## 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
- 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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# Vegetation management report

For Lot: 1 Plan: YK4

14/03/2023

Queensland Government

This publication has been compiled by Operations Support, Department of Resources.



# Recent changes

Updated mapping

Updated vegetation mapping was released on 8 September 2022 and includes the most recent Queensland Herbarium scientific updates to the Regulated Vegetation Management Map, regional ecosystems, wetland, high-value regrowth and essential habitat mapping.

The Department of Environment and Science have also updated their protected plant and koala protection mapping to align with the Queensland Herbarium scientific updates.

# Overview

Based on the lot on plan details you have supplied, this report provides the following detailed information:

***Property details*** - information about the specified Lot on Plan, lot size, local government area, bioregion(s), subregion(s) and catchment(s);

***Vegetation management framework*** - an explanation of the application of the framework and contact details for the Department of Resources who administer the framework;

***Vegetation management framework details for the specified Lot on Plan*** including:

- the vegetation management categories on the property;
- the vegetation management regional ecosystems on the property;
- vegetation management watercourses or drainage features on the property;
- vegetation management wetlands on the property;
- vegetation management essential habitat on the property;
- whether any area management plans are associated with the property;
- whether the property is coastal or non-coastal; and
- whether the property is mapped as Agricultural Land Class A or B;

***Protected plant framework*** - an explanation of the application of the framework and contact details for the Department of Environment and Science who administer the framework, including:

- high risk areas on the protected plant flora survey trigger map for the property;

***Koala protection framework*** - an explanation of the application of the framework and contact details for the Department of Environment and Science who administer the framework; and

***Koala protection framework details for the specified Lot on Plan*** including:

- the koala district the property is located in;
- koala priority areas on the property;
- core and locally refined koala habitat areas on the property;
- whether the lot is located in an identified koala broad-hectare area; and
- koala habitat regional ecosystems on the property for core koala habitat areas.

This information will assist you to determine your options for managing vegetation under:

**-** the vegetation management framework, which may include:

- exempt clearing work;
- accepted development vegetation clearing code;
- an area management plan;
- a development approval;

**-** the protected plant framework, which may include:

- the need to undertake a flora survey;
- exempt clearing;
- a protected plant clearing permit;

**-** the koala protection framework, which may include:

- exempted development;
- a development approval;
- the need to undertake clearing sequentially and in the presence of a koala spotter.

# Other laws

The clearing of native vegetation is regulated by both Queensland and Australian legislation, and some local governments also regulate native vegetation clearing. You may need to obtain an approval or permit under another Act, such as the Commonwealth Government's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Section 8 of this guide provides contact details of other agencies you should confirm requirements with, before commencing vegetation clearing.

# Table of Contents

# 1. Property details

## 1.1 Tenure and title area

All of the lot, plan, tenure and title area information associated with property Lot: 1 Plan: YK4, are listed in Table 1.

**Table 1: Lot, plan, tenure and title area information for the property**

| Lot | Plan | Tenure | Property title area (sq metres) |
|---|---|---|---|
| 1 | YK4 | Lands Lease | 890,000,000 |

The tenure of the land may affect whether clearing is considered exempt clearing work or may be carried out under an accepted development vegetation clearing code.

**Does this property have a freehold tenure and is in the Wet Tropics of Queensland World Heritage Area?**

No, this property is not located in the Wet Tropics of Queensland World Heritage Area.

## 1.2 Property location

Table 2 provides a summary of the locations for property Lot: 1 Plan: YK4, in relation to natural and administrative boundaries.

**Table 2: Property location details**

| Local Government(s) |
|---|
| Cook Shire |

| Bioregion(s) | Subregion(s) |
|---|---|
| Cape York Peninsula | Weipa Plateau |

| Catchment(s) |
|---|
| Archer |
| Watson |
| Embley |

# 2. Vegetation management framework (administered by the Department of Resources)

The *Vegetation Management Act 1999* (VMA), the Vegetation Management Regulation 2012, the *Planning Act 2016* and the Planning Regulation 2017, in conjunction with associated policies and codes, form the Vegetation Management Framework.

The VMA does not apply to all land tenures or vegetation types. State forests, national parks, forest reserves and some tenures under the *Forestry Act 1959* and *Nature Conservation Act 1992* are not regulated by the VMA. Managing or clearing vegetation on these tenures may require approvals under these laws.

The following native vegetation is not regulated under the VMA but may require permit(s) under other laws:

- grass or non-woody herbage;
- a plant within a grassland regional ecosystem prescribed under Schedule 5 of the Vegetation Management Regulation 2012; and
- a mangrove.

## 2.1 Exempt clearing work

Exempt clearing work is an activity for which you do not need to notify the Department of Resources or obtain an approval under the vegetation management framework. Exempt clearing work was previously known as exemptions.

In areas that are mapped as Category X (white in colour) on the regulated vegetation management map (see section 4.1), and where the land tenure is freehold, indigenous land and leasehold land for agriculture and grazing purposes, the clearing of vegetation is considered exempt clearing work and does not require notification or development approval under the vegetation management framework. For all other land tenures, contact the Department of Resources before commencing clearing to ensure that the proposed activity is exempt clearing work.

A range of routine property management activities are considered exempt clearing work. A list of exempt clearing work is available at
https://www.qld.gov.au/environment/land/management/vegetation/clearing-approvals/exemptions.

Exempt clearing work may be affected if the proposed clearing area is subject to development approval conditions, a covenant, an environmental offset, an exchange area, a restoration notice, or an area mapped as Category A. Exempt clearing work may require approval under other Commonwealth, State or Local Government laws, or local government planning schemes. Contact the Department of Resources prior to clearing in any of these areas.

## 2.2 Accepted development vegetation clearing codes

Some clearing activities can be undertaken under an accepted development vegetation clearing code. The codes can be downloaded at
https://www.qld.gov.au/environment/land/management/vegetation/clearing-approvals/codes

If you intend to clear vegetation under an accepted development vegetation clearing code, you must notify the Department of Resources before commencing. The information in this report will assist you to complete the online notification form.

You can complete the online form at
https://apps.dnrm.qld.gov.au/vegetation/

## 2.3 Area management plans

Area Management Plans (AMP) provide an alternative approval system for vegetation clearing under the vegetation management framework. They list the purposes and clearing conditions that have been approved for the areas covered by the plan. It is not necessary to use an AMP, even when an AMP applies to your property.

On 8 March 2020, AMPs ended for fodder harvesting, managing thickened vegetation and managing encroachment. New notifications cannot be made for these AMPs. You will need to consider options for fodder harvesting, managing thickened vegetation or encroachment under a relevant accepted development vegetation clearing code or apply for a development approval.

New notifications can be made for all other AMPs. These will continue to apply until their nominated end date.

If an Area Management Plan applies to your property for which you can make a new notification, it will be listed in Section 3.6 of this report. Before clearing under one of these AMPs, you must first notify the Department of Resources and then follow the conditions and requirements listed in the AMP.
https://www.qld.gov.au/environment/land/management/vegetation/clearing-approvals/area-management-plans

## 2.4 Development approvals

If under the vegetation management framework your proposed clearing is not exempt clearing work, or is not permitted under an accepted development vegetation clearing code, or an AMP, you may be able to apply for a development approval. Information on how to apply for a development approval is available at
https://www.qld.gov.au/environment/land/management/vegetation/clearing-approvals/development

## 2.5. Contact information for the Department of Resources

For further information on the vegetation management framework:
**Phone** 135VEG (135 834)
**Email** vegetation@resources.qld.gov.au
**Visit** https://www.resources.qld.gov.au/?contact=vegetation to submit an online enquiry.

# 3. Vegetation management framework for Lot: 1 Plan: YK4

## 3.1 Vegetation categories

The vegetation categories on your property are shown on the regulated vegetation management map in section 4.1 of this report. A summary of vegetation categories on the subject lot are listed in Table 3. Descriptions for these categories are shown in Table 4.

**Table 3: Vegetation categories for subject property. Total area: 89401.78ha**

| Vegetation category | Area (ha) |
|---|---|
| Category A | 113.8 |
| Category B | 88857.9 |
| Category X | 430.1 |

**Table 4: Description of vegetation categories**

| Category | Colour on Map | Description | Requirements / options under the vegetation management framework |
|---|---|---|---|
| A | red | Compliance areas, environmental offset areas and voluntary declaration areas | Special conditions apply to Category A areas. Before clearing, contact the Department of Resources to confirm any requirements in a Category A area. |
| B | dark blue | Remnant vegetation areas | Exempt clearing work, or notification and compliance with accepted development vegetation clearing codes, area management plans or development approval. |
| C | light blue | High-value regrowth areas | Exempt clearing work, or notification and compliance with managing Category C regrowth vegetation accepted development vegetation clearing code. |
| R | yellow | Regrowth within 50m of a watercourse or drainage feature in the Great Barrier Reef catchment areas | Exempt clearing work, or notification and compliance with managing Category R regrowth accepted development vegetation clearing code or area management plans. |
| X | white | Clearing on freehold land, indigenous land and leasehold land for agriculture and grazing purposes is considered exempt clearing work under the vegetation management framework. Contact the Department of Resources to clarify whether a development approval is required for other State land tenures. | No permit or notification required on freehold land, indigenous land and leasehold land for agriculture and grazing. A development approval may be required for some State land tenures. |

**Property Map of Assessable Vegetation (PMAV)**

The following Property Map of Assessable Vegetation (PMAVs) may be present on this property:

**Reference number**

2009/009594

2010/004960

## 3.2 Regional ecosystems

The endangered, of concern and least concern regional ecosystems on your property are shown on the vegetation management supporting map in section 4.2 and are listed in Table 5.

A description of regional ecosystems can be accessed online at https://www.qld.gov.au/environment/plants-animals/plants/ecosystems/descriptions/

**Table 5: Regional ecosystems present on subject property**

| Regional Ecosystem | VMA Status | Category | Area (Ha) | Short Description | Structure Category |
|---|---|---|---|---|---|
| 3.3.10 | Least concern | B | 1,949.70 | Melaleuca fluviatilis and/or Melaleuca argentea woodland or M. saligna or M. dealbata woodland fringing watercourses | Mid-dense |
| 3.3.20 | Least concern | B | 4,605.21 | Corymbia clarksoniana or C. novoguinensis woodland on alluvial plains | Sparse |
| 3.3.24 | Least concern | B | 2,081.88 | Eucalyptus leptophleba +/- Erythrophleum chlorostachys woodland on riverine levees and alluvial plains | Sparse |
| 3.3.28 | Least concern | B | 318.41 | Eucalyptus platyphylla and Corymbia clarksoniana woodland on alluvial plains | Sparse |
| 3.3.31 | Least concern | B | 253.22 | Eucalyptus tetrodonta +/- Corymbia spp. woodland on coastal plains | Sparse |
| 3.3.38 | Least concern | B | 65.63 | Deciduous notophyll and/or microphyll vine thicket +/- Lagerstroemia archeriana on heavy clay alluvium | Dense |
| 3.3.49 | Least concern | A | 11.38 | Melaleuca viridiflora +/- Corymbia clarksoniana low open woodland on floodplains and alluvial plains | Very sparse |
| 3.3.49 | Least concern | B | 8,178.33 | Melaleuca viridiflora +/- Corymbia clarksoniana low open woodland on floodplains and alluvial plains | Very sparse |
| 3.3.49 | Least concern | X | less than 0.01 | Melaleuca viridiflora +/- Corymbia clarksoniana low open woodland on floodplains and alluvial plains | Very sparse |
| 3.3.5 | Least concern | B | 807.05 | Evergreen to semi-deciduous notophyll vine forest on alluvia on major watercourses | Dense |
| 3.3.50 | Least concern | B | 2,104.51 | Melaleuca spp. woodland on swamps on floodplains and non-floodplain landforms | Sparse |
| 3.3.66 | Least concern | B | 249.61 | Lakes and lagoons dominated by a variety of aquatic plants, frequently with fringing woodlands or sedgelands | Other |
| 3.5.36 | Least concern | B | 5,580.54 | Eucalyptus tetrodonta and Corymbia nesophila woodland to open forest on undulating plains and remnant plateaus | Sparse |
| 3.5.39 | Least concern | A | 68.27 | Eucalyptus tetrodonta +/- Corymbia clarksoniana woodland on sand plains | Sparse |
| 3.5.39 | Least concern | B | 38,483.70 | Eucalyptus tetrodonta +/- Corymbia clarksoniana woodland on sand plains | Sparse |
| 3.5.39 | Least concern | X | less than 0.01 | Eucalyptus tetrodonta +/- Corymbia clarksoniana woodland on sand plains | Sparse |
| 3.5.41 | Least concern | B | 1,517.55 | Melaleuca viridiflora +/- Corymbia clarksoniana woodland to low open woodland on plains | Sparse |

| Regional Ecosystem | VMA Status | Category | Area (Ha) | Short Description | Structure Category |
|---|---|---|---|---|---|
| 3.7.3 | Least concern | B | 161.18 | Eucalyptus cullenii +/- E. tetrodonta woodland on erosional escarpments and plains | Sparse |
| 3.7.4 | Least concern | B | 653.26 | Eucalyptus tetrodonta and Corymbia stockeri woodland on ironstone knolls and slopes | Sparse |
| 3.9.4 | Least concern | A | 34.13 | Eucalyptus leptophleba +/- Corymbia dallachiana or Eucalyptus platyphylla open woodland on rolling plains | Very sparse |
| 3.9.4 | Least concern | B | 21,474.22 | Eucalyptus leptophleba +/- Corymbia dallachiana or Eucalyptus platyphylla open woodland on rolling plains | Very sparse |
| 3.9.4 | Least concern | X | less than 0.01 | Eucalyptus leptophleba +/- Corymbia dallachiana or Eucalyptus platyphylla open woodland on rolling plains | Very sparse |
| 3.9.5 | Least concern | B | 374.87 | Corymbia papuana open woodland on rolling plains | Very sparse |
| non-rem | None | X | 430.15 | None | None |

Please note:

1. All area and area derived figures included in this table have been calculated via reprojecting relevant spatial features to Albers equal-area conic projection (central meridian = 146, datum Geocentric Datum of Australia 1994). As a result, area figures may differ slightly if calculated for the same features using a different co-ordinate system.

2. If Table 5 contains a Category 'plant', please be aware that this refers to 'plantations' such as forestry, and these areas are considered non-remnant under the VMA.

The VMA status of the regional ecosystem (whether it is endangered, of concern or least concern) also determines if any of the following are applicable:

- exempt clearing work;
- accepted development vegetation clearing codes;
- performance outcomes in State Code 16 of the State Development Assessment Provisions (SDAP).

## 3.3 Watercourses

Vegetation management watercourses and drainage features for this property are shown on the vegetation management supporting map in section 4.2.

## 3.4 Wetlands

Vegetation management wetlands are present on this property and are shown on the vegetation management supporting map in section 4.2 of this report.

## 3.5 Essential habitat

Under the VMA, essential habitat for protected wildlife is native wildlife prescribed under the *Nature Conservation Act 1992* (NCA) as critically endangered, endangered, vulnerable or near-threatened wildlife.

Essential habitat for protected wildlife includes suitable habitat on the lot, or where a species has been known to occur up to 1.1 kilometres from a lot on which there is assessable vegetation. These important habitat areas are protected under the VMA.

Any essential habitat on this property will be shown as blue hatching on the vegetation supporting map in section 4.2.

If essential habitat is identified on the lot, information about the protected wildlife species is provided in Table 6 below. The numeric labels on the vegetation management supporting map can be cross referenced with Table 6 to outline the essential

habitat factors for that particular species. There may be essential habitat for more than one species on each lot, and areas of Category A, Category B and Category C can be mapped as Essential Habitat.

Essential habitat is compiled from a combination of species habitat models and buffered species records. Regional ecosystem is a mandatory essential habitat factor, unless otherwise stated. Essential habitat, for protected wildlife, means an area of vegetation shown on the Regulated Vegetation Management Map -

1) that has at least 3 essential habitat factors for the protected wildlife that must include any essential habitat factors that are stated as mandatory for the protected wildlife in the essential habitat database. Essential habitat factors are comprised of - regional ecosystem (mandatory for most species), vegetation community, altitude, soils, position in landscape; or

2) in which the protected wildlife, at any stage of its life cycle, is located.

If there is no essential habitat mapping shown on the vegetation management supporting map for this lot, and there is no table in the sections below, it confirms that there is no essential habitat on the lot.

**Category A and/or Category B and/or Category C**

**Table 6: Essential habitat in Category A and/or Category B and/or Category C**

No records

## 3.6 Area Management Plan(s)

Nil

## 3.7 Coastal or non-coastal

**For the purposes of the accepted development vegetation clearing codes and State Code 16 of the State Development Assessment Provisions (SDAP), this property is regarded as***

Non Coastal

*See also Map 4.3

## 3.8 Agricultural Land Class A or B

The following can be used to identify Agricultural Land Class A or B areas under the "Managing regulated regrowth vegetation" accepted development vegetation clearing code:

**Does this lot contain land that is mapped as Agricultural Land Class A or B in the State Planning Interactive Mapping System?**

No Class A

Class B (with urban areas masked as per SPP): 64371.72ha

Note - This confirms Agricultural Land Classes as per the State Planning Interactive Mapping System only. This response does not include Agricultural Land Classes identified under local government planning schemes. For further information, check the Planning Scheme for your local government area.

See Map 4.4 to identify the location and extent of Class A and/or Class B Agricultural land on Lot: 1 Plan: YK4.

# 4. Vegetation management framework maps

Vegetation management maps included in this report may also be requested individually at:
https://www.resources.qld.gov.au/qld/environment/land/vegetation/vegetation-map-request-form

**Regulated vegetation management map**

The regulated vegetation management map shows vegetation categories needed to determine clearing requirements. These maps are updated monthly to show new property maps of assessable vegetation (PMAV).

**Vegetation management supporting map**

The vegetation management supporting map provides information on regional ecosystems, wetlands, watercourses and essential habitat.

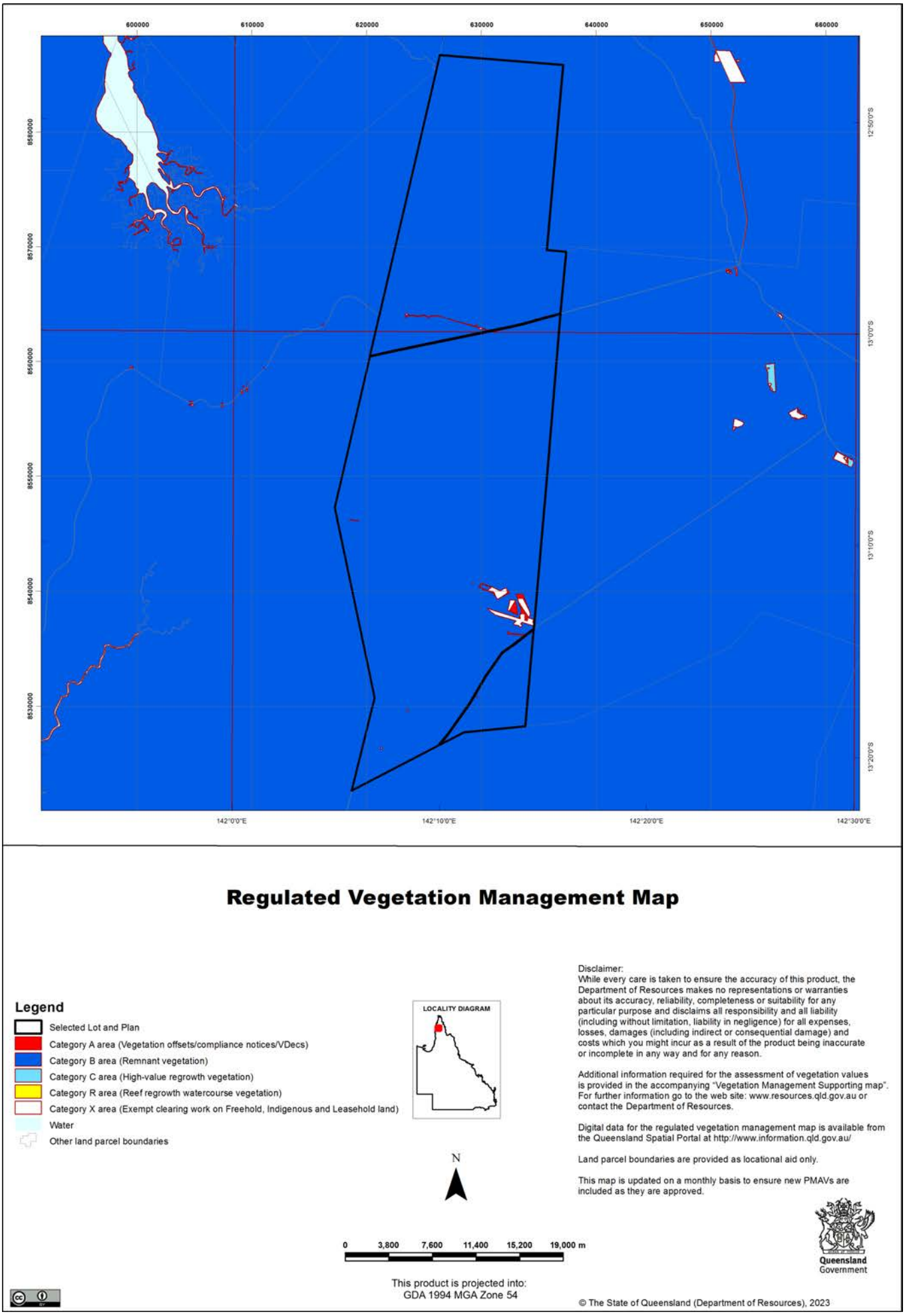
**Coastal/non-coastal map**

The coastal/non-coastal map confirms whether the lot, or which parts of the lot, are considered coastal or non-coastal for the purposes of the accepted development vegetation clearing codes and State Code 16 of the State Development Assessment Provisions (SDAP).

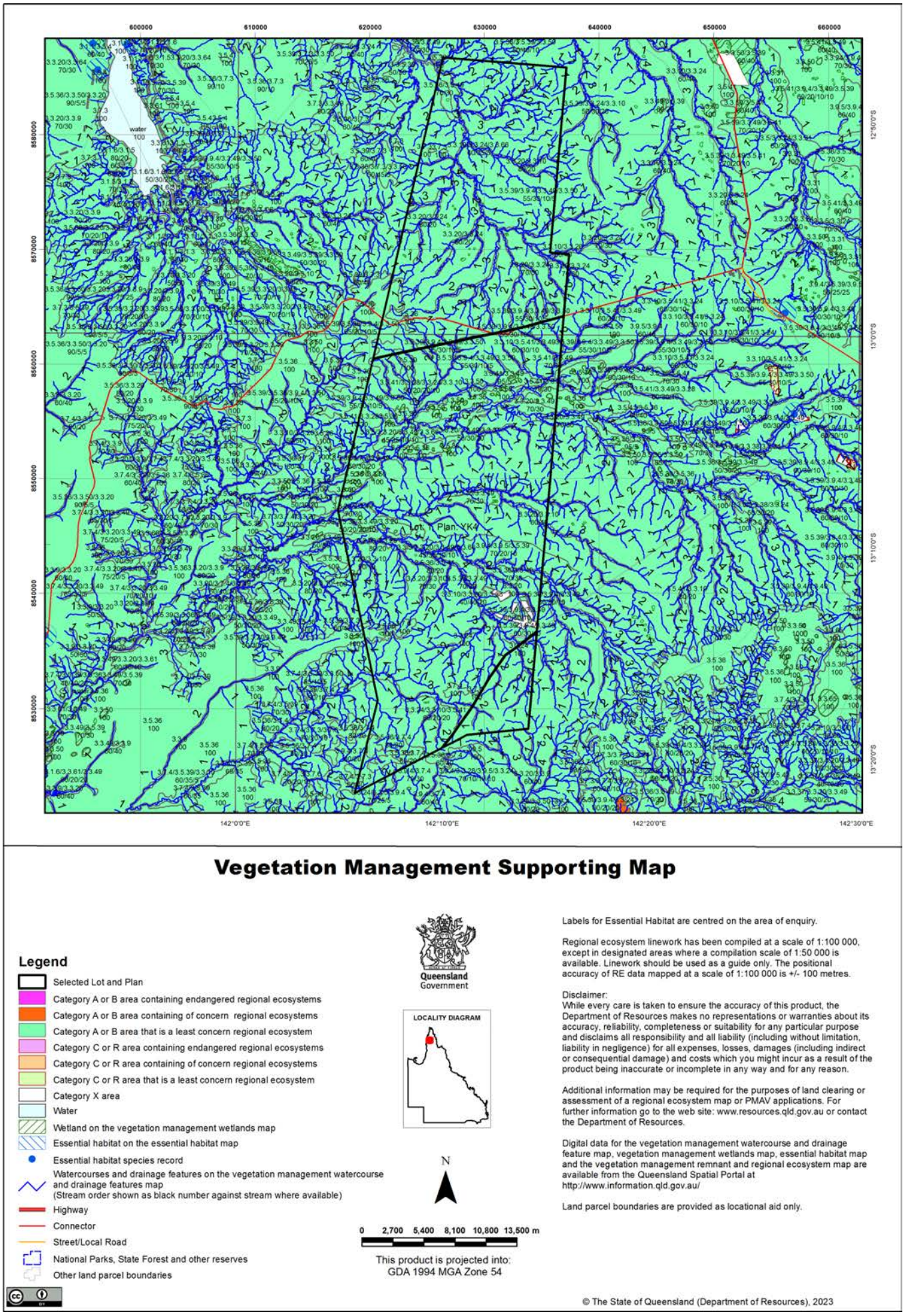
**Agricultural Land Class A or B as per State Planning Policy: State Interest for Agriculture**

The Agricultural Land Class map confirms the location and extent of land mapped as Agricultural Land Classes A or B as identified on the State Planning Interactive Mapping System. Please note that this map does not include areas identified as Agricultural Land Class A or B in local government planning schemes. This map can be used to identify Agricultural Land Class A or B areas under the "Managing regulated regrowth vegetation" accepted development vegetation clearing code.

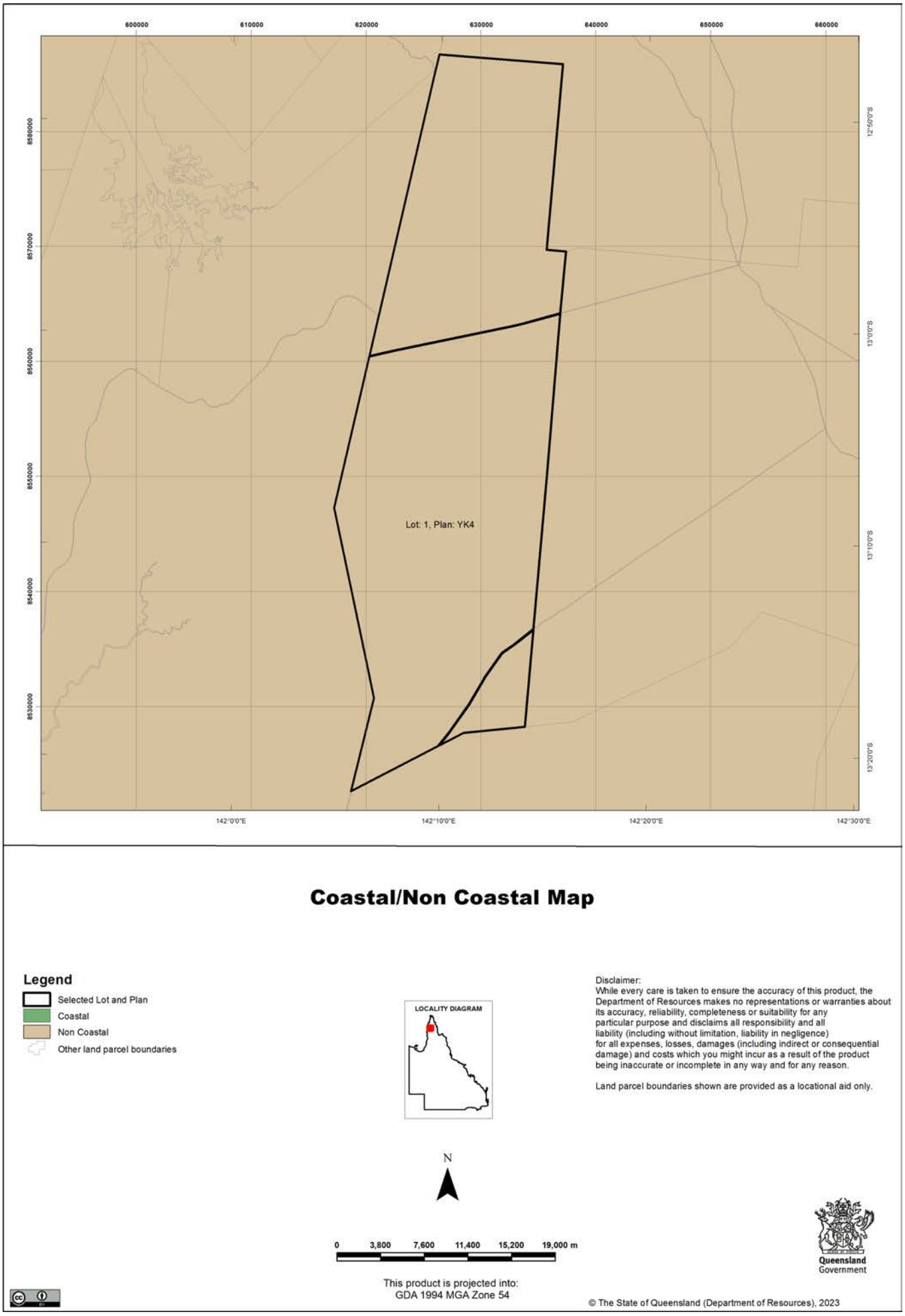
# 4.1 Regulated vegetation management map



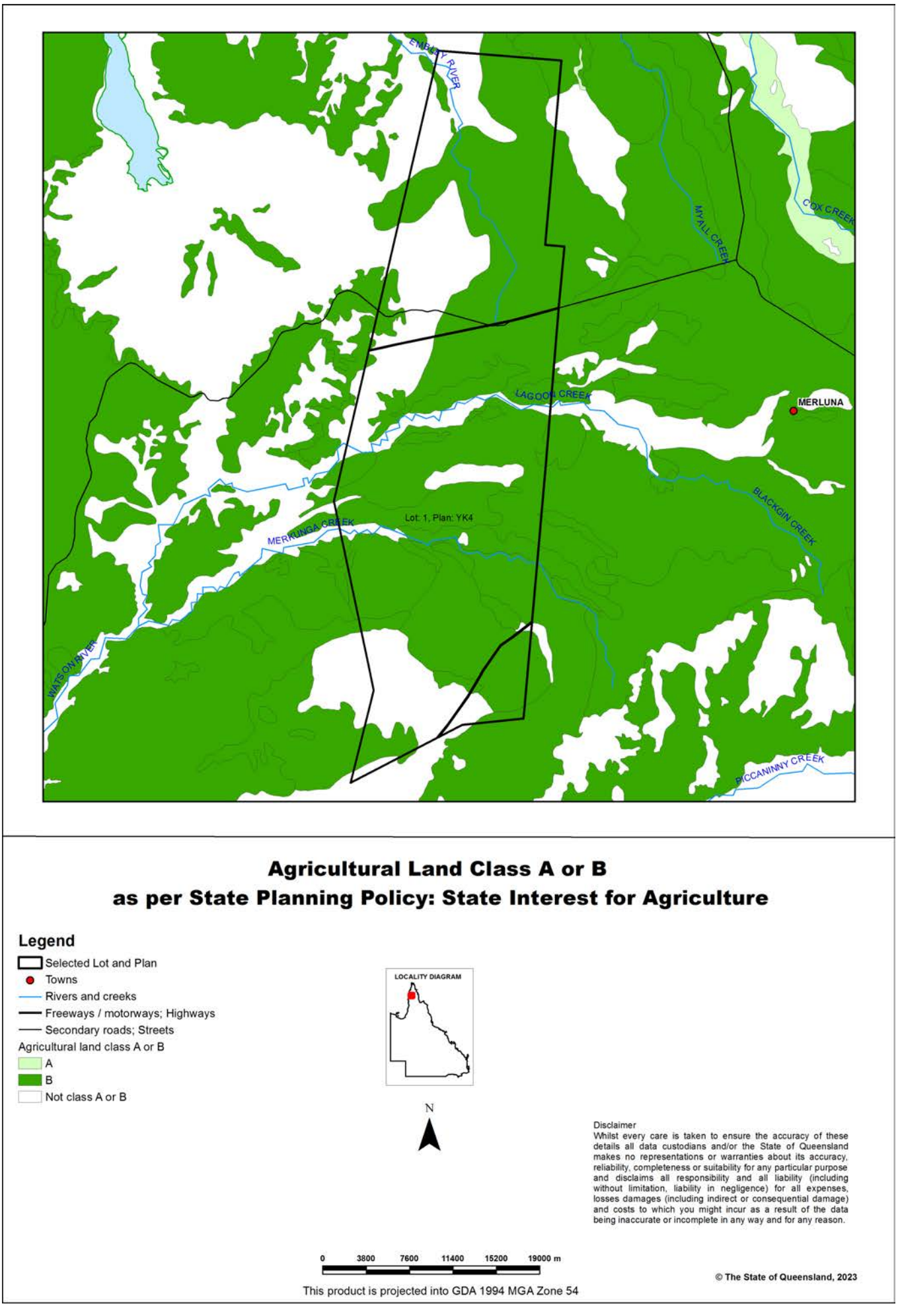
# 4.2 Vegetation management supporting map



## 4.3 Coastal/non-coastal map



## 4.4 Agricultural Land Class A or B as per State Planning Policy: State Interest for Agriculture



# 5. Protected plants framework (administered by the Department of Environment and Science (DES))

In Queensland, all plants that are native to Australia are protected plants under the *Nature Conservation Act 1992* (NCA). The NCA regulates the clearing of protected plants 'in the wild' (see Operational policy: When a protected plant in Queensland is considered to be 'in the wild') that are listed as critically endangered, endangered, vulnerable or near threatened under the Act.

Please note that the protected plant clearing framework applies irrespective of the classification of the vegetation under the *Vegetation Management Act 1999* and any approval or exemptions given under another Act, for example, the *Vegetation Management Act 1999* or *Planning Regulation 2017*.

## 5.1 Clearing in high risk areas on the flora survey trigger map

The flora survey trigger map identifies high-risk areas for threatened and near threatened plants. These are areas where threatened or near threatened plants are known to exist or are likely to exist based on the habitat present. The flora survey trigger map for this property is provided in section 5.5.

If you are proposing to clear an area shown as high risk on the flora survey trigger map, a flora survey of the clearing impact area must be undertaken by a suitably qualified person in accordance with the Flora survey guidelines. The main objective of a flora survey is to locate any threatened or near threatened plants that may be present in the clearing impact area.

If the flora survey identifies that threatened or near threatened plants are not present within the clearing impact area or clearing within 100m of a threatened or near threatened plant can be avoided, the clearing activity is exempt from a permit. An exempt clearing notification form must be submitted to the Department of Environment and Science, with a copy of the flora survey report, at least one week prior to clearing.

If the flora survey identifies that threatened or near threatened plants are present in, or within 100m of, the area to be cleared, a clearing permit is required before any clearing is undertaken. The flora survey report, as well as an impact management report, must be submitted with the clearing permit application form.

## 5.2 Clearing outside high risk areas on the flora survey trigger map

In an area other than a high risk area, a clearing permit is only required where a person is, or becomes aware that threatened or near threatened plants are present in, or within 100m of, the area to be cleared. You must keep a copy of the flora survey trigger map for the area subject to clearing for five years from the day the clearing starts. If you do not clear within the 12 month period that the flora survey trigger map was printed, you need to print and check a new flora survey trigger map.

## 5.3 Exemptions

Many activities are 'exempt' under the protected plant clearing framework, which means that clearing of native plants that are in the wild can be undertaken for these activities with no need for a flora survey or a protected plant clearing permit. The Information sheet - General exemptions for the take of protected plants provides some of these exemptions.

Some exemptions under the NCA are the same as exempt clearing work (formerly known as exemptions) under the *Vegetation Management Act 1999* (i.e. listed in Schedule 21 of the Planning Regulations 2017) while some are different.

## 5.4 Contact information for DES

For further information on the protected plants framework:
**Phone** 1300 130 372 (and select option four)
**Email** palm@des.qld.gov.au
**Visit** https://www.qld.gov.au/environment/plants-animals/plants/protected-plants

## 5.5 Protected plants flora survey trigger map

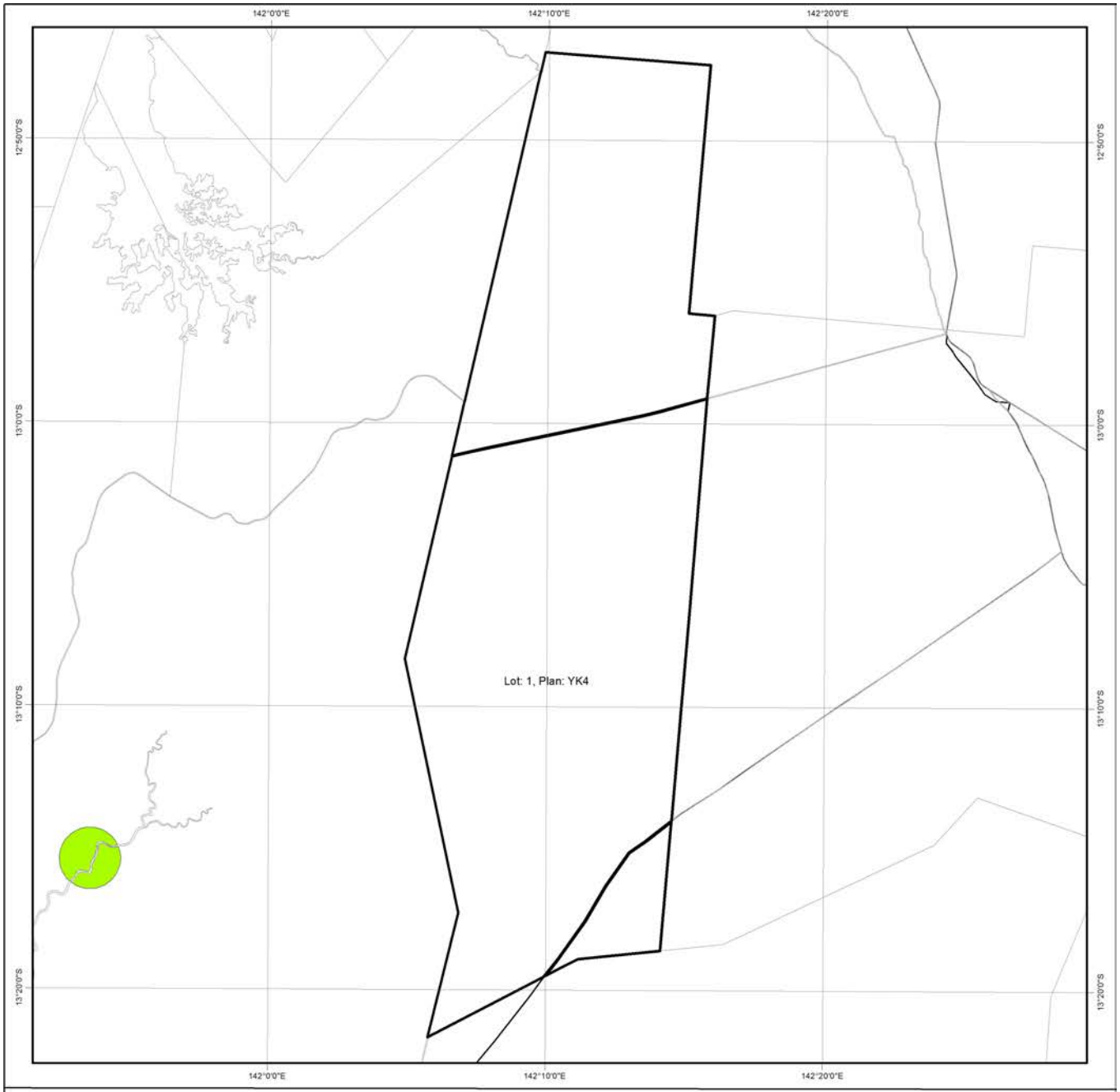
This map included may also be requested individually at: https://apps.des.qld.gov.au/map-request/flora-survey-trigger/.

**Updates to the data informing the flora survey trigger map**

The flora survey trigger map will be reviewed, and updated if necessary, at least every 12 months to ensure the map reflects the most up-to-date and accurate data available.

**Species information**

Please note that flora survey trigger maps do not identify species associated with 'high risk areas'. While some species information may be publicly available, for example via the Queensland Spatial Catalogue, the Department of Environment and Science does not provide species information on request. Regardless of whether species information is available for a particular high risk area, clearing plants in a high risk area may require a flora survey and/or clearing permit. Please see the Department of Environment and Science webpage on the clearing of protected plants for more information.




# Protected Plants Flora Survey Trigger Map

## Legend

- Selected Lot and Plan
- High risk area
- Other land parcel boundaries
- Freeways / motorways / highways
- Secondary roads / streets


N

0 2,500 5,000 7,500 10,000 12,500 m

This product is projected into:
GDA 1994 MGA Zone 54

This map shows areas where particular provisions of the Nature Conservation Act 1992 apply to the clearing of protected plants.

Land parcel boundaries are provided as locational aid only.

This map is produced at a scale relevant to the size of the area selected and should be printed as A4 size in portrait orientation.

For further information or assistance with interpretation of this product, please contact the Department of Environment and Science at palm@des.qld.gov.au

Disclaimer:
While every care is taken to ensure the accuracy of the data used to generate this product, the Queensland Government makes no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaim all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damages) and costs which might be incurred as a consequence of reliance on the data, or as a result of the data being inaccurate or incomplete in any way and for any reason.

# 6. Koala protection framework (administered by the Department of Environment and Science (DES))

The koala (*Phascolarctos cinereus*) is listed in Queensland as endangered by the Queensland Government under *Nature Conservation Act 1992* and by the Australian Government under the *Environment Protection and Biodiversity Conservation Act 1999*.

The Queensland Government's koala protection framework is comprised of the *Nature Conservation Act 1992*, the Nature Conservation (Animals) Regulation 2020, the Nature Conservation (Koala) Conservation Plan 2017, the *Planning Act 2016* and the Planning Regulation 2017.

## 6.1 Koala mapping

### 6.1.1 Koala districts

The parts of Queensland where koalas are known to occur has been divided into three koala districts - koala district A, koala district B and koala district C. Each koala district is made up of areas with comparable koala populations (e.g. density, extent and significance of threatening processes affecting the population) which require similar management regimes.

Section 7.1 identifies which koala district your property is located in.

### 6.1.2 Koala habitat areas

Koala habitat areas are areas of vegetation that have been determined to contain koala habitat that is essential for the conservation of a viable koala population in the wild based on the combination of habitat suitability and biophysical variables with known relationships to koala habitat (e.g. landcover, soil, terrain, climate and ground water). In order to protect this important koala habitat, clearing controls have been introduced into the Planning Regulation 2017 for development in koala habitat areas.

Please note that koala habitat areas only exist in koala district A which is the South East Queensland "Shaping SEQ" Regional Plan area. These areas include the local government areas of Brisbane, Gold Coast, Logan, Lockyer Valley, Ipswich, Moreton Bay, Noosa, Redland, Scenic Rim, Somerset, Sunshine Coast and Toowoomba (urban extent).

There are two different categories of koala habitat area (core koala habitat area and locally refined koala habitat), which have been determined using two different methodologies. These methodologies are described in the document Spatial modelling in South East Queensland.

Section 7.2 shows any koala habitat area that exists on your property.

Under the Nature Conservation (Koala) Conservation Plan 2017, an owner of land (or a person acting on the owner's behalf with written consent) can request to make, amend or revoke a koala habitat area determination if they believe, on reasonable grounds, that the existing determination for all or part of their property is incorrect.

More information on requests to make, amend or revoke a koala habitat area determination can be found in the document Guideline - Requests to make, amend or revoke a koala habitat area determination.

The koala habitat area map will be updated at least annually to include any koala habitat areas that have been made, amended or revoked.

Changes to the koala habitat area map which occur between annual updates because of a request to make, amend or revoke a koala habitat area determination can be viewed on the register of approved requests to make, amend or revoke a koala habitat area available at: https://environment.des.qld.gov.au/wildlife/animals/living-with/koalas/mapping/koalamaps. The register includes the lot on plan for the change, the date the decision was made and the map issued to the landholder that shows areas determined to be koala habitat areas.

### 6.1.3 Koala priority areas

Koala priority areas are large, connected areas that have been determined to have the highest likelihood of achieving conservation outcomes for koalas based on the combination of habitat suitability, biophysical variables with known relationships to koala habitat (e.g. landcover, soil, terrain, climate and ground water) and a koala conservation cost benefit analysis.

Conservation efforts will be prioritised in these areas to ensure the conservation of viable koala populations in the wild including a focus on management (e.g. habitat protection, habitat restoration and threat mitigation) and monitoring. This includes a prohibition on clearing in koala habitat areas that are in koala priority areas under the Planning Regulation 2017 (subject to some exemptions).

Please note that koala priority areas only exist in koala district A which is the South East Queensland "Shaping SEQ" Regional Plan area. These areas include the local government areas of Brisbane, Gold Coast, Logan, Lockyer Valley,

Ipswich, Moreton Bay, Noosa, Redland, Scenic Rim, Somerset, Sunshine Coast and Toowoomba (urban extent).

Section 7.2 identifies if your property is in a koala priority area.

#### 6.1.4 Identified koala broad-hectare areas

There are seven identified koala broad-hectare areas in SEQ. These are areas of koala habitat that are located in areas committed to meet development targets in the SEQ Regional Plan to accommodate SEQ's growing population including bring-forward Greenfield sites under the Queensland Housing Affordability Strategy and declared master planned areas under the repealed *Sustainable Planning Act 2009* and the repealed *Integrated Planning Act 1997*.

Specific assessment benchmarks apply to development applications for development proposed in identified koala broad-hectare areas to ensure koala conservation measures are incorporated into the proposed development.

Section 7.2 identifies if your property is in an identified koala broad-hectare area.

## 6.2 Koala habitat planning controls

On 7 February 2020, the Queensland Government introduced new planning controls to the Planning Regulation 2017 to strengthen the protection of koala habitat in South East Queensland (i.e. koala district A).

More information on these planning controls can be found here:
https://environment.des.qld.gov.au/wildlife/animals/living-with/koalas/mapping/legislation-policy.

As a high-level summary, the koala habitat planning controls make:

- development that involves interfering with koala habitat (defined below) in an area that is both a koala priority area and a koala habitat area, prohibited development (i.e. development for which a development application cannot be made);
- development that involves interfering with koala habitat (defined below) in an area that is a koala habitat area but is not a koala priority area, assessable development (i.e. development for which development approval is required); and
- development that is for extractive industries where the development involves interfering with koala habitat (defined below) in an area that is both a koala habitat area and a key resource area, assessable development (i.e. development for which development approval is required).

**Interfering with koala habitat** means:

1) Removing, cutting down, ringbarking, pushing over, poisoning or destroying in anyway, including by burning, flooding or draining native vegetation in a koala habitat area; but
2) Does not include destroying standing vegetation by stock or lopping a tree.

However, these planning controls do not apply if the development is exempted development as defined in Schedule 24 of the Planning Regulation 2017. More information on exempted development can be found here:
https://environment.des.qld.gov.au/wildlife/animals/living-with/koalas/mapping/legislation-policy.

There are also assessment benchmarks that apply to development applications for:

- building works, operational works, material change of use or reconfiguration of a lot where:
  - the local government planning scheme makes the development assessable;
  - the premises includes an area that is both a koala priority area and a koala habitat area; and
  - the development does not involve interfering with koala habitat (defined above); and

- development in identified koala broad-hectare areas.

The Guideline - Assessment Benchmarks in relation to Koala Habitat in South East Queensland assessment benchmarks outlines these assessment benchmarks, the intent of these assessment benchmarks and advice on how proposed development may meet these assessment benchmarks.

## 6.3 Koala Conservation Plan clearing requirements

Section 10 and 11 of the Nature Conservation (Koala) Conservation Plan 2017 prescribes requirements that must be met when clearing koala habitat in koala district A and koala district B.

These clearing requirements are independent to the koala habitat planning controls introduced into the Planning Regulation 2017, which means they must be complied with irrespective of any approvals or exemptions offered under other legislation.

Unlike the clearing controls prescribed in the Planning Regulation 2017 that are to protect koala habitat, the clearing requirements prescribed in the Nature Conservation (Koala) Conservation Plan 2017 are in place to prevent the injury or death of koalas when koala habitat is being cleared.

## 6.4 Contact information for DES

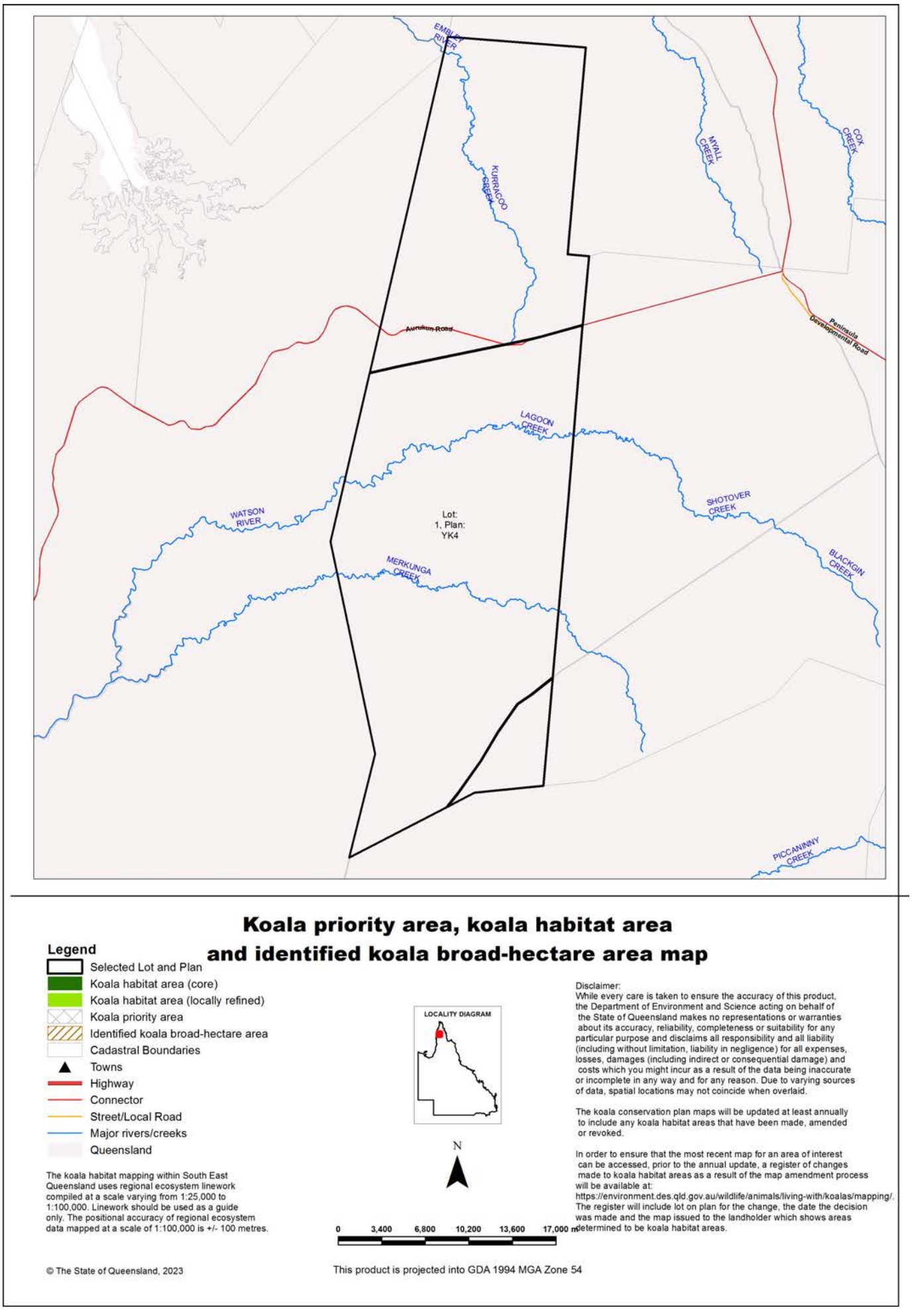
For further information on the koala protection framework:
**Phone** 13 QGOV (13 74 68)
**Email** koala.assessment@des.qld.gov.au
**Visit** https://environment.des.qld.gov.au/wildlife/animals/living-with/koalas/mapping

# 7. Koala protection framework details for Lot: 1 Plan: YK4

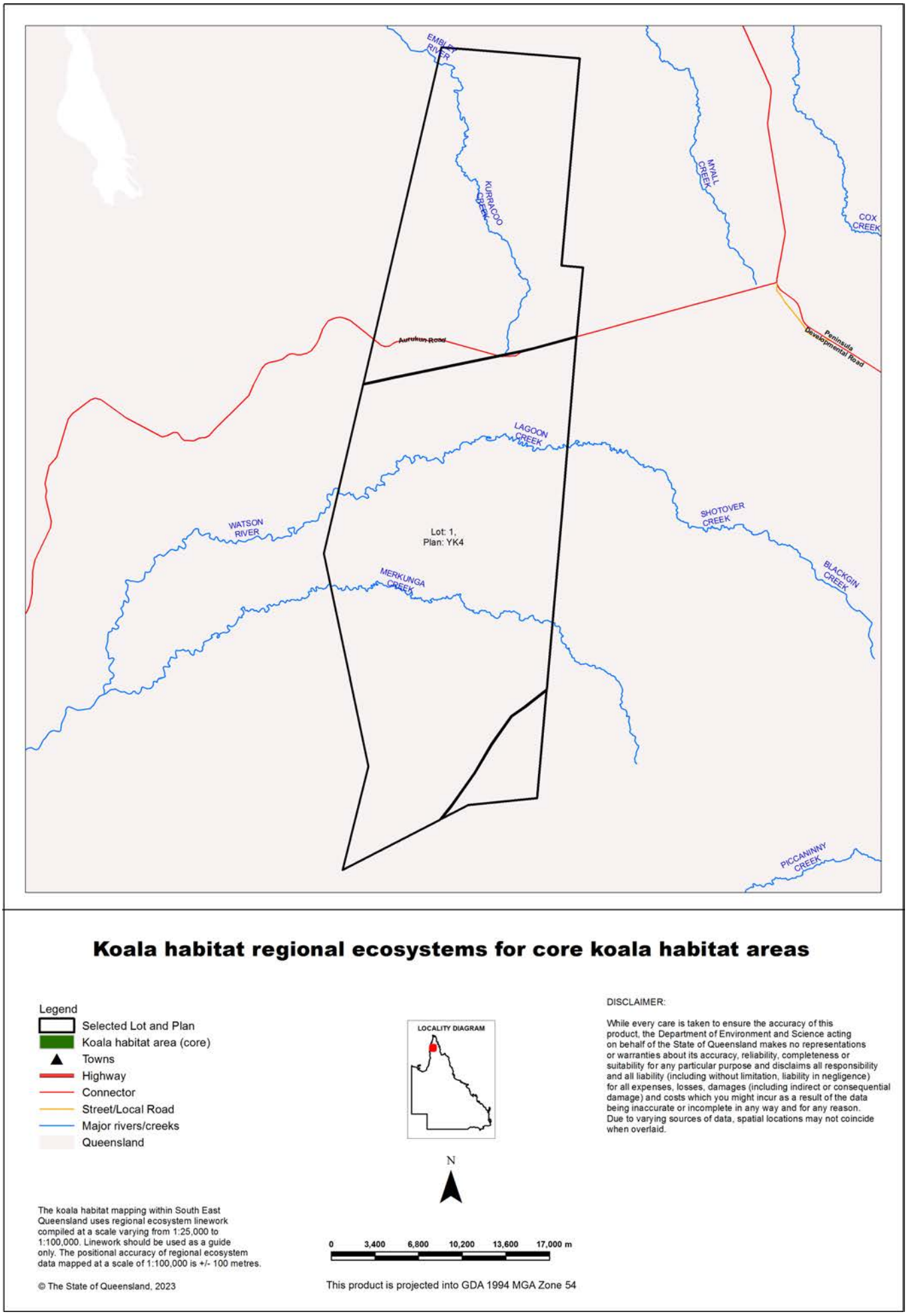
## 7.1 Koala districts

(no results)

## 7.2 Koala priority area, koala habitat area and identified koala broad-hectare area map



# 7.3 Koala habitat regional ecosystems for core koala habitat areas



# 8. Other relevant legislation contacts list

| Activity | Legislation | Agency | Contact details |
|---|---|---|---|
| • Interference with overland flow<br>• Earthworks, significant disturbance | *Water Act 2000*<br>*Soil Conservation Act 1986* | Department of Regional Development, Manufacturing and Water<br>(Queensland Government)<br>Department of Resources<br>(Queensland Government) | Ph: 13 QGOV (13 74 68)<br>www.rdmw.qld.gov.au<br>www.resources.qld.gov.au |
| • Indigenous Cultural Heritage | *Aboriginal Cultural Heritage Act 2003*<br>*Torres Strait Islander Cultural Heritage Act 2003* | Department of Seniors, Disability Services and Aboriginal and Torres Strait Islander Partnerships | Ph: 13 QGOV (13 74 68)<br>www.datsip.qld.gov.au |
| • Mining and environmentally relevant activities<br>• Infrastructure development (coastal)<br>• Heritage issues | *Environmental Protection Act 1994*<br>*Coastal Protection and Management Act 1995*<br>*Queensland Heritage Act 1992* | Department of Environment and Science<br>(Queensland Government) | Ph: 13 QGOV (13 74 68)<br>www.des.qld.gov.au |
| • Protected plants and protected areas | *Nature Conservation Act 1992* | Department of Environment and Science<br>(Queensland Government) | Ph: 1300 130 372 (option 4)<br>palm@des.qld.gov.au<br>www.des.qld.gov.au |
| • Koala mapping and regulations | *Nature Conservation Act 1992* | Department of Environment and Science<br>(Queensland Government) | Ph: 13 QGOV (13 74 68)<br>Koala.assessment@des.qld.gov.au |
| • Interference with fish passage in a watercourse, mangroves<br>• Forestry activities on State land tenures | *Fisheries Act 1994*<br>*Forestry Act 1959* | Department of Agriculture and Fisheries<br>(Queensland Government) | Ph: 13 QGOV (13 74 68)<br>www.daf.qld.gov.au |
| • Matters of National Environmental Significance including listed threatened species and ecological communities | *Environment Protection and Biodiversity Conservation Act 1999* | Department of Agriculture, Water and the Environment<br>(Australian Government) | Ph: 1800 803 772<br>www.environment.gov.au |
| • Development and planning processes | *Planning Act 2016*<br>*State Development and Public Works Organisation Act 1971* | Department of State Development, Infrastructure, Local Government and Planning<br>(Queensland Government) | Ph: 13 QGOV (13 74 68)<br>www.dsdmip.qld.gov.au |
| • Local government requirements | *Local Government Act 2009*<br>*Planning Act 2016* | Department of State Development, Infrastructure, Local Government and Planning<br>(Queensland Government) | Ph: 13 QGOV (13 74 68)<br>Your relevant local government office |
| • Harvesting timber in the Wet Tropics of Qld World Heritage area | *Wet Tropics World Heritage Protection and Management Act 1993* | Wet Tropics Management Authority | Ph: (07) 4241 0500<br>www.wettropics.gov.au |

# Appendix C

## EPBC Act Offset calculators

EMM
creating opportunities

# C.1 Offset Area 1

# Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

| Matter of National Environmental Significance | |
|---|---|
| **Name** | Black-Footed Tree-Rat |
| **EPBC Act status** | Vulnerable |
| **Annual probability of extinction**<br>Based on IUCN category definitions | **0.2%** |

| Key to Cell Colours |
|---|
| User input required |
| Drop-down list |
| Calculated output |
| Not applicable to attribute |

## Impact calculator

**Impact calculator**

| Protected matter attributes | Attribute relevant to case? | Description | Quantum of impact | | Units | Information source |
|---|---|---|---|---|---|---|
| ***Ecological communities*** | | | | | | |
| **Area of community** | No | | **Area** | | | |
| | | | **Quality** | | | |
| | | | **Total quantum of impact** | 0.00 | | |
| ***Threatened species habitat*** | | | | | | |
| **Area of habitat** | Yes | | **Area** | 6885 | Hectares | |
| | | | **Quality** | **7** | Scale 0-10 | |
| | | | **Total quantum of impact** | ##### | Adjusted hectares | |
| **Protected matter attributes** | **Attribute relevant to case?** | **Description** | **Quantum of impact** | | **Units** | **Information source** |
| **Number of features**<br>e.g. Nest hollows, habitat trees | No | | | | | |
| **Condition of habitat**<br>Change in habitat condition, but no change in extent | No | | | | | |
| ***Threatened species*** | | | | | | |
| **Birth rate**<br>e.g. Change in nest success | No | | | | | |
| **Mortality rate**<br>e.g Change in number of road kills per year | No | | | | | |
| **Number of individuals**<br>e.g. Individual plants/animals | No | | | | | |

## Offset calculator

**Offset calculator**

| Protected matter attributes | Attribute relevant to case? | Total quantum of impact | Units | Proposed offset | Time horizon (years) | | Start area and quality | | Future area and quality without offset | | Future area and quality with offset | | Raw gain | Confidence in result (%) | Adjusted gain | Net present value (adjusted hectares) | % of impact offset | Minimum (90%) direct offset requirement met? | Cost ($ total) | Information source |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Ecological Communities*** | | | | | | | | | | | | | | | | | | | | |
| **Area of community** | No | | | | **Risk-related time horizon (max. 20 years)** | | **Start area (hectares)** | | **Risk of loss (%) without offset** | | **Risk of loss (%) with offset** | | | | | | | | | |
| | | | | | | | | | **Future area without offset (adjusted hectares)** | 0.0 | **Future area with offset (adjusted hectares)** | 0.0 | | | | | | | | |
| | | | | | **Time until ecological benefit** | | **Start quality (scale of 0-10)** | | **Future quality without offset (scale of 0-10)** | | **Future quality with offset (scale of 0-10)** | | | | | | | | | |
| ***Threatened species habitat*** | | | | | | | | | | | | | | | | | | | | |
| **Area of habitat** | Yes | 4819.57 | Adjusted hectares | | **Time over which loss is averted (max. 20 years)** | 20 | **Start area (hectares)** | 31000 | **Risk of loss (%) without offset** | 1% | **Risk of loss (%) with offset** | 0% | | | | | | | | |
| | | | | | | | | | **Future area without offset (adjusted hectares)** | 30690.0 | **Future area with offset (adjusted hectares)** | 31000.0 | 310.00 | 80% | 248.00 | 238.29 | 4908.68 | 101.85% | Yes | |
| | | | | | **Time until ecological benefit** | 20 | **Start quality (scale of 0-10)** | **7** | **Future quality without offset (scale of 0-10)** | **6** | **Future quality with offset (scale of 0-10)** | **8** | 2.00 | 80% | 1.60 | 1.54 | | | | |
| **Protected matter attributes** | **Attribute relevant to case?** | **Total quantum of impact** | **Units** | **Proposed offset** | **Time horizon (years)** | | **Start value** | | **Future value without offset** | | **Future value with offset** | | **Raw gain** | **Confidence in result (%)** | **Adjusted gain** | **Net present value** | **% of impact offset** | **Minimum (90%) direct offset requirement met?** | **Cost ($ total)** | **Information source** |
| **Number of features**<br>e.g. Nest hollows, habitat trees | No | | | | | | | | | | | | | | | | | | | |
| **Condition of habitat**<br>Change in habitat condition, but no change in extent | No | | | | | | | | | | | | | | | | | | | |
| ***Threatened species*** | | | | | | | | | | | | | | | | | | | | |
| **Birth rate**<br>e.g. Change in nest success | No | | | | | | | | | | | | | | | | | | | |
| **Mortality rate**<br>e.g Change in number of road kills per year | No | | | | | | | | | | | | | | | | | | | |
| **Number of individuals**<br>e.g. Individual plants/animals | No | | | | | | | | | | | | | | | | | | | |

## Summary

**Summary**

| Protected matter attributes | Quantum of impact | Net present value of offset | % of impact offset | Direct offset adequate? | Cost ($) | | |
|---|---|---|---|---|---|---|---|
| | | | | | Direct offset ($) | Other compensatory measures ($) | Total ($) |
| **Birth rate** | 0 | | | | $0.00 | | $0.00 |
| **Mortality rate** | 0 | | | | $0.00 | | $0.00 |
| **Number of individuals** | 0 | | | | $0.00 | | $0.00 |
| **Number of features** | 0 | | | | $0.00 | | $0.00 |
| **Condition of habitat** | 0 | | | | $0.00 | | $0.00 |
| **Area of habitat** | 4819.57 | 4908.68 | 101.85% | **Yes** | $0.00 | N/A | $0.00 |
| **Area of community** | 0 | | | | $0.00 | | $0.00 |
| | | | | | **$0.00** | **$0.00** | **$0.00** |

# Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

| Matter of National Environmental Significance | |
|---|---|
| **Name** | Masked Owl |
| **EPBC Act status** | Vulnerable |
| **Annual probability of extinction**<br>Based on IUCN category definitions | **0.2%** |

| Key to Cell Colours |
|---|
| User input required |
| Drop-down list |
| Calculated output |
| Not applicable to attribute |

## Impact calculator

| Protected matter attributes | Attribute relevant to case? | Description | Quantum of impact | | Units | Information source |
|---|---|---|---|---|---|---|
| ***Ecological communities*** | | | | | | |
| **Area of community** | No | | **Area** | | | |
| | | | **Quality** | | | |
| | | | **Total quantum of impact** | 0.00 | | |
| ***Threatened species habitat*** | | | | | | |
| **Area of habitat** | Yes | | **Area** | 8781 | Hectares | |
| | | | **Quality** | **5** | Scale 0-10 | |
| | | | **Total quantum of impact** | ##### | Adjusted hectares | |
| **Protected matter attributes** | **Attribute relevant to case?** | **Description** | **Quantum of impact** | | **Units** | **Information source** |
| **Number of features**<br>e.g. Nest hollows, habitat trees | No | | | | | |
| **Condition of habitat**<br>Change in habitat condition, but no change in extent | No | | | | | |
| ***Threatened species*** | | | | | | |
| **Birth rate**<br>e.g. Change in nest success | No | | | | | |
| **Mortality rate**<br>e.g Change in number of road kills per year | No | | | | | |
| **Number of individuals**<br>e.g. Individual plants/animals | No | | | | | |

## Offset calculator

| Protected matter attributes | Attribute relevant to case? | Total quantum of impact | Units | Proposed offset | Time horizon (years) | | Start area and quality | | Future area and quality without offset | | Future area and quality with offset | | Raw gain | Confidence in result (%) | Adjusted gain | Net present value (adjusted hectares) | % of impact offset | Minimum (90%) direct offset requirement met? | Cost ($ total) | Information source |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Ecological Communities*** | | | | | | | | | | | | | | | | | | | | |
| **Area of community** | No | | | | **Risk-related time horizon (max. 20 years)** | | **Start area (hectares)** | | **Risk of loss (%) without offset** | | **Risk of loss (%) with offset** | | | | | | | | | |
| | | | | | | | | | **Future area without offset (adjusted hectares)** | 0.0 | **Future area with offset (adjusted hectares)** | 0.0 | | | | | | | | |
| | | | | | **Time until ecological benefit** | | **Start quality (scale of 0-10)** | | **Future quality without offset (scale of 0-10)** | | **Future quality with offset (scale of 0-10)** | | | | | | | | | |
| ***Threatened species habitat*** | | | | | | | | | | | | | | | | | | | | |
| **Area of habitat** | Yes | 4390.50 | Adjusted hectares | | **Time over which loss is averted (max. 20 years)** | 20 | **Start area (hectares)** | 28000 | **Risk of loss (%) without offset** | 1% | **Risk of loss (%) with offset** | 0% | 280.00 | 80% | 224.00 | 215.23 | 4390.60 | 100.00% | Yes | |
| | | | | | | | | | **Future area without offset (adjusted hectares)** | 27720.0 | **Future area with offset (adjusted hectares)** | 28000.0 | | | | | | | | |
| | | | | | **Time until ecological benefit** | 20 | **Start quality (scale of 0-10)** | **5** | **Future quality without offset (scale of 0-10)** | **4** | **Future quality with offset (scale of 0-10)** | **6** | 2.00 | 80% | 1.60 | 1.54 | | | | |
| **Protected matter attributes** | **Attribute relevant to case?** | **Total quantum of impact** | **Units** | **Proposed offset** | **Time horizon (years)** | | **Start value** | | **Future value without offset** | | **Future value with offset** | | **Raw gain** | **Confidence in result (%)** | **Adjusted gain** | **Net present value** | **% of impact offset** | **Minimum (90%) direct offset requirement met?** | **Cost ($ total)** | **Information source** |
| **Number of features**<br>e.g. Nest hollows, habitat trees | No | | | | | | | | | | | | | | | | | | | |
| **Condition of habitat**<br>Change in habitat condition, but no change in extent | No | | | | | | | | | | | | | | | | | | | |
| ***Threatened species*** | | | | | | | | | | | | | | | | | | | | |
| **Birth rate**<br>e.g. Change in nest success | No | | | | | | | | | | | | | | | | | | | |
| **Mortality rate**<br>e.g Change in number of road kills per year | No | | | | | | | | | | | | | | | | | | | |
| **Number of individuals**<br>e.g. Individual plants/animals | No | | | | | | | | | | | | | | | | | | | |

## Summary

| Protected matter attributes | Quantum of impact | Net present value of offset | % of impact offset | Direct offset adequate? | Cost ($) | | |
|---|---|---|---|---|---|---|---|
| | | | | | Direct offset ($) | Other compensatory measures ($) | Total ($) |
| **Birth rate** | 0 | | | | $0.00 | | $0.00 |
| **Mortality rate** | 0 | | | | $0.00 | | $0.00 |
| **Number of individuals** | 0 | | | | $0.00 | | $0.00 |
| **Number of features** | 0 | | | | $0.00 | | $0.00 |
| **Condition of habitat** | 0 | | | | $0.00 | | $0.00 |
| **Area of habitat** | 4390.5 | 4390.60 | 100.00% | **Yes** | $0.00 | N/A | $0.00 |
| **Area of community** | 0 | | | | $0.00 | | $0.00 |
| | | | | | **$0.00** | **$0.00** | **$0.00** |

# Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

| Matter of National Environmental Significance | |
|---|---|
| **Name** | Palm Cockatoo |
| **EPBC Act status** | Vulnerable |
| **Annual probability of extinction**<br>Based on IUCN category definitions | **0.2%** |

| Key to Cell Colours |
|---|
| User input required |
| Drop-down list |
| Calculated output |
| Not applicable to attribute |

## Impact calculator

| Protected matter attributes | Attribute relevant to case? | Description | Quantum of impact | | Units | Information source |
|---|---|---|---|---|---|---|
| ***Ecological communities*** | | | | | | |
| **Area of community** | No | | **Area** | | | |
| | | | **Quality** | | | |
| | | | **Total quantum of impact** | 0.00 | | |
| ***Threatened species habitat*** | | | | | | |
| **Area of habitat** | Yes | | **Area** | 8531 | Hectares | |
| | | | **Quality** | **7** | Scale 0-10 | |
| | | | **Total quantum of impact** | ##### | Adjusted hectares | |
| **Protected matter attributes** | **Attribute relevant to case?** | **Description** | **Quantum of impact** | | **Units** | **Information source** |
| **Number of features**<br>e.g. Nest hollows, habitat trees | No | | | | | |
| **Condition of habitat**<br>Change in habitat condition, but no change in extent | No | | | | | |
| ***Threatened species*** | | | | | | |
| **Birth rate**<br>e.g. Change in nest success | No | | | | | |
| **Mortality rate**<br>e.g Change in number of road kills per year | No | | | | | |
| **Number of individuals**<br>e.g. Individual plants/animals | No | | | | | |

## Offset calculator

| Protected matter attributes | Attribute relevant to case? | Total quantum of impact | Units | Proposed offset | Time horizon (years) | | Start area and quality | | Future area and quality without offset | | Future area and quality with offset | | Raw gain | Confidence in result (%) | Adjusted gain | Net present value (adjusted hectares) | % of impact offset | Minimum (90%) direct offset requirement met? | Cost ($ total) | Information source |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Ecological Communities*** | | | | | | | | | | | | | | | | | | | | |
| **Area of community** | No | | | | **Risk-related time horizon (max. 20 years)** | | **Start area (hectares)** | | **Risk of loss (%) without offset** | | **Risk of loss (%) with offset** | | | | | | | | | |
| | | | | | | | | | **Future area without offset (adjusted hectares)** | 0.0 | **Future area with offset (adjusted hectares)** | 0.0 | | | | | | | | |
| | | | | | **Time until ecological benefit** | | **Start quality (scale of 0-10)** | | **Future quality without offset (scale of 0-10)** | | **Future quality with offset (scale of 0-10)** | | | | | | | | | |
| ***Threatened species habitat*** | | | | | | | | | | | | | | | | | | | | |
| **Area of habitat** | Yes | 5971.70 | Adjusted hectares | | **Time over which loss is averted (max. 20 years)** | 20 | **Start area (hectares)** | 38000 | **Risk of loss (%) without offset** | 1% | **Risk of loss (%) with offset** | 0% | | | | | | | | |
| | | | | | | | | | **Future area without offset (adjusted hectares)** | 37620.0 | **Future area with offset (adjusted hectares)** | 38000.0 | 380.00 | 80% | 304.00 | 292.09 | 6017.09 | 100.76% | Yes | |
| | | | | | **Time until ecological benefit** | 20 | **Start quality (scale of 0-10)** | **7** | **Future quality without offset (scale of 0-10)** | **6** | **Future quality with offset (scale of 0-10)** | **8** | 2.00 | 80% | 1.60 | 1.54 | | | | |
| **Protected matter attributes** | **Attribute relevant to case?** | **Total quantum of impact** | **Units** | **Proposed offset** | **Time horizon (years)** | | **Start value** | | **Future value without offset** | | **Future value with offset** | | **Raw gain** | **Confidence in result (%)** | **Adjusted gain** | **Net present value** | **% of impact offset** | **Minimum (90%) direct offset requirement met?** | **Cost ($ total)** | **Information source** |
| **Number of features**<br>e.g. Nest hollows, habitat trees | No | | | | | | | | | | | | | | | | | | | |
| **Condition of habitat**<br>Change in habitat condition, but no change in extent | No | | | | | | | | | | | | | | | | | | | |
| ***Threatened species*** | | | | | | | | | | | | | | | | | | | | |
| **Birth rate**<br>e.g. Change in nest success | No | | | | | | | | | | | | | | | | | | | |
| **Mortality rate**<br>e.g Change in number of road kills per year | No | | | | | | | | | | | | | | | | | | | |
| **Number of individuals**<br>e.g. Individual plants/animals | No | | | | | | | | | | | | | | | | | | | |

## Summary

| Protected matter attributes | Quantum of impact | Net present value of offset | % of impact offset | Direct offset adequate? | Cost ($) | | |
|---|---|---|---|---|---|---|---|
| | | | | | Direct offset ($) | Other compensatory measures ($) | Total ($) |
| **Birth rate** | 0 | | | | $0.00 | | $0.00 |
| **Mortality rate** | 0 | | | | $0.00 | | $0.00 |
| **Number of individuals** | 0 | | | | $0.00 | | $0.00 |
| **Number of features** | 0 | | | | $0.00 | | $0.00 |
| **Condition of habitat** | 0 | | | | $0.00 | | $0.00 |
| **Area of habitat** | 5971.7 | 6017.09 | 100.76% | **Yes** | $0.00 | N/A | $0.00 |
| **Area of community** | 0 | | | | $0.00 | | $0.00 |
| | | | | | **$0.00** | **$0.00** | **$0.00** |

# Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

| Matter of National Environmental Significance | |
|---|---|
| **Name** | Red Goshawk |
| **EPBC Act status** | Endangered |
| **Annual probability of extinction**<br>Based on IUCN category definitions | **1.2%** |

| Key to Cell Colours |
|---|
| User input required |
| Drop-down list |
| Calculated output |
| Not applicable to attribute |

## Impact calculator

| Protected matter attributes | Attribute relevant to case? | Description | Quantum of impact | | Units | Information source |
|---|---|---|---|---|---|---|
| ***Ecological communities*** | | | | | | |
| **Area of community** | No | | **Area** | | | |
| | | | **Quality** | | | |
| | | | **Total quantum of impact** | 0.00 | | |
| ***Threatened species habitat*** | | | | | | |
| **Area of habitat** | Yes | | **Area** | 8,781 | Hectares | |
| | | | **Quality** | **7** | Scale 0-10 | |
| | | | **Total quantum of impact** | ##### | Adjusted hectares | |
| **Protected matter attributes** | **Attribute relevant to case?** | **Description** | **Quantum of impact** | | **Units** | **Information source** |
| **Number of features**<br>e.g. Nest hollows, habitat trees | No | | | | | |
| **Condition of habitat**<br>Change in habitat condition, but no change in extent | No | | | | | |
| ***Threatened species*** | | | | | | |
| **Birth rate**<br>e.g. Change in nest success | No | | | | | |
| **Mortality rate**<br>e.g Change in number of road kills per year | No | | | | | |
| **Number of individuals**<br>e.g. Individual plants/animals | No | | | | | |

## Offset calculator

| Protected matter attributes | Attribute relevant to case? | Total quantum of impact | Units | Proposed offset | Time horizon (years) | | Start area and quality | | Future area and quality without offset | | Future area and quality with offset | | Raw gain | Confidence in result (%) | Adjusted gain | Net present value (adjusted hectares) | % of impact offset | Minimum (90%) direct offset requirement met? | Cost ($ total) | Information source |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Ecological Communities*** | | | | | | | | | | | | | | | | | | | | |
| **Area of community** | No | | | | **Risk-related time horizon (max. 20 years)** | | **Start area (hectares)** | | **Risk of loss (%) without offset** | | **Risk of loss (%) with offset** | | | | | | | | | |
| | | | | | | | | | **Future area without offset (adjusted hectares)** | 0.0 | **Future area with offset (adjusted hectares)** | 0.0 | | | | | | | | |
| | | | | | **Time until ecological benefit** | | **Start quality (scale of 0-10)** | | **Future quality without offset (scale of 0-10)** | | **Future quality with offset (scale of 0-10)** | | | | | | | | | |
| ***Threatened species habitat*** | | | | | | | | | | | | | | | | | | | | |
| **Area of habitat** | Yes | 6146.70 | Adjusted hectares | | **Time over which loss is averted (max. 20 years)** | 20 | **Start area (hectares)** | 47500 | **Risk of loss (%) without offset** | 1% | **Risk of loss (%) with offset** | 0% | 475.00 | 80% | 380.00 | 299.35 | 6166.53 | 100.32% | Yes | |
| | | | | | | | | | **Future area without offset (adjusted hectares)** | 47025.0 | **Future area with offset (adjusted hectares)** | 47500.0 | | | | | | | | |
| | | | | | **Time until ecological benefit** | 20 | **Start quality (scale of 0-10)** | **7** | **Future quality without offset (scale of 0-10)** | **6** | **Future quality with offset (scale of 0-10)** | **8** | 2.00 | 80% | 1.60 | 1.26 | | | | |
| **Protected matter attributes** | **Attribute relevant to case?** | **Total quantum of impact** | **Units** | **Proposed offset** | **Time horizon (years)** | | **Start value** | | **Future value without offset** | | **Future value with offset** | | **Raw gain** | **Confidence in result (%)** | **Adjusted gain** | **Net present value** | **% of impact offset** | **Minimum (90%) direct offset requirement met?** | **Cost ($ total)** | **Information source** |
| **Number of features**<br>e.g. Nest hollows, habitat trees | No | | | | | | | | | | | | | | | | | | | |
| **Condition of habitat**<br>Change in habitat condition, but no change in extent | No | | | | | | | | | | | | | | | | | | | |
| ***Threatened species*** | | | | | | | | | | | | | | | | | | | | |
| **Birth rate**<br>e.g. Change in nest success | No | | | | | | | | | | | | | | | | | | | |
| **Mortality rate**<br>e.g Change in number of road kills per year | No | | | | | | | | | | | | | | | | | | | |
| **Number of individuals**<br>e.g. Individual plants/animals | No | | | | | | | | | | | | | | | | | | | |

## Summary

| Protected matter attributes | Quantum of impact | Net present value of offset | % of impact offset | Direct offset adequate? | Cost ($) | | |
|---|---|---|---|---|---|---|---|
| | | | | | Direct offset ($) | Other compensatory measures ($) | Total ($) |
| **Birth rate** | 0 | | | | $0.00 | | $0.00 |
| **Mortality rate** | 0 | | | | $0.00 | | $0.00 |
| **Number of individuals** | 0 | | | | $0.00 | | $0.00 |
| **Number of features** | 0 | | | | $0.00 | | $0.00 |
| **Condition of habitat** | 0 | | | | $0.00 | | $0.00 |
| **Area of habitat** | 6146.7 | 6166.53 | 100.32% | **Yes** | $0.00 | N/A | $0.00 |
| **Area of community** | 0 | | | | $0.00 | | $0.00 |
| | | | | | **$0.00** | **$0.00** | **$0.00** |

## C.2 Offset Area 2

# Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

| Matter of National Environmental Significance | |
|---|---|
| **Name** | Black-footed Tree-Rat |
| **EPBC Act status** | Vulnerable |
| **Annual probability of extinction**<br>Based on IUCN category definitions | **0.2%** |

| Key to Cell Colours |
|---|
| User input required |
| Drop-down list |
| Calculated output |
| Not applicable to attribute |

## Impact calculator

| Protected matter attributes | Attribute relevant to case? | Description | Quantum of impact | | Units | Information source |
|---|---|---|---|---|---|---|
| ***Ecological communities*** | | | | | | |
| **Area of community** | No | | **Area** | | | |
| | | | **Quality** | | | |
| | | | **Total quantum of impact** | 0.00 | | |
| ***Threatened species habitat*** | | | | | | |
| **Area of habitat** | Yes | | **Area** | 6885 | Hectares | |
| | | | **Quality** | **7** | Scale 0-10 | |
| | | | **Total quantum of impact** | ##### | Adjusted hectares | |
| **Protected matter attributes** | **Attribute relevant to case?** | **Description** | **Quantum of impact** | | **Units** | **Information source** |
| **Number of features**<br>e.g. Nest hollows, habitat trees | No | | | | | |
| **Condition of habitat**<br>Change in habitat condition, but no change in extent | No | | | | | |
| ***Threatened species*** | | | | | | |
| **Birth rate**<br>e.g. Change in nest success | No | | | | | |
| **Mortality rate**<br>e.g Change in number of road kills per year | No | | | | | |
| **Number of individuals**<br>e.g. Individual plants/animals | No | | | | | |

## Offset calculator

| Protected matter attributes | Attribute relevant to case? | Total quantum of impact | Units | Proposed offset | Time horizon (years) | | Start area and quality | | Future area and quality without offset | | Future area and quality with offset | | Raw gain | Confidence in result (%) | Adjusted gain | Net present value (adjusted hectares) | % of impact offset | Minimum (90%) direct offset requirement met? | Cost ($ total) | Information source |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Ecological Communities*** | | | | | | | | | | | | | | | | | | | | |
| **Area of community** | No | | | | **Risk-related time horizon (max. 20 years)** | | **Start area (hectares)** | | **Risk of loss (%) without offset** | | **Risk of loss (%) with offset** | | | | | | | | | |
| | | | | | | | | | **Future area without offset (adjusted hectares)** | 0.0 | **Future area with offset (adjusted hectares)** | 0.0 | | | | | | | | |
| | | | | | **Time until ecological benefit** | | **Start quality (scale of 0-10)** | | **Future quality without offset (scale of 0-10)** | | **Future quality with offset (scale of 0-10)** | | | | | | | | | |
| ***Threatened species habitat*** | | | | | | | | | | | | | | | | | | | | |
| **Area of habitat** | Yes | 4819.57 | Adjusted hectares | | **Time over which loss is averted (max. 20 years)** | 20 | **Start area (hectares)** | 24000 | **Risk of loss (%) without offset** | 1% | **Risk of loss (%) with offset** | 0% | 240.00 | 80% | 192.00 | 184.48 | 4923.28 | 102.15% | Yes | |
| | | | | | | | | | **Future area without offset (adjusted hectares)** | 23760.0 | **Future area with offset (adjusted hectares)** | 24000.0 | | | | | | | | |
| | | | | | **Time until ecological benefit** | 20 | **Start quality (scale of 0-10)** | **5** | **Future quality without offset (scale of 0-10)** | **4** | **Future quality with offset (scale of 0-10)** | **7** | 3.00 | 70% | 2.10 | 2.02 | | | | |
| **Protected matter attributes** | **Attribute relevant to case?** | **Total quantum of impact** | **Units** | **Proposed offset** | **Time horizon (years)** | | **Start value** | | **Future value without offset** | | **Future value with offset** | | **Raw gain** | **Confidence in result (%)** | **Adjusted gain** | **Net present value** | **% of impact offset** | **Minimum (90%) direct offset requirement met?** | **Cost ($ total)** | **Information source** |
| **Number of features**<br>e.g. Nest hollows, habitat trees | No | | | | | | | | | | | | | | | | | | | |
| **Condition of habitat**<br>Change in habitat condition, but no change in extent | No | | | | | | | | | | | | | | | | | | | |
| ***Threatened species*** | | | | | | | | | | | | | | | | | | | | |
| **Birth rate**<br>e.g. Change in nest success | No | | | | | | | | | | | | | | | | | | | |
| **Mortality rate**<br>e.g Change in number of road kills per year | No | | | | | | | | | | | | | | | | | | | |
| **Number of individuals**<br>e.g. Individual plants/animals | No | | | | | | | | | | | | | | | | | | | |

## Summary

| Protected matter attributes | Quantum of impact | Net present value of offset | % of impact offset | Direct offset adequate? | Cost ($) | | |
|---|---|---|---|---|---|---|---|
| | | | | | Direct offset ($) | Other compensatory measures ($) | Total ($) |
| **Birth rate** | 0 | | | | $0.00 | | $0.00 |
| **Mortality rate** | 0 | | | | $0.00 | | $0.00 |
| **Number of individuals** | 0 | | | | $0.00 | | $0.00 |
| **Number of features** | 0 | | | | $0.00 | | $0.00 |
| **Condition of habitat** | 0 | | | | $0.00 | | $0.00 |
| **Area of habitat** | 4819.57 | 4923.28 | 102.15% | **Yes** | $0.00 | N/A | $0.00 |
| **Area of community** | 0 | | | | $0.00 | | $0.00 |
| | | | | | **$0.00** | **$0.00** | **$0.00** |

# Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

| Matter of National Environmental Significance | |
|---|---|
| **Name** | Masked Owl |
| **EPBC Act status** | Vulnerable |
| **Annual probability of extinction**<br>Based on IUCN category definitions | **0.2%** |

| Key to Cell Colours |
|---|
| User input required |
| Drop-down list |
| Calculated output |
| Not applicable to attribute |

## Impact calculator

| Protected matter attributes | Attribute relevant to case? | Description | Quantum of impact | | Units | Information source |
|---|---|---|---|---|---|---|
| ***Ecological communities*** | | | | | | |
| **Area of community** | No | | **Area** | | | |
| | | | **Quality** | | | |
| | | | **Total quantum of impact** | 0.00 | | |
| ***Threatened species habitat*** | | | | | | |
| **Area of habitat** | Yes | | **Area** | 8781 | Hectares | |
| | | | **Quality** | **5** | Scale 0-10 | |
| | | | **Total quantum of impact** | ##### | Adjusted hectares | |
| **Protected matter attributes** | **Attribute relevant to case?** | **Description** | **Quantum of impact** | | **Units** | **Information source** |
| **Number of features**<br>e.g. Nest hollows, habitat trees | No | | | | | |
| **Condition of habitat**<br>Change in habitat condition, but no change in extent | No | | | | | |
| ***Threatened species*** | | | | | | |
| **Birth rate**<br>e.g. Change in nest success | No | | | | | |
| **Mortality rate**<br>e.g Change in number of road kills per year | No | | | | | |
| **Number of individuals**<br>e.g. Individual plants/animals | No | | | | | |

## Offset calculator

| Protected matter attributes | Attribute relevant to case? | Total quantum of impact | Units | Proposed offset | Time horizon (years) | | Start area and quality | | Future area and quality without offset | | Future area and quality with offset | | Raw gain | Confidence in result (%) | Adjusted gain | Net present value (adjusted hectares) | % of impact offset | Minimum (90%) direct offset requirement met? | Cost ($ total) | Information source |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Ecological Communities*** | | | | | | | | | | | | | | | | | | | | |
| **Area of community** | No | | | | **Risk-related time horizon (max. 20 years)** | | **Start area (hectares)** | | **Risk of loss (%) without offset** | | **Risk of loss (%) with offset** | | | | | | | | | |
| | | | | | | | | | **Future area without offset (adjusted hectares)** | 0.0 | **Future area with offset (adjusted hectares)** | 0.0 | | | | | | | | |
| | | | | | **Time until ecological benefit** | | **Start quality (scale of 0-10)** | | **Future quality without offset (scale of 0-10)** | | **Future quality with offset (scale of 0-10)** | | | | | | | | | |
| ***Threatened species habitat*** | | | | | | | | | | | | | | | | | | | | |
| **Area of habitat** | Yes | 4390.50 | Adjusted hectares | | **Time over which loss is averted (max. 20 years)** | 20 | **Start area (hectares)** | 28000 | **Risk of loss (%) without offset** | 1% | **Risk of loss (%) with offset** | 0% | 280.00 | 80% | 224.00 | 215.23 | 4390.60 | 100.00% | Yes | |
| | | | | | | | | | **Future area without offset (adjusted hectares)** | 27720.0 | **Future area with offset (adjusted hectares)** | 28000.0 | | | | | | | | |
| | | | | | **Time until ecological benefit** | 20 | **Start quality (scale of 0-10)** | **5** | **Future quality without offset (scale of 0-10)** | **4** | **Future quality with offset (scale of 0-10)** | **6** | 2.00 | 80% | 1.60 | 1.54 | | | | |
| **Protected matter attributes** | **Attribute relevant to case?** | **Total quantum of impact** | **Units** | **Proposed offset** | **Time horizon (years)** | | **Start value** | | **Future value without offset** | | **Future value with offset** | | **Raw gain** | **Confidence in result (%)** | **Adjusted gain** | **Net present value** | **% of impact offset** | **Minimum (90%) direct offset requirement met?** | **Cost ($ total)** | **Information source** |
| **Number of features**<br>e.g. Nest hollows, habitat trees | No | | | | | | | | | | | | | | | | | | | |
| **Condition of habitat**<br>Change in habitat condition, but no change in extent | No | | | | | | | | | | | | | | | | | | | |
| ***Threatened species*** | | | | | | | | | | | | | | | | | | | | |
| **Birth rate**<br>e.g. Change in nest success | No | | | | | | | | | | | | | | | | | | | |
| **Mortality rate**<br>e.g Change in number of road kills per year | No | | | | | | | | | | | | | | | | | | | |
| **Number of individuals**<br>e.g. Individual plants/animals | No | | | | | | | | | | | | | | | | | | | |

## Summary

| Protected matter attributes | Quantum of impact | Net present value of offset | % of impact offset | Direct offset adequate? | Cost ($) | | |
|---|---|---|---|---|---|---|---|
| | | | | | Direct offset ($) | Other compensatory measures ($) | Total ($) |
| **Birth rate** | 0 | | | | $0.00 | | $0.00 |
| **Mortality rate** | 0 | | | | $0.00 | | $0.00 |
| **Number of individuals** | 0 | | | | $0.00 | | $0.00 |
| **Number of features** | 0 | | | | $0.00 | | $0.00 |
| **Condition of habitat** | 0 | | | | $0.00 | | $0.00 |
| **Area of habitat** | 4390.5 | 4390.60 | 100.00% | **Yes** | $0.00 | N/A | $0.00 |
| **Area of community** | 0 | | | | $0.00 | | $0.00 |
| | | | | | **$0.00** | **$0.00** | **$0.00** |

# Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

| Matter of National Environmental Significance | |
|---|---|
| **Name** | Palm Cockatoo |
| **EPBC Act status** | Vulnerable |
| **Annual probability of extinction**<br>Based on IUCN category definitions | **0.2%** |

| Key to Cell Colours |
|---|
| User input required |
| Drop-down list |
| Calculated output |
| Not applicable to attribute |

## Impact calculator

| Protected matter attributes | Attribute relevant to case? | Description | Quantum of impact | | Units | Information source |
|---|---|---|---|---|---|---|
| ***Ecological communities*** | | | | | | |
| **Area of community** | No | | **Area** | | | |
| | | | **Quality** | | | |
| | | | **Total quantum of impact** | 0.00 | | |
| ***Threatened species habitat*** | | | | | | |
| **Area of habitat** | Yes | | **Area** | 8531 | Hectares | |
| | | | **Quality** | **7** | Scale 0-10 | |
| | | | **Total quantum of impact** | ##### | Adjusted hectares | |
| **Protected matter attributes** | **Attribute relevant to case?** | **Description** | **Quantum of impact** | | **Units** | **Information source** |
| **Number of features**<br>e.g. Nest hollows, habitat trees | No | | | | | |
| **Condition of habitat**<br>Change in habitat condition, but no change in extent | No | | | | | |
| ***Threatened species*** | | | | | | |
| **Birth rate**<br>e.g. Change in nest success | No | | | | | |
| **Mortality rate**<br>e.g Change in number of road kills per year | No | | | | | |
| **Number of individuals**<br>e.g. Individual plants/animals | No | | | | | |

## Offset calculator

| Protected matter attributes | Attribute relevant to case? | Total quantum of impact | Units | Proposed offset | Time horizon (years) | | Start area and quality | | Future area and quality without offset | | Future area and quality with offset | | Raw gain | Confidence in result (%) | Adjusted gain | Net present value (adjusted hectares) | % of impact offset | Minimum (90%) direct offset requirement met? | Cost ($ total) | Information source |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Ecological Communities*** | | | | | | | | | | | | | | | | | | | | |
| **Area of community** | No | | | | **Risk-related time horizon (max. 20 years)** | | **Start area (hectares)** | | **Risk of loss (%) without offset** | | **Risk of loss (%) with offset** | | | | | | | | | |
| | | | | | | | | | **Future area without offset (adjusted hectares)** | 0.0 | **Future area with offset (adjusted hectares)** | 0.0 | | | | | | | | |
| | | | | | **Time until ecological benefit** | | **Start quality (scale of 0-10)** | | **Future quality without offset (scale of 0-10)** | | **Future quality with offset (scale of 0-10)** | | | | | | | | | |
| ***Threatened species habitat*** | | | | | | | | | | | | | | | | | | | | |
| **Area of habitat** | Yes | 5971.70 | Adjusted hectares | | **Time over which loss is averted (max. 20 years)** | 20 | **Start area (hectares)** | 38000 | **Risk of loss (%) without offset** | 1% | **Risk of loss (%) with offset** | 0% | | | | | | | | |
| | | | | | | | | | **Future area without offset (adjusted hectares)** | 37620.0 | **Future area with offset (adjusted hectares)** | 38000.0 | 380.00 | 80% | 304.00 | 292.09 | 6017.09 | 100.76% | Yes | |
| | | | | | **Time until ecological benefit** | 20 | **Start quality (scale of 0-10)** | **7** | **Future quality without offset (scale of 0-10)** | **6** | **Future quality with offset (scale of 0-10)** | **8** | 2.00 | 80% | 1.60 | 1.54 | | | | |
| **Protected matter attributes** | **Attribute relevant to case?** | **Total quantum of impact** | **Units** | **Proposed offset** | **Time horizon (years)** | | **Start value** | | **Future value without offset** | | **Future value with offset** | | **Raw gain** | **Confidence in result (%)** | **Adjusted gain** | **Net present value** | **% of impact offset** | **Minimum (90%) direct offset requirement met?** | **Cost ($ total)** | **Information source** |
| **Number of features**<br>e.g. Nest hollows, habitat trees | No | | | | | | | | | | | | | | | | | | | |
| **Condition of habitat**<br>Change in habitat condition, but no change in extent | No | | | | | | | | | | | | | | | | | | | |
| ***Threatened species*** | | | | | | | | | | | | | | | | | | | | |
| **Birth rate**<br>e.g. Change in nest success | No | | | | | | | | | | | | | | | | | | | |
| **Mortality rate**<br>e.g Change in number of road kills per year | No | | | | | | | | | | | | | | | | | | | |
| **Number of individuals**<br>e.g. Individual plants/animals | No | | | | | | | | | | | | | | | | | | | |

## Summary

| Protected matter attributes | Quantum of impact | Net present value of offset | % of impact offset | Direct offset adequate? | Cost ($) | | |
|---|---|---|---|---|---|---|---|
| | | | | | Direct offset ($) | Other compensatory measures ($) | Total ($) |
| **Birth rate** | 0 | | | | $0.00 | | $0.00 |
| **Mortality rate** | 0 | | | | $0.00 | | $0.00 |
| **Number of individuals** | 0 | | | | $0.00 | | $0.00 |
| **Number of features** | 0 | | | | $0.00 | | $0.00 |
| **Condition of habitat** | 0 | | | | $0.00 | | $0.00 |
| **Area of habitat** | 5971.7 | 6017.09 | 100.76% | **Yes** | $0.00 | N/A | $0.00 |
| **Area of community** | 0 | | | | $0.00 | | $0.00 |
| | | | | | **$0.00** | **$0.00** | **$0.00** |

# Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

| Matter of National Environmental Significance | |
|---|---|
| **Name** | Red Goshawk |
| **EPBC Act status** | Endangered |
| **Annual probability of extinction**<br>Based on IUCN category definitions | **1.2%** |

| Key to Cell Colours |
|---|
| User input required |
| Drop-down list |
| Calculated output |
| Not applicable to attribute |

## Impact calculator

| Protected matter attributes | Attribute relevant to case? | Description | Quantum of impact | | Units | Information source |
|---|---|---|---|---|---|---|
| ***Ecological communities*** | | | | | | |
| **Area of community** | No | | **Area** | | | |
| | | | **Quality** | | | |
| | | | **Total quantum of impact** | 0.00 | | |
| ***Threatened species habitat*** | | | | | | |
| **Area of habitat** | Yes | | **Area** | 8781 | Hectares | |
| | | | **Quality** | **8** | Scale 0-10 | |
| | | | **Total quantum of impact** | ##### | Adjusted hectares | |
| **Protected matter attributes** | **Attribute relevant to case?** | **Description** | **Quantum of impact** | | **Units** | **Information source** |
| **Number of features**<br>e.g. Nest hollows, habitat trees | No | | | | | |
| **Condition of habitat**<br>Change in habitat condition, but no change in extent | No | | | | | |
| ***Threatened species*** | | | | | | |
| **Birth rate**<br>e.g. Change in nest success | No | | | | | |
| **Mortality rate**<br>e.g Change in number of road kills per year | No | | | | | |
| **Number of individuals**<br>e.g. Individual plants/animals | No | | | | | |

## Offset calculator

| Protected matter attributes | Attribute relevant to case? | Total quantum of impact | Units | Proposed offset | Time horizon (years) | | Start area and quality | | Future area and quality without offset | | Future area and quality with offset | | Raw gain | Confidence in result (%) | Adjusted gain | Net present value (adjusted hectares) | % of impact offset | Minimum (90%) direct offset requirement met? | Cost ($ total) | Information source |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Ecological Communities*** | | | | | | | | | | | | | | | | | | | | |
| **Area of community** | No | | | | **Risk-related time horizon (max. 20 years)** | | **Start area (hectares)** | | **Risk of loss (%) without offset** | | **Risk of loss (%) with offset** | | | | | | | | | |
| | | | | | | | | | **Future area without offset (adjusted hectares)** | 0.0 | **Future area with offset (adjusted hectares)** | 0.0 | | | | | | | | |
| | | | | | **Time until ecological benefit** | | **Start quality (scale of 0-10)** | | **Future quality without offset (scale of 0-10)** | | **Future quality with offset (scale of 0-10)** | | | | | | | | | |
| ***Threatened species habitat*** | | | | | | | | | | | | | | | | | | | | |
| **Area of habitat** | Yes | 7024.80 | Adjusted hectares | | **Time over which loss is averted (max. 20 years)** | 20 | **Start area (hectares)** | 42000 | **Risk of loss (%) without offset** | 1% | **Risk of loss (%) with offset** | 0% | 420.00 | 80% | 336.00 | 264.68 | 7090.24 | 100.93% | Yes | |
| | | | | | | | | | **Future area without offset (adjusted hectares)** | 41580.0 | **Future area with offset (adjusted hectares)** | 42000.0 | | | | | | | | |
| | | | | | **Time until ecological benefit** | 20 | **Start quality (scale of 0-10)** | **6** | **Future quality without offset (scale of 0-10)** | **5** | **Future quality with offset (scale of 0-10)** | **8** | 3.00 | 70% | 2.10 | 1.65 | | | | |
| **Protected matter attributes** | **Attribute relevant to case?** | **Total quantum of impact** | **Units** | **Proposed offset** | **Time horizon (years)** | | **Start value** | | **Future value without offset** | | **Future value with offset** | | **Raw gain** | **Confidence in result (%)** | **Adjusted gain** | **Net present value** | **% of impact offset** | **Minimum (90%) direct offset requirement met?** | **Cost ($ total)** | **Information source** |
| **Number of features**<br>e.g. Nest hollows, habitat trees | No | | | | | | | | | | | | | | | | | | | |
| **Condition of habitat**<br>Change in habitat condition, but no change in extent | No | | | | | | | | | | | | | | | | | | | |
| ***Threatened species*** | | | | | | | | | | | | | | | | | | | | |
| **Birth rate**<br>e.g. Change in nest success | No | | | | | | | | | | | | | | | | | | | |
| **Mortality rate**<br>e.g Change in number of road kills per year | No | | | | | | | | | | | | | | | | | | | |
| **Number of individuals**<br>e.g. Individual plants/animals | No | | | | | | | | | | | | | | | | | | | |

## Summary

| Protected matter attributes | Quantum of impact | Net present value of offset | % of impact offset | Direct offset adequate? | Cost ($) | | |
|---|---|---|---|---|---|---|---|
| | | | | | Direct offset ($) | Other compensatory measures ($) | Total ($) |
| **Birth rate** | 0 | | | | $0.00 | | $0.00 |
| **Mortality rate** | 0 | | | | $0.00 | | $0.00 |
| **Number of individuals** | 0 | | | | $0.00 | | $0.00 |
| **Number of features** | 0 | | | | $0.00 | | $0.00 |
| **Condition of habitat** | 0 | | | | $0.00 | | $0.00 |
| **Area of habitat** | 7024.8 | 7090.24 | 100.93% | **Yes** | $0.00 | N/A | $0.00 |
| **Area of community** | 0 | | | | $0.00 | | $0.00 |
| | | | | | **$0.00** | **$0.00** | **$0.00** |

# Appendix D

## EPBC Act Offset calculators: input justification

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## D.1 Input justification: impact area

The following tables provide the input justification for that part of the EPBC Act Offset Calculators related to the Impact Area.

**Table D.1 Impact Area: EPBC offset assessment guide input justification – Palm Cockatoo**

| Aspect | Score | Justification |
|---|---|---|
| Area of habitat (ha) | 8,531.8 | The total area of Palm Cockatoo habitat being impacted is 8,531.8. |
| Habitat quality score (1-10) | 7/10 | The quality of Palm Cockatoo habitat in the impact site is assessed as being a **7 out of 10,** comprising:<br>• 2 out of 4 for site condition<br>• 2 out of 3 for site context<br>• 3 out of 3 for stocking rate. |
| Site Condition | 2/4 | The species breeding and foraging habitat areas are remnant vegetation.<br>The species inhabits closed forest and riparian systems as well as open woodland adjacent to these habitats. All remnant forests within the impact area provided potential habitat for the species. Breeding habitat on western Cape York overwhelmingly occurs within 1,500 m of riparian and alluvial vegetation along watercourses (RE3.3.9a; RE3.3.20), rainforest (RE3.3.5) or other closed forest vegetation (RE3.5.4), and within the riparian/alluvial vegetation, rainforest, or other closed forest itself. The use of the breeding habitat within the 1,500 m distance from riparian or rainforest vegetation on western Cape York, appears to be noticeably gradational, where used hollows are found in much higher density closer to the boundary between riparian/woodland habitats (Ecotone 2023). Approximately 80% of hollows selected for display or breeding may be found within the first 550 m from the riparian vegetation boundary (Ecotone 2023).<br>Degrading factors to vegetation condition are inappropriate fire regimes. Frequent and intensive bushfires have been occurring in project site and more broadly. There was an extensive and hot bushfire in late 2022. These fires are modifying the understorey across large areas in the project site. Frequent fires have removed a lot of ground cover, shrubs and woody debris. They are also limiting growth of trees with areas supporting a lower abundance of large trees.<br>The vegetation closely fringing creeks is relatively intact, in part due to an absence of fire. Overall, the habitat for this species throughout the project site is in moderate to good condition. Within the project site, a number of threats were evident to the Palm Cockatoo populations and associated habitat condition including:<br>• bushfire – too frequent and intense fires resulting in:<br>– loss of existing hollow-bearing trees<br>– lack of fallen woody debris<br>– lack of understorey species and reduced recruitment<br>– loss of foraging resources<br>• feral cats and pigs<br>• weeds. |

**Table D.1 Impact Area: EPBC offset assessment guide input justification – Palm Cockatoo**

| Aspect | Score | Justification |
|---|---|---|
| Site Context | 2/3 | The Palm Cockatoo in Australia has a relatively restricted range, being found only on Cape York Peninsula. Individuals recorded in the terrestrial ecology study area are not at the limit of the species range within Australia, which extends throughout the Cape from approximately 200 km south of the terrestrial ecology study area near Pormpuraaw on the west coast and Princess Charlotte Bay on the east coast of the Cape to the northern tip of the Cape.<br>The project site is well connected to other large tracts of remnant vegetation and habitat for the species. To the west, there are existing developments including bauxite mines and townships of Aurukun and Weipa. However, this clearing is minor compared to extent of remnant vegetation remaining in Cape York across species distribution.<br>The project site and surrounds are known to support populations of Palm Cockatoo. |
| Stocking Rate | 3/3 | Palm Cockatoo were observed through direct observation and from calls at seven locations in the terrestrial ecology study area, as part of seasonal surveys for this project. This was primarily along Coconut and Tapplebang creeks in Swamp Box fringing forest, but also in adjacent Eucalyptus and Corymbia woodland to tall woodland. The species assessment in EIS has concluded that this population is considered likely to be an important population.<br>Given the restricted distribution to Cape York and low breeding success of this species, all individuals of Palm Cockatoo are likely to form part of one key source population for breeding and dispersal. |

## Table D.2 Impact Area: EPBC offset assessment guide input justification – Red Goshawk

| Aspect | Score | Justification |
|---|---|---|
| Area of habitat (ha) | 8,781 | The total area of Red Goshawk habitat being impacted is 8,781 ha. |
| Habitat quality score (1-10) | 7/10 | The quality of Red Goshawk habitat in the impact site is assessed as being a **7 out of 10**, comprising:<br>• 2 out of 4 for site condition<br>• 2 out of 3 for site context<br>• 3 out of 3 for stocking rate. |
| Site Condition | 2/4 | Red Goshawk habitat is described as 'coastal and sub-coastal tall open forests and woodlands, tropical savannas traversed by wooded or forested rivers, and the edges of rainforests, usually on fertile soils' (TSSC 2015a). The species is known to avoid very dense and very open habitats that don't provide enough coverage for ambush of prey or inhibit fast flight and manoeuvring when hunting.<br>The more recent Approved Conservation Advice (2023) describes breeding habitat as areas with large, tall trees (>14 m) within proximity to a watercourse (within 2.5 km), that occur within foraging habitat.<br>All potential breeding and foraging habitat in the project site is remnant vegetation.<br>All remnant habitats in the terrestrial ecology study area are considered to provide either potential breeding/nesting, hunting/foraging and/or dispersal habitat for this species (i.e. 'coastal and sub-coastal tall open forests and woodlands'). Within the project site, this includes Eucalyptus and Corymbia woodland to tall woodland, Swamp Box fringing forest, Mixed foredune complex and Paperbark woodland and sedgelands due to the extensive remnant coverage of these structurally suitable communities, availability of tall trees and riparian forests. The impact area supports suitable vegetation communities within approximately 2.5 km of persistent water features, which are likely to be preferred as breeding/nesting habitat.<br>Degrading factors to vegetation condition are inappropriate fire regimes. Frequent and intensive bushfires have been occurring in project site and more broadly. There was an extensive and hot bushfire in late 2022. These fires are modifying the understorey across large areas in the project site. Frequent fires have removed a lot of ground cover, shrubs and woody debris. They are also limiting growth of trees with areas supporting a lower abundance of large trees.<br>The vegetation closely fringing creeks is relatively intact, in part due to an absence of fire. Overall, the habitat for this species throughout the project site is in moderate to good condition. Within the project site a number of threats were evident to the Red Goshawk and associated habitat condition including:<br>• bushfire – too frequent and intense fires resulting in:<br>– loss of large trees they nest in<br>– lack of fallen woody debris<br>– lack of understorey species and reduced recruitment<br>– creating more open woodlands making them less suitable for hunting<br>– direct loss of prey being small and medium sized mammals<br>• feral cats and pigs<br>• weeds. |

## Table D.2 Impact Area: EPBC offset assessment guide input justification – Red Goshawk

| Aspect | Score | Justification |
|---|---|---|
| Site Context | 2/3 | Red goshawks are currently known to breed from the Kimberley, east to Cape York Peninsula, and on the Tiwi Islands (MacColl et al. 2021). They may still breed at very low densities in the Wet Tropics and Einasleigh Uplands though record data are scarce (MacColl et al. 2021). Birds recorded from far outside the breeding range in central Australia (Aumann 2001) and the Pilbara (L Trotter pers. comm. cited in MacColl et al. 2021) likely include both dispersive juveniles (Aumann 2001) and seasonal migrants from further north.<br>The breeding range of red goshawks has significantly contracted since 1980. The species gradually declined to extinction in New South Wales over the 1980s and 1990s (Cooper et al. 2014) and populations in south-east Queensland largely disappeared before 2010 (Seaton 2014). Apart from the satellite-tracked birds, records south of Cape York Peninsula over the last decade are increasingly scant, although some places where the species has been recorded historically have not been surveyed recently (MacColl et al. 2021).<br>The Project area within Cape York is an important breeding, foraging and refugia area for Red Goshawk. The vast areas of habitat provide important connectivity for the species within the site and the greater region. To the west, there are existing developments including bauxite mines and townships of Aurukun and Weipa. However, this clearing is minor compared to extent of remnant vegetation remaining in Cape York across species distribution. Two of the major threats in the project area are from habitat loss due to mining and bushfire.<br>Due to recent uplisting of the species and known Red Goshawk populations in the project area, site context is considered high. |
| Stocking Rate | 3/3 | This species was recorded as part of bird surveys and, incidentally, at three locations in the terrestrial ecology study area during seasonal surveys for this project, in Eucalyptus and Corymbia woodland to tall woodland and Swamp Box fringing forest. It was recorded on a number of occasions at the Tapplebang Creek location. This species was also recorded at two locations along the Ward River downstream of the terrestrial ecology study area.<br>Due to a small population size, all foraging and breeding habitat is considered critical to the survival of the species. Red goshawks naturally occur at low densities and require tracts of relatively intact and biodiverse land for hunting and nesting. |

## Table D.3 Impact Area: EPBC offset assessment guide input justification – Black-footed Tree-Rat

| Aspect | Score | Justification |
|---|---|---|
| Area of habitat (ha) | 6,885.1 | The total area of Black-footed Tree-Rat habitat being impacted is 6,885.1 ha. |
| Habitat quality score (1-10) | 7/10 | The quality of Black-footed Tree-rat habitat in the impact site is assessed as being a **7 out of 10**, comprising<br>• 2 out of 4 for site condition<br>• 2 out of 3 for site context<br>• 3 out of 3 for stocking rate. |
| Site condition | 2/4 | The species inhabits Eucalypt forests and woodlands particularly in forests where suitable large hollows are plentiful. The species has also been known to den in large rainforest trees containing suitable hollows. All remnant habitats within the impact area provided potential habitat for the species (i.e. Eucalyptus and Corymbia woodland to tall woodland, Swamp Box fringing forest, Mixed foredune complex and Paperbark/ woodland and sedgeland). The impact area supports an abundance of potentially suitable hollow-bearing trees required for denning.<br>Degrading factors to vegetation condition are inappropriate fire regimes. Frequent and intensive bushfires have been occurring in project site and more broadly. There was an extensive and hot bushfire in late 2022. These fires are modifying the understorey across large areas in the project site. Frequent fires have removed a lot of ground cover, shrubs and woody debris. They are also limiting growth of trees with areas supporting a lower abundance of large trees.<br>The vegetation closely fringing creeks is relatively intact, in part due to an absence of fire. Overall, the habitat for this species throughout the terrestrial ecology study area is in moderate to good condition. Within the project site a number of threats were evident to the Black-footed Tree-Rat populations and associated habitat including:<br>• bushfire – too frequent and intense fires resulting in:<br>– loss of hollow-bearing trees<br>– lack of fallen woody debris<br>– lack of understorey species and reduced recruitment<br>– direct loss of foraging resources<br>• feral cats and pigs<br>• weeds. |
| Site context | 2/3 | The distribution of the Black-footed Tree-Rat in Australia is poorly known. It has been recorded mostly from eucalypt forests and woodlands (but not rainforests) around Mareeba, but there are records sparsely across Cape York Peninsula (TSSC 2015). The individual found within the project site falls within the species distribution range. The project site is well connected to other large tracts of remnant vegetation and habitat for the species. To the west, there are existing developments including bauxite mines and townships of Aurukun and Weipa. However, this clearing is minor compared to extent of remnant vegetation remaining in Cape York across species distribution. Three of the major threats in the project area are from mining, bushfire, and pest animals. |
| Species stocking rate | 3/3 | A single Black-footed Tree-Rat was recorded through direct observation of identifiable remains in Swamp Box fringing forest on Tapplebang Creek, and another individual was recorded on a camera trap in Eucalyptus and Corymbia woodland to tall woodland as part of seasonal surveys for this project.<br>The species assessment in EIS has concluded that this population is considered likely to be an important population. Given the lack of knowledge on the species ecology, as well as the declining population size, the population of Black-footed Tree-Rat on the site are likely to form part of an important population for breeding and dispersal. |

## Table D.4 Impact Area: EPBC offset assessment guide input justification – Masked Owl

| Aspect | Score | Justification |
|---|---|---|
| Area of habitat (ha) | 8,781 | The total area of Masked Owl habitat being impacted is 8,781 ha. |
| Habitat quality score (1-10) | 5/10 | The quality of Masked Owl habitat in the impact site are assessed as being a **5 out of 10** comprising<br>• 2 out of 4 for site condition<br>• 2 out of 3 for site context<br>• 1 out of 3 for stocking rate. |
| Site Condition | 2/4 | The Masked Owl nests in large hollows in large trees, usually Eucalypts, and usually within closed forest (DAWE 2020c). Remnant habitats, including Eucalyptus and Corymbia woodland to tall woodland, Swamp Box fringing forest, Mixed foredune complex and Paperbark woodland and sedgeland, provide potentially suitable foraging, breeding/nesting and dispersal habitat within the impact areas.<br>The impact area supports an abundance of potentially suitable hollow-bearing trees for nesting, therefore habitat in the study area is likely to provide foraging, breeding/nesting and dispersal habitat. All habitat for the Masked Owl is remnant vegetation.<br>Degrading factors to vegetation condition are inappropriate fire regimes. Frequent and intensive bushfires have been occurring in project site and more broadly. There was an extensive and hot bushfire in late 2022. These fires are modifying the understorey across large areas in the project site. Frequent fires have removed a lot of ground cover, shrubs and woody debris. They are also limiting growth of trees with areas supporting a lower abundance of large trees.<br>The vegetation closely fringing creeks is relatively intact, in part due to an absence of fire. Overall, the habitat for this species throughout the terrestrial ecology study area is in moderate to good condition. Within the project site, a number of threats were evident to the Masked Owl populations and associated habitat including:<br>• bushfire – too frequent and intense fires resulting in:<br>– loss of hollow-bearing trees<br>– lack of fallen woody debris<br>– lack of understorey species and reduced recruitment<br>– direct loss of foraging resources being small and medium size mammals<br>• feral cats and pigs<br>• weeds. |
| Site Context | 2/3 | The population of Masked Owl in Cape York Peninsula is considered to be one of three subpopulations, the other two occurring in the Kimberley and Northern Territory. The Queensland subpopulation occurs in Cape York Peninsula and extends south along the southern rim of the Gulf of Carpentaria to Normanton in the west and down to the Atherton Tablelands in the east (DAWE 2020c). There is a relatively recent record approximately 60 km to the east of the terrestrial ecology study area (CSIRO 2020). Connectivity of habitat for the species is high.<br>To the west, there are existing developments including bauxite mines and townships of Aurukun and Weipa. However, this clearing is minor compared to extent of remnant vegetation remaining in Cape York across species distribution. Three of the major threats in the project area are from mining, bushfire and pest animals.<br>The species has not been recorded in project site. |
| Stocking Rate | 1/3 | This species was not recorded in the terrestrial ecology study area during seasonal field surveys for the project. There are very few records of the species, and its distribution is poorly known. In Queensland, there are historical records from the Normanton region, and from Pascoe, Archer, Chester and Watson Rivers on Cape York Peninsula (Higgins 1999; Mees 1964; Storr 1984).<br>This species is considered to have a moderate likelihood of occurrence in the study area, given nearby records and the presence of potentially suitable habitat. |

## D.2 Input Justification: Offset Area 1

The following tables summarise the inputs for each MNES offset calculator for Offset Area 1.

**Table D.5 Offset Area 1: EPBC offset assessment guide input justification – Palm Cockatoo**

| Aspect | Score | Justification |
|---|---|---|
| Time over which loss is averted (max 20 years) | 20 years | This is the time over which changes in the level of risk can be considered and is equivalent to the time over which the offset area is proposed to be actively managed. A timeframe of 20 years has been applied, as this is the length of time over which active management of the property will be in place and is consistent with the offset assessment guide. |
| Start quality (1-10) | 7/10 | The impact site and offset site are similar in nature as they are located adjacent to each other, support similar vegetation communities, both on similar geologies, support watercourses of similar nature including riparian vegetation, and under similar climatic conditions including fire regimes. Therefore the same justification for each sub-element of habitat quality is the same. As field surveys haven't been completed for Offset Area 1 this desktop approach is proposed at this time.<br>The starting quality of Palm Cockatoo habitat in the offset site has been assessed as per the impact site – **7 out of 10**. |
| Time until ecological benefit | 20 years | This is the estimated time it will take the habitat to improve for the offset to be realised. It is estimated that it will take up to **20 years** for the quality of the remnant vegetation in the offset site to be raised one point. Management actions will seek to protect existing hollows from high intensity and high frequency bushfires, increase number of large trees and future abundance of hollows, provide refuges for Palm Cockatoo during bushfire and retain areas of foraging resources so they are more resilient during bushfire events, native species ground cover, increase recruitment and species diversity as well as woody debris.<br>Feral animal populations will also be reduced.<br>To achieve the performance outcomes 20 years is proposed. |
| Risk of loss (%) without offset | 1% | There is a risk that Palm Cockatoo habitat on the offset site could be completely lost due to future development or experience significant loss of ecological function if the offset was not put into effect. There is a risk that future bauxite mining may occur in the MDL which is a large portion of the offset area (approx. 23,000) Approximately 29,000 ha is located in the Restricted Area (RA) 315. RA315 earmarks this area for future bauxite mining by the Queensland Government and would assist to facilitate future mining in this area.<br>Either the proponent has potential to expand bauxite operations to the south in the future, or a different company may pursue bauxite mining in this area in future. While the area supports remnant vegetation and can't be cleared without a permit, the MDL and RA315 increase the likelihood of risk of loss in the future as opposed to other parts of Cape York that are not under these tenements.<br>Endorsement from State Gov't would be required to place this area under an environmental offset and it would be removed from the MDL and any future ML.<br>The freehold tenure also provides the landholder with lawful use rights that can allow a level of vegetation clearing. These include creation and maintenance of access tracks, clearing for fencelines and native forestry. They may also choose to run livestock which could have a detrimental impact on habitat quality and understorey can be cleared out without impacting on status of 'remnant'.<br>The risk of loss without the offset has been set at **1%.**<br>The risk of loss is considered greater on Offset Area 1 than is contemplated as the background risk in the 'Guidance for deriving Risk of Loss estimates when evaluating biodiversity offset proposals under EPBC Act' (University of Queensland 2017). While it is recognised Cape York is largely undisturbed supporting large tracts of remnant vegetation, and most areas would support MNES therefore triggering a referral, due to the specific location and circumstances for offset area 1 the risk of loss is higher. It is located in western Cape York on the bauxite plateau, large portions are in a MDL and RA315 and is in freehold tenure. There will be higher pressures for future clearing. |

## Table D.5 Offset Area 1: EPBC offset assessment guide input justification – Palm Cockatoo

| Aspect | Score | Justification |
|---|---|---|
| Future quality without offset (1-10) | 6/10 | A habitat quality score was allocated based on the start quality of the habitat and the existing threatening processes that would continue to impact the offset site habitat and species without the offset being in place.<br>It has been assessed that habitat quality will go down at least one point over a 20-year period due to:<br>• inappropriate fire regimes as shown in Appendix G which are having a significant, detrimental impact on Palm Cockatoo and biodiversity such as:<br>– reduction in recruitment and growth of large trees that will form hollows in future<br>– potential loss of existing hollow-bearing trees from high intensity and high frequency fires<br>– threat to their refugia in more dense riparian woodlands<br>– removing foraging material for Palm Cockatoo<br>– potential to reduce breeding success with late season, high intensity fires<br>– removing understorey and ground layers which in turn increases potential for soil runoff into watercourses and wetlands<br>• predation from feral cats<br>• habitat degradation from feral pigs<br>• changes in land use that could further degrade habitat such as grazing.<br>Without the offset being legally secured on title and associated management activities, degradation of the offset site from these threats are assessed as reducing the future habitat quality score to a **6 out of 10**. |
| Risk of loss (%) with offset | 0% | With the offset in place, which includes legal security on title, preventing future clearing, and implementing an approved offset management plan that will include active bushfire management, pest animal control and regular ecological monitoring the risk of loss is very low. |
| Future quality with offset (1-10) | 8/10 | This is the habitat quality score estimated for the offset within the time until ecological benefit. For Palm Cockatoo, the habitat quality score is estimated to increase by one point to **8 out of 10** within 20 years due to the implementation of management measures.<br>The largest change proposed is to the fire regime. Inappropriate fire regimes are a significant threat to palm cockatoos (Murphy et al., 2003). in some areas frequent, high-intensity fires are destroying nest trees directly, and may also indirectly reduce the number of breeding hollows available to palm cockatoos through the negative impacts on the abundance and diversity of termites (Abenspergtraun and Milewski 1995), which play a significant role in the creation of new hollows (Perry et al., 1985). Further information about the negative impacts of fire are summarised in Section 5.1.3 and 5.1.4.<br>The following actions will be implemented to improve habitat quality. |

**Table D.5 Offset Area 1: EPBC offset assessment guide input justification – Palm Cockatoo**

| Aspect | Score | Justification | |
|---|---|---|---|
| | | **Management action** | **Conservation outcome** |
| | | Implement a suitable **fire management regime** in the offset area that is designed to prevent high intensity bushfires coming through every year in late dry season, and moving to a mosaic of different burn intervals and intensities is proposed. | • Protection of existing hollows suitable for Palm Cockatoo from inappropriate fire regimes including high severity and high interval fires<br>• Increasing number of large trees that will form hollows in the future<br>• Protection of riparian vegetation communities and vine thickets which are refuge for Palm Cockatoo from high severity bushfires<br>• Improve availability of foraging resources for Palm Cockatoo from implementation of cooler mosaic burns<br>• Increase in ground cover, woody debris and species recruitment through changed fire management regimes<br>• Reducing likelihood of late season bushfires occurring by actively managing fuel loads, particularly adjacent to Aurukun Road where many fires start from<br>• Increasing time between burns of habitat patches to allow a mosaic of different burn intervals providing refuge for various fauna species and ensuring foraging resources aren't completely removed from large areas |
| | | Implement a **feral animal management** program | • Reduction of feral pig populations<br>• Reduction of feral cat populations<br>• Improvement in habitat quality of ecosystems including watercourses and wetlands |
| | | Implement a **weed management** program | • Reduction of non-native plant cover<br>• Reduction in fuel load and likelihood of hot bushfires occurring<br>• Improvement in habitat quality of ecosystems |
| | | Manage **land use** | • Manage land use to ensure no damage occurs to creeks, wetlands and open woodlands such as from vehicle use<br>• Restricted access<br>• Restriction on any grazing in future<br>• Reduced likelihood of unplanned fires occurring which includes maintenance of access roads, fire breaks and managing fuel loads in key areas through planned burns<br>• No vegetation clearing unless authorised under OAMP |
| | | Implement a species monitoring program | • Improved understanding of the active nest sites of Palm Cockatoo in the offset area so they can be better managed<br>• Increase in Palm Cockatoo populations and breeding pairs utilising the offset area from year 1 to year 20<br>• Improved understanding of species habitat utilisation and dispersal |

## Table D.5 Offset Area 1: EPBC offset assessment guide input justification – Palm Cockatoo

| Aspect | Score | Justification |
|---|---|---|
| Confidence in result (%) | 80%<br>Risk of loss<br>80% habitat quality gains | This describes the confidence in managing the risk of loss with introduction of the proposed offset and the confidence in the evaluated change in quality of the offset site. The level of confidence that **risk of loss is averted by the offset is 80%.**<br>The level of confidence that habitat quality gains will be achieved is assessed at **80%**. To achieve a one-point increase in habitat quality over 20 years is reasonable and achievable through the management actions proposed.<br>Management actions proposed including stopping the high intensity and high frequency bushfires occurring annually across the offset and moving to more appropriate fire regimes of that include a mosaic of different burn intervals and intensities, with majority being earlier season burns.<br>This has shown to be effective in other large properties in Cape York, including Rio Tinto's land and conservation reserves such Piccaninny Plains. This fire regime is demonstrated to have multiple benefits and a number of regulators and stakeholder groups are working together to reduce late season, hot wildfires. The Australian Wildlife Conservancy (AWC) carry out Australia's largest non-government prescribed burning program which has reduced destructive wildfire by 50% across their northern sanctuaries. The extent of wildfire has been reduced by 64% on Piccaninny Plains Wildlife Sanctuary in Cape York which is confirmed to support Red Goshawk and Black-footed Tree Rat.<br>For the Amrun project also on western Cape York in one year (2021) they humanely destroyed 709 pigs as part of their feral pig control program. Highest levels of pig activity were found along creeks and aerial shooting was the most effective. The feral animal control program in 2021 also removed 12 feral cats and 11 feral dogs (Rio Tinto 2022). |
| Area of offset required | 38,000 | The calculator was prepared to calculate the amount of habitat required to satisfy the offset liability for the loss of 8,531 ha of remnant vegetation within the impact footprint. |
| % of impact offset | 100.76% | Based on inputs of 38,000 ha of habitat the calculator states **100.76%** is delivered. |

## Table D.6 Offset Area 1: EPBC offset assessment guide input justification – Red Goshawk

| Aspect | Score | Justification |
|---|---|---|
| Time over which loss is averted (max 20 years) | 20 years | This is the time over which changes in the level of risk can be considered and is equivalent to the time over which the offset area is proposed to be actively managed. A timeframe of 20 years has been applied as this is the length of time over which active management of the property will be in place and is consistent with the offset assessment guide. |
| Start quality (1-10) | 7/10 | The impact site and offset site are similar in nature as they are located adjacent to each other, support similar vegetation communities, both on similar geologies, support watercourses and under similar climatic conditions including fire regimes. As field surveys haven't been completed for Offset Area 1 this desktop approach is proposed at this time.<br>The starting quality of Red Goshawk habitat in the offset site has been assessed as per the impact site – **7 out of 10**. |
| Time until ecological benefit | 20 years | This is the estimated time it will take the habitat to improve for the offset to be realised. It is estimated that it will take up to **20 years** for the quality of the remnant vegetation in the offset site to be raised one point.<br>Management actions will seek to protect existing large trees, including any nests, from high intensity and high frequency bushfires, increase number of large trees and canopy cover and refuge for Red Goshawk during bushfire and ensure riparian woodlands remain intact. Through changes in fire management an increase in prey is also anticipated.<br>Feral animal populations will also be reduced.<br>To achieve the performance outcomes 20 years is proposed. |
| Risk of loss (%) without offset | 1% | This is a risk that Red Goshawk habitat on the offset site will be completely lost from future development or experience significant loss of ecological function if the offset was not put into effect.<br>There is a risk that future bauxite mining may occur in the MDL which is a large portion of the offset area (approx. 23,000) Approximately 29,000 ha is located in the Restricted Area (RA) 315. RA315 earmarks this area for future bauxite mining by the Queensland Government and would assist to facilitate future mining in this area.<br>Either the proponent has potential to expand bauxite operations to the south in the future, or a different company may pursue bauxite mining in this area in future. While the area supports remnant vegetation and can't be cleared without a permit, the MDL and RA315 increase the likelihood of risk of loss in the future as opposed to other parts of Cape York that are not under these tenements.<br>Endorsement from State Gov't would be required to place this area under an environmental offset, and it would be removed from the MDL and any future ML.<br>The freehold tenure also provides the landholder with lawful use rights that can allow a level of vegetation clearing. These include creation and maintenance of access tracks, clearing for fencelines and native forestry. They may also choose to run livestock which could have a detrimental impact on habitat quality and understorey can be cleared out without impacting on status of 'remnant'.<br>The risk of loss without the offset has been set at **1%.**<br>The risk of loss is considered greater on Offset Area 1 than is contemplated as the background risk in the 'Guidance for deriving Risk of Loss estimates when evaluating biodiversity offset proposals under EPBC Act' (University of Queensland 2017). While it is recognised Cape York is largely undisturbed supporting large tracts of remnant vegetation, and most areas would support MNES therefore triggering a referral, due to the specific location and circumstances for offset area 1 the risk of loss is higher. It is located in western Cape York on the bauxite plateau, large portions are in a MDL and RA315 and is in freehold tenure. There will be higher pressures for future clearing. |
| Future quality without offset (1-10) | 6/10 | A habitat quality score was allocated based on the start quality of the habitat and the existing threatening processes that would continue to impact the offset site habitat and species without the offset being in place. |

## Table D.6 Offset Area 1: EPBC offset assessment guide input justification – Red Goshawk

<table>
<tr><th>Aspect</th><th>Score</th><th>Justification</th></tr>
<tr><td></td><td></td><td>It has been assessed that habitat quality will go down at least one point over a 20-year period due to:<ul><li>inappropriate fire regimes, as shown in Appendix G, are having a number of detrimental impacts on Red Goshawk such as:<ul><li>changing the composition of forest and woodland habitat to unsuitable hunting habitat (vegetation thickening)</li><li>preventing trees growing to suitable nesting height</li><li>loss of existing tall trees required for nesting</li><li>reduction in prey being small to medium sized mammals due to too frequent or too hot fires or feral cats</li><li>removing understorey and ground layers which in turn increases potential for soil runoff into watercourses and wetlands</li></ul></li><li>changes in land use; possible grazing by livestock may alter the groundcover composition and in turn increase fire occurrence or intensity.</li></ul>Without the offset and associated management activities, degradation of the offset site from these threats are assessed as reducing the future habitat quality score to a 6 out of 10.</td></tr>
<tr><td>Risk of loss (%) with offset</td><td>0%</td><td>With the offset in place, which includes legal security on title, preventing future clearing, and implementing an approved offset management plan that will include active bushfire management, pest animal control and regular ecological monitoring the risk of loss is very low.<br>The risk of loss with the offset has been set at 0%.</td></tr>
<tr><td>Future quality with offset (1-10)</td><td>8/10</td><td>This is the habitat quality score estimated for the offset within the time until ecological benefit. For Red Goshawk, the habitat quality score is estimated to increase by one point to 8 out of 10 within 20 years due to the implementation of management measures.<br>The largest change proposed is to the fire regime. Inappropriate fire regimes are a significant threat to Red Goshawk. Further details about negative impacts from fire are provided in Section 5.1.3 and 5.1.4.<br>The following actions will be implemented to improve habitat quality
<table>
<tr><th>Management action</th><th>Conservation outcome</th></tr>
<tr><td>Implement a suitable fire management regime in the offset area that is designed to prevent high intensity bushfires coming through every year in late dry season, and moving to a mosaic of different burn intervals and intensities is proposed.</td><td><ul><li>Reducing likelihood of late season bushfires occurring by actively managing fuel loads, particularly adjacent to Aurukun Road where many fires start from</li><li>Increasing time between burns of habitat patches to allow a mosaic of different burn intervals providing refuge for various fauna species and ensuring foraging resources aren’t completely removed from large areas</li><li>Reduced likelihood Red Goshawk will abandon any existing nests by removing or reducing occurrence of high intensity bushfires</li><li>Protection of existing large trees that Red Goshawk may nest in</li><li>Improving native species canopy cover and height through changed fire management regimes</li><li>Increasing ground cover, woody debris and species recruitment and maintaining suitable hunting grounds through changed fire management regimes</li><li>Increasing number of small and medium sized native mammals</li><li>Increase in number of large (20 m) trees from year 1 to year 20</li></ul></td></tr>
</table></td></tr>
</table>

**Table D.6 Offset Area 1: EPBC offset assessment guide input justification – Red Goshawk**

| Aspect | Score | Justification | |
|---|---|---|---|
| | | Implement a feral animal management program | • Reduction of feral pig populations<br>• Reduction of feral cat populations<br>• Increase in number of small and medium sized native mammals<br>• Improvement in habitat quality of ecosystems |
| | | Implement a weed management program | • Reduction of non-native plant cover<br>• Reduction in fuel load and likelihood of hot bushfires occurring<br>• Improvement in habitat quality of ecosystems |
| | | Manage land use | • Manage land use to ensure no damage occurs to creeks, wetlands and open woodlands such as from vehicle use<br>• Restricted access<br>• Reduced likelihood of unplanned fires occurring<br>• No vegetation clearing unless authorised under OAMP<br>• No or restricted grazing |
| | | Implement a species monitoring program | • Improved understanding of any active nest sites of Red Goshawk in the offset area so they can be better managed<br>• Improved understanding of species habitat utilisation and dispersal<br>• Demonstrated increase in small and medium sized mammals<br>• Improved understanding of relationship between fire regimes and small and medium sized mammal populations |
| Confidence in result (%) | 80% | This describes the confidence in managing the risk of loss with introduction of the proposed offset and the confidence in the evaluated change in quality of the offset site. The level of confidence that **risk of loss is averted by the offset is 80%.**<br>The level of confidence that habitat quality gains will be achieved is assessed at **80%**. To achieve a one-point increase in habitat quality over 20 years is reasonable and achievable through the management actions proposed.<br>Management actions proposed including stopping the high intensity and high frequency bushfires occurring annually across the offset and moving to more appropriate fire regimes of moving to that include a mosaic of different burn intervals and intensities, with majority being earlier season burns.<br>This has shown to be effective in other large properties in Cape York, including Rio Tinto's land and conservation reserves such Piccaninny Plains. This fire regime is demonstrated to have multiple benefits and a number of regulators and stakeholder groups are working together to reduce late season, hot wildfires.<br>For the Amrun project also on western Cape York in one year (2021) they humanely destroyed 709 pigs as part of their feral pig control program. Highest levels of pig activity were found along creeks and aerial shooting was the most effective. The feral animal control program in 2021 also removed 12 feral cats and 11 feral dogs (Rio Tinto 2022). | |
| Area of offset required | 47,500 | The calculator was prepared to calculate the amount of habitat required to satisfy the offset liability for the loss of 8,781 ha of remnant vegetation within the impact footprint. | |
| % of impact offset | 100.32% | Based on inputs of 47,500 ha of habitat the calculator states **100.32%** is delivered. | |

## Table D.7 Offset Area 1: EPBC offset assessment guide input justification – Black-footed Tree-Rat

| Aspect | Score | Justification |
|---|---|---|
| Time over which loss is averted (max 20 years) | 20 years | This is the time over which changes in the level of risk can be considered and is equivalent to the time over which the offset area is proposed to be actively managed. A timeframe of 20 years has been applied as this is the length of time over which active management of the property will be in place and is consistent with the offset assessment guide. |
| Start quality (1-10) | 7/10 | The impact site and offset site are similar in nature as they are located adjacent to each other, support similar vegetation communities, are both on similar geologies, support large hollow bearing tree habitat and are under similar climatic conditions including fire regimes. As field surveys haven't been completed for Offset Area 1 this desktop approach is proposed at this time.<br>The starting quality of Black-footed Tree-Rat habitat in the offset site has been assessed as per the impact site – **7 out of 10**. |
| Time until ecological benefit | 20 years | This is the estimated time it will take the habitat to improve for the offset to be realised. It is estimated that it will take up to **20 years** for the quality of the remnant vegetation in the offset site to be raised one point. Management actions will seek to protect existing hollows from hot bushfires, increase number of large trees and canopy cover, native species ground cover, increase recruitment and species diversity as well as woody debris. Feral animal and weed populations will also be reduced. To achieve the performance outcomes 20 years is proposed. |
| Risk of loss (%) without offset | 1% | There is a risk that Black-footed Tree-Rat habitat on the offset site could be completely lost due to future development or experience significant loss of ecological function if the offset was not put into effect. There is a risk that future bauxite mining may occur in the MDL which is a large portion of the offset area (approx. 23,000) Approximately 29,000 ha is located in the Restricted Area (RA) 315. RA315 earmarks this area for future bauxite mining by the Queensland Government and would assist to facilitate future mining in this area.<br>Either the proponent has potential to expand bauxite operations to the south in the future, or a different company may pursue bauxite mining in this area in future. While the area supports remnant vegetation and can't be cleared without a permit, the MDL and RA315 increase the likelihood of risk of loss in the future as opposed to other parts of Cape York that are not under these tenements.<br>Endorsement from State Gov't would be required to place this area under an environmental offset, and it would be removed from the MDL and any future ML.<br>The freehold tenure also provides the landholder with lawful use rights that can allow a level of vegetation clearing. These include creation and maintenance of access tracks, clearing for fencelines and native forestry. They may also choose to run livestock which could have a detrimental impact on habitat quality and understorey can be cleared out without impacting on status of 'remnant'.<br>The risk of loss without the offset has been set at 1%.<br>The risk of loss is considered greater on Offset Area 1 than is contemplated in the 'Guidance for deriving Risk of Loss estimates when evaluating biodiversity offset proposals under EPBC Act' (University of Queensland 2017). While it is recognised Cape York is largely undisturbed supporting large tracts of remnant vegetation, and most areas would support MNES therefore triggering a referral, due to the specific location and circumstances for offset area 1 the risk of loss is higher. It is located in western Cape York on the bauxite plateau, large portions are in a MDL and RA315 and is in freehold tenure. There will be higher pressures for future clearing.<br>The landholder may undertake some clearing under current lawful exemptions such as track maintenance, clearing for fencelines and native forestry. They may also choose to run livestock which is a known threat to Black-footed Tree-Rat habitat.<br>The risk of loss without the offset has been set at **1%.** |

## Table D.7 Offset Area 1: EPBC offset assessment guide input justification – Black-footed Tree-Rat

<table>
<tr><th>Aspect</th><th>Score</th><th>Justification</th></tr>
<tr><td>Future quality without offset (1-10)</td><td>6/10</td><td>A habitat quality score was allocated based on the start quality of the habitat and the existing threatening processes that would continue to impact the offset site habitat and species without the offset being in place.<br>It has been assessed that habitat quality will go down at least one point over a 20-year period due to:<br>• inappropriate fire regimes as shown in Appendix G which are known to have a number of detrimental impacts on Black-footed Tree-Rat such as:<br>– creating more open canopy woodlands with lack of understorey<br>– preventing trees growing and forming new hollows<br>– loss of existing hollow-bearing trees used for denning<br>– direct loss of individuals from hot fires<br>– loss of food resources<br>– removing understorey and ground layers which in turn increases potential for soil runoff into watercourses and wetlands<br>• predation from feral cats (Felis catus)<br>• habitat degradation due to livestock which could be commenced as a land use.<br>Without the offset and associated management activities, degradation of the offset site from these threats are assessed as reducing the future habitat quality score to a 6 out of 10.</td></tr>
<tr><td>Risk of loss (%) with offset</td><td>0%</td><td>With the offset in place, which includes legal security on title, preventing future clearing, and implementing an approved offset management plan that will include active bushfire management, pest animal control and regular ecological monitoring the risk of loss is very low.<br>The risk of loss with the offset has been set at 0%.</td></tr>
<tr><td>Future quality with offset (1-10)</td><td>8/10</td><td>This is the habitat quality score estimated for the offset within the time until ecological benefit. For Black-footed Tree-Rat the habitat quality score is estimated to increase by one point to 8 out of 10 within 20 years due to the implementation of management measures.<br>The largest change proposed is to the fire regime. Inappropriate fire regimes are a significant threat to Black-footed Tree-Rat as they destroy and are a likely causal factor in the population decline (Winter & Atherton, 1985). Frequent, high-intensity fires may destroy denning trees directly, reduce available foraging resources and result in mortality of individuals. Further information on detrimental impacts from fire are provided in Section 5.1.3 and 5.1.4.<br>Management actions to be implemented to increase habitat quality are summarised below.
<table>
<tr><th>Management action</th><th>Conservation outcome</th></tr>
<tr><td>Implement a suitable fire management regime in the offset area that is designed to prevent high intensity bushfires coming through every year in late dry season, and moving to a mosaic of different burn intervals and intensities is proposed.</td><td>• Protection of existing hollows from hot bushfires<br>• Increasing number of large trees that will form hollows in the future<br>• Improve availability of foraging resources for Black-footed Tree Rat from implementation of appropriate fire regimes<br>• Increase in ground cover, woody debris and species recruitment through changed fire management regimes<br>• Reducing likelihood of late season bushfires occurring by actively managing fuel loads, particularly adjacent to Aurukun Road where many fires start from</td></tr>
</table>
</td></tr>
</table>

**Table D.7 Offset Area 1: EPBC offset assessment guide input justification – Black-footed Tree-Rat**

| Aspect | Score | Justification | |
|---|---|---|---|
| | | | • Increasing time between burns of habitat patches to allow a mosaic of different burn intervals providing refuge for various fauna species and ensuring foraging resources aren't completely removed from large areas |
| | | Implement a feral animal management program | • Reduction of feral pig populations<br>• Reduction of feral cat populations<br>• Improvement in habitat quality of ecosystems |
| | | Implement a weed management program | • Reduction of non-native plant cover<br>• Reduction in fuel load and likelihood of hot bushfires occurring<br>• Improvement in habitat quality of ecosystems |
| | | Manage land use | • Manage land use to ensure no damage occurs to creeks, wetlands and open woodlands such as from vehicle use<br>• Restricted access<br>• Reduced likelihood of unplanned fires occurring<br>• No vegetation clearing unless authorised under OAMP<br>• No or restricted grazing |
| | | Implement a species monitoring program | • Improved understanding of species habitat utilisation and dispersal<br>• Increase in Black-footed Tree Rat populations utilising the offset area from year 1 to year 20 |
| Confidence in result (%) | 80% | This describes the confidence in managing the risk of loss with introduction of the proposed offset and the confidence in the evaluated change in quality of the offset site. The level of confidence that **risk of loss is averted by the offset is 80%.**<br>The level of confidence that habitat quality gains will be achieved is assessed at **80%**. To achieve a one point increase in habitat quality over 20 years is reasonable and achievable through the management actions proposed.<br>Management actions proposed including stopping the high intensity and high frequency bushfires occurring annually across the offset and moving to more appropriate fire regimes of moving to that include a mosaic of different burn intervals and intensities, with majority being earlier season burns.<br>This has shown to be effective<br>in other large properties in Cape York including Rio Tinto's land and conservation reserves such Piccaninny Plains. This fire regime is demonstrated to have multiple benefits and a number of regulators and stakeholder groups are working together to reduce late season, hot wildfires. The Australian Wildlife Conservancy (AWC) carry out Australia's largest non-government prescribed burning program which has reduced destructive wildfire by 50% across their northern sanctuaries. The extent of wildfire has been reduced by 64% on Piccaninny Plains Wildlife Sanctuary in Cape York which is confirmed to support Red Goshawk and Black-footed Tree Rat.<br>For the Amrun project also on western Cape York in one year (2021) they humanely destroyed 709 pigs as part of their feral pig control program. Highest levels of pig activity were found along creeks and aerial shooting was the most effective. The feral animal control program in 2021 also removed 12 feral cats and 11 feral dogs (Rio Tinto 2022). | |
| Area of offset required | 31,000 | The calculator was prepared to calculate the amount of habitat required to satisfy the offset liability for the loss of 6,885 ha of remnant vegetation within the impact footprint. | |
| % of impact offset | 101.85% | Based on inputs of 31,000 ha of habitat the calculator states **101.85%** is delivered. | |

## Table D.8 Offset Area 1: EPBC offset assessment guide input justification – Masked Owl

| Aspect | Score | Justification |
|---|---|---|
| Time over which loss is averted (max 20 years) | 20 years | This is the time over which changes in the level of risk can be considered and is equivalent to the time over which the offset area is proposed to be actively managed. A timeframe of 20 years has been applied as this is the length of time over which active management of the property will be in place and is consistent with the offset assessment guide. |
| Start quality (1-10) | 5/10 | The impact site and offset site are similar in nature as they are located adjacent to each other, support similar vegetation communities, both on similar geologies, support watercourses and riparian vegetation, and under similar climatic conditions including fire regimes. As field surveys haven't been completed for Offset Area 1 this desktop approach is proposed at this time.<br>The starting quality of Masked Owl habitat in the offset site has been assessed as per the impact site – **5 out of 10**. |
| Time until ecological benefit | 20 years | This is the estimated time it will take the habitat to improve for the offset to be realised. It is estimated that it will take up to **20 years** for the quality of the remnant vegetation in the offset site to be raised one point.<br>Management actions will seek to protect existing hollows from hot bushfires, increase number of large trees and canopy cover, improve abundance of small and medium sized mammals which Masked Owl feed on. Feral animal populations will also be reduced. To achieve the performance outcomes 20 years is proposed. |
| Risk of loss (%) without offset | 1% | There is a risk that Masked Owl habitat on the offset site could be completely lost due to future development or experience significant loss of ecological function if the offset was not put into effect. There is a risk that future bauxite mining may occur in the MDL which is a large portion of the offset area (approx. 23,000) Approximately 29,000 ha is located in the Restricted Area (RA) 315. RA315 earmarks this area for future bauxite mining by the Queensland Government and would assist to facilitate future mining in this area.<br>Either the proponent has potential to expand bauxite operations to the south in the future, or a different company may pursue bauxite mining in this area in future. While the area supports remnant vegetation and can't be cleared without a permit the MDL and RA315 increase the likelihood of risk of loss in the future as opposed to other parts of Cape York that are not under these tenements.<br>Endorsement from State Gov't would be required to place this area under an environmental offset, and it would be removed from the MDL and any future ML.<br>The freehold tenure also provides the landholder with lawful use rights that can allow a level of vegetation clearing. These include creation and maintenance of access tracks, clearing for fencelines and native forestry. They may also choose to run livestock which could have a detrimental impact on habitat quality and understorey can be cleared out without impacting on status of 'remnant'.<br>The risk of loss without the offset has been set at 1%.<br>The risk of loss is considered greater on Offset Area 1 than is contemplated in the 'Guidance for deriving Risk of Loss estimates when evaluating biodiversity offset proposals under EPBC Act' (University of Queensland 2017). While it is recognised Cape York is largely undisturbed supporting large tracts of remnant vegetation, and most areas would support MNES therefore triggering a referral, due to the specific location and circumstances for offset area 1 the risk of loss is higher. It is located in western Cape York on the bauxite plateau, large portions are in a MDL and RA315 and is in freehold tenure. There will be higher pressures for future clearing.<br>The landholder may undertake some clearing under current lawful exemptions such as track maintenance, clearing for fencelines and native forestry. They may also choose to run livestock which could have a detrimental impact on habitat quality.<br>The risk of loss without the offset has been set at **1%.** |

## Table D.8 Offset Area 1: EPBC offset assessment guide input justification – Masked Owl

<table>
<tr><th>Aspect</th><th>Score</th><th>Justification</th></tr>
<tr><td>Future quality without offset (1-10)</td><td>4/10</td><td>A habitat quality score was allocated based on the start quality of the habitat and the existing threatening processes that would continue to impact the offset site habitat and species without the offset being in place.<br>It has been assessed that habitat quality will go down at least one point over a 20-year period due to:<br>• inappropriate fire regimes, as shown in Appendix G, which are showing to have a number of detrimental impacts on Masked Owl such as:<br>– creating more open canopy woodlands with lack of understorey<br>– preventing trees growing and forming new hollows<br>– loss of existing hollow-bearing trees used for breeding<br>– reduction in prey being small to medium sized mammals due to too frequent or too hot fires or feral cats<br>– removing understorey and ground layers which in turn increases potential for soil runoff into watercourses and wetlands<br>• changes in land use; grazing by livestock is a recognised threat to the species.<br>Without the offset and associated management activities, degradation of the offset site from these threats are assessed as reducing the future habitat quality score to a 4 out of 10.</td></tr>
<tr><td>Risk of loss (%) with offset</td><td>0%</td><td>With the offset in place, which includes legal security on title, preventing future clearing, and implementing an approved offset management plan that will include regular ecological monitoring the risk of loss is very low.<br>The risk of loss with the offset has been set at 0%.</td></tr>
<tr><td>Future quality with offset (1-10)</td><td>6/10</td><td>This is the habitat quality score estimated for the offset within the time until ecological benefit. For Masked Owl the habitat quality score is estimated to increase by one point to 6 out of 10 within 20 years due to the implementation of management measures.<br>The largest change proposed is to the fire regime. Inappropriate fire regimes are a significant threat to Masked Owl (Woinarski, 2004). Fires can have a detrimental impact on number of small and medium sized mammals in an area. The reduction of Masked Owl prey is one of the most likely causes of their decline.<br>Management actions to be implemented to increase habitat quality are summarised below.
<table>
<tr><th>Management action</th><th>Conservation outcome</th></tr>
<tr><td>Implement a suitable fire management regime in the offset area that is designed to prevent high intensity bushfires coming through every year in late season, and moving to a mosaic of different burn intervals and intensities is proposed.</td><td>• Protection of existing hollows from high intensity and high frequency bushfires<br>• Increasing number of large trees that will form hollows in the future<br>• Increasing number of small and medium sized native mammals<br>• Increase in ground cover, woody debris and species recruitment through changed fire management regimes<br>• Reducing likelihood of late season bushfires occurring by actively managing fuel loads, particularly adjacent to Aurukun Road where many fires start from<br>• Increasing time between burns of habitat patches to allow a mosaic of different burn intervals providing refuge for various fauna species and ensuring foraging resources aren’t completely removed from large areas</td></tr>
</table></td></tr>
</table>

## Table D.8 Offset Area 1: EPBC offset assessment guide input justification – Masked Owl

| Aspect | Score | Justification | |
|---|---|---|---|
| | | Implement a feral animal management program | • Reduction of feral pig populations<br>• Reduction of feral cat populations<br>• Improvement in habitat quality of ecosystems<br>• Increasing number of small and medium sized native mammals |
| | | Implement a weed management program | • Reduction of non-native plant cover<br>• Reduction in fuel load and likelihood of hot bushfires occurring<br>• Improvement in habitat quality of ecosystems |
| | | Manage land use | • Manage land use to ensure no damage occurs to creeks, wetlands and open woodlands such as from vehicle use<br>• Restricted access<br>• Reduced likelihood of unplanned fires occurring<br>• No vegetation clearing unless authorised under OAMP<br>• No or restricted grazing |
| | | Implement a species monitoring program | • Targeted surveys over 20 years to detect presence of species.<br>• Confirm any active roost sites<br>• Demonstrated increase in small and medium sized mammals<br>• Improved understanding of relationship between fire regimes and small and medium sized mammal populations |
| Confidence in result (%) | 80%<br>Risk of loss<br>80% habitat gains | This describes the confidence in managing the risk of loss with introduction of the proposed offset and the confidence in the evaluated change in quality of the offset site. The level of confidence that **risk of loss is averted by the offset is 80%.**<br>The level of confidence that habitat quality gains will be achieved is assessed at **80%**. To achieve a one-point increase in habitat quality over 20 years is reasonable and achievable through the management actions proposed.<br>Management actions proposed including stopping the high intensity and high frequency bushfires occurring annually across the offset and moving to more appropriate fire regimes of moving to that include a mosaic of different burn intervals and intensities, with majority being earlier season burns.<br>This has shown to be effective in other large properties in Cape York, including Rio Tinto's land and conservation reserves such Piccaninny Plains. This fire regime is demonstrated to have multiple benefits and a number of regulators and stakeholder groups are working together to reduce late season, hot wildfires. The Australian Wildlife Conservancy (AWC) carry out Australia's largest non-government prescribed burning program which has reduced destructive wildfire by 50% across their northern sanctuaries. The extent of wildfire has been reduced by 64% on Piccaninny Plains Wildlife Sanctuary in Cape York which is confirmed to support Red Goshawk and Black-footed Tree Rat.<br>For the Amrun project also on western Cape York in one year (2021) they humanely destroyed 709 pigs as part of their feral pig control program. Highest levels of pig activity were found along creeks and aerial shooting was the most effective. The feral animal control program in 2021 also removed 12 feral cats and 11 feral dogs (Rio Tinto 2022). | |
| Area of offset required | 28,000 | The calculator was prepared to calculate the amount of habitat required to satisfy the offset liability for the loss of 8,781 ha of remnant vegetation within the impact footprint. | |
| % of impact offset | 100% | Based on inputs of 28,000 ha of habitat the calculator states 100% is delivered. | |

## D.3 Input Justification: Offset Area 2

The following tables summarise the inputs for each MNES offset calculator for Offset Area 2. The full calculator is included in Appendix C.

**Table D.9 Offset Area 2: EPBC offset assessment guide input justification – Palm Cockatoo**

| Aspect | Score | Justification |
|---|---|---|
| Time over which loss is averted (max 20 years) | 20 years | This is the time over which changes in the level of risk can be considered and is equivalent to the time over which the offset area is proposed to be actively managed. A timeframe of 20 years has been applied as this is the length of time over which active management of the property will be in place and is consistent with the offset assessment guide. |
| Start quality (1-10) | 7/10 | The quality of Palm Cockatoo habitat in the offset site is assessed as follows using the Offsets Assessment Guide.<br>Watson River Station supports a diversity of remnant REs that provide suitable habitat for the Palm Cockatoo, and the species has been observed on the property. Based on a rapid assessment of parts of the site in 2022 and desktop information the following has been identified for habitat quality.<br>The quality of Palm Cockatoo habitat in the offset site is assessed as being a 7 out of 10. Justification is below. |
| Site condition | 2/4 | The species inhabits closed forest and riparian systems as well as open woodland adjacent to these habitats. Eucalypt woodlands within the offset area provide potential breeding and foraging habitat for the species. The offset area is mapped as containing over 25,000 ha of *Eucalyptus tetrodonta* and Corymbia woodland to open forest (BVG 14a and 14b), and over 5,000 ha of watercourse vegetation including *Corymbia clarksoniana* or *C. novoguinensis* woodland on alluvial plains.<br>Woodlands were observed to support hollow-bearing trees. From initial assessments these communities appear to be in moderate condition with a more open canopy than the impact site. Cattle grazing occurs on the property and there was a lack of understorey noted. Threats to vegetation condition and function on the offset area would include feral pigs, weeds, grazing and bushfire.<br>High number of streams occur on the offset area including larger watercourses being Watson River and Merkunga Creek which provide good refuge and likely breeding habitat for the species. Evidence of Palm Cockatoo feeding was found near the Watson River. |
| Site context | 2/3 | The Palm Cockatoo in Australia has a relatively restricted range, being found only on Cape York Peninsula. However, Palm Cockatoo do extend throughout the Cape from approximately 200 km south of the impact site near Pormpuraaw on the west coast and Princess Charlotte Bay on the east coast of the Cape to the northern tip of the Cape. There are a number of Palm Cockatoo records in proximity of Watson River Station and they have been observed on site. The potential offset area is well connected to other large tracts of remnant vegetation and habitat for the species. Three of the major threats in the offset area are from inappropriate fire regimes, grazing and pest animals. |
| Species stocking rate | 3/3 | Palm Cockatoo has been observed on Watson River Station by the station managers and evidence of them foraging was seen near Watson River by ecologists during a rapid assessment. The number of Palm Cockatoos likely to use the offset area and breeding pairs is currently unknown. Based on suitable habitat including hollows and riparian woodlands and larger watercourses the offset area is considered likely to support an important population. Given the restricted distribution to Cape York and low breeding success of this species, all individuals of Palm Cockatoo are likely to form part of one key source population for breeding and dispersal. |

## Table D.9 Offset Area 2: EPBC offset assessment guide input justification – Palm Cockatoo

| Aspect | Score | Justification |
|---|---|---|
| Time until ecological benefit | 20 years | This is the estimated time it will take the habitat to improve for the offset to be realised. It is estimated that it will take up to **20 years** for the quality of the remnant vegetation in the offset site to be raised one point. Management actions will seek to protect existing hollows from hot bushfires, increase number of large trees and canopy cover, exclude or manage grazing regime to improve native species ground cover, increase recruitment and species diversity as well as woody debris. Feral animal populations will also be reduced.<br>To achieve the performance outcomes 20 years is proposed. |
| Risk of loss (%) without offset | 1% | It is acknowledged the risk that Palm Cockatoo habitat on the offset area would be completely lost from future development is low. The property is not within a mining area on bauxite plateau. However, it is an active cattle station. The landholder may undertake some clearing under current lawful exemptions such as track maintenance, clearing around buildings and cattle yards, clearing for fencelines and native forestry. Grazing by livestock also has potential to have a detrimental impact on habitat quality.<br>The risk of loss without the offset has been set at **1%.** |
| Future quality without offset (1-10) | 6/10 | A habitat quality score was allocated based on the start quality of the habitat and the existing threatening processes that would continue to impact the offset site habitat and species without the offset being in place.<br>It has been assessed that habitat quality will go down at least one point over a 20-year period due to:<br>• inappropriate fire regimes occurring which are showing to have a number of detrimental impacts on Palm Cockatoo such as:<br>– creating more open canopy woodlands with lack of understorey<br>– threat to their refugia in more dense riparian woodlands<br>– preventing trees growing and forming new hollows<br>– loss of existing hollow-bearing trees used for breeding<br>– removing foraging material for Palm Cockatoo<br>• predation from feral cats (*Felis catus*)<br>• land use primarily grazing of cattle.<br>Fire regime on Watson River Station has been fewer hot fires as fuel load is reduced from grazing and burns are generally occurring earlier in dry season. However, fire regimes are dependent on landholders and it is possible the fire regime could change in the future.<br>Without the offset and associated management activities, degradation of the offset site from these threats are assessed as reducing the future habitat quality score to a **6 out of 10**. |
| Risk of loss (%) with offset | 0% | With the offset in place, which includes legal security on title, preventing future clearing, and implementing an approved offset management plan that will include regular ecological monitoring the risk of loss is very low.<br>The risk of loss with the offset has been set at **0%**. |
| Future quality with offset (1-10) | 8/10 | This is the habitat quality score estimated for the offset within the time until ecological benefit. For Palm Cockatoo, the habitat quality score is estimated to increase by one point to **8 out of 10** within 20 years due to the implementation of management measures.<br>The largest change proposed is to the fire regime and grazing. Inappropriate fire regimes are a significant threat to palm cockatoos (Murphy et al. 2003). in some areas frequent, high-intensity fires are destroying nest trees directly, and may also indirectly reduce the number of breeding hollows available to palm cockatoos through the negative impacts on the abundance and diversity of termites (Abenspergtraun and Milewski 1995), which play a significant role in the creation of new hollows (Perry et al. 1985).<br>The following actions will be implemented to improve habitat quality. |

## Table D.9 Offset Area 2: EPBC offset assessment guide input justification – Palm Cockatoo

| Aspect | Score | Justification | |
|---|---|---|---|
| | | **Management action** | **Conservation outcome** |
| | | Implement a suitable **fire management regime** in the offset area that is designed to prevent high intensity bushfires coming through every year in late dry season, and moving to a mosaic of different burn intervals and intensities is proposed. | • Protection of existing hollows suitable for Palm Cockatoo from inappropriate fire regimes including high severity and high interval fires<br>• Increasing number of large trees that will form hollows in the future<br>• Protection of riparian vegetation communities and vine thickets which are refuge for Palm Cockatoo from high severity bushfires<br>• Improve availability of foraging resources for Palm Cockatoo from implementation of cooler mosaic burns<br>• Increase in ground cover, woody debris and species recruitment through changed fire management regimes<br>• Reducing likelihood of late season bushfires occurring by actively managing fuel loads, increasing time between burns of habitat patches to allow a mosaic of different burn intervals providing refuge for various fauna species and ensuring foraging resources aren't completely removed from large areas |
| | | Implement a feral animal management program | • Reduction of feral pig populations<br>• Reduction of feral cat populations<br>• Improvement in habitat quality of ecosystems |
| | | Implement a weed management program | • Reduction of non-native plant cover<br>• Reduction in fuel load and likelihood of hot bushfires occurring<br>• Improvement in habitat quality of ecosystems |
| | | Manage land use | • Manage land use to ensure no damage occurs to creeks, wetlands and open woodlands such as from vehicle use<br>• Restricted access<br>• Reduced likelihood of unplanned fires occurring<br>• No vegetation clearing unless authorised under OAMP |
| | | Implement a species monitoring program | • Improved understanding of the active nest sites of Palm Cockatoo in the offset area so they can be better managed<br>• Increase in Palm Cockatoo populations and breeding pairs utilising the offset area from year 1 to year 20<br>• Improved understanding of species habitat utilisation and dispersal |
| Confidence in result (%) | 80%<br>Risk of loss<br>80% habitat gains | This describes the confidence in managing the risk of loss with introduction of the proposed offset and the confidence in the evaluated change in quality of the offset site. The level of confidence that **risk of loss is averted by the offset is 80%.** | |

## Table D.9 Offset Area 2: EPBC offset assessment guide input justification – Palm Cockatoo

| Aspect | Score | Justification |
|---|---|---|
| | | The level of confidence that habitat quality gains will be achieved is assessed at **80%**. To achieve a one-point increase in habitat quality over 20 years is reasonable and achievable through the management actions proposed.<br>Management actions proposed are believed to be shown as effective and performance outcomes set for Palm Cockatoo would be achievable in the timeframe provided for. Also regular monitoring will occur to ensure effectiveness of management actions.<br>Management actions proposed including moving to cooler, mosaic burns early in dry season to actively discourage intense and extensive bushfires has shown effective in other large properties in Cape York including Rio Tinto's land and conservation reserves such Piccaninny Plains. This fire regime is demonstrated to have multiple benefits and a number of regulators and stakeholder groups are working together to reduce late season, hot wildfires. The Australian Wildlife Conservancy (AWC) carry out Australia's largest non-government prescribed burning program which has reduced destructive wildfire by 50% across their northern sanctuaries. The extent of wildfire has been reduced by 64% on Piccaninny Plains Wildlife Sanctuary in Cape York which is confirmed to support Red Goshawk and Black-footed Tree Rat.<br>For the Amrun project also on western Cape York in one year (2021) they humanely destroyed 709 pigs as part of their feral pig control program. Highest levels of pig activity were found along creeks and aerial shooting was the most effective. The feral animal control program in 2021 also removed 12 feral cats and 11 feral dogs (Rio Tinto 2022). |
| Area of offset required | 38,000 | The calculator was prepared to calculate the amount of habitat required to satisfy the offset liability for the loss of 8,531 ha of remnant vegetation within the impact footprint. |
| % of impact offset | 100.8% | Based on inputs of 38,000 ha of habitat the calculator states **100.8%** is delivered. |

## Table D.10 Offset Area 2: EPBC offset assessment guide input justification – Masked Owl

| Aspect | Score | Justification |
|---|---|---|
| Time over which loss is averted (max 20 years) | 20 years | This is the time over which changes in the level of risk can be considered and is equivalent to the time over which the offset area is proposed to be actively managed. A timeframe of 20 years has been applied as this is the length of time over which active management of the property will be in place and is consistent with the offset assessment guide. |
| Start quality (1-10) | 5/10 | The starting quality of Masked Owl habitat in the offset site has been assessed as per the impact site – 5 out of 10. |
| Site condition | 2/4 | The Masked Owl nests in large hollows in large trees, usually Eucalypts, and usually within closed forest (DAWE 2020c). Remnant habitats, including Eucalyptus and Corymbia woodland to tall woodland and Paperbark woodland and sedgeland, provide potentially suitable foraging, breeding/nesting and dispersal habitat within the offset areas.<br>Woodlands on the offset area were observed to support hollow-bearing trees. From initial assessments these communities appear to be in moderate condition with a more open canopy than the impact site. Cattle grazing occurs on the property and there was a lack of understorey noted. Threats to vegetation condition and function on the offset area would include feral pigs, weeds, grazing and bushfire. |
| Site context | 2/3 | The population of Masked Owl in Cape York Peninsula is considered to be one of three subpopulations, the other two occurring in the Kimberley and Northern Territory. The Queensland subpopulation occurs in Cape York Peninsula and extends south along the southern rim of the Gulf of Carpentaria to Normanton in the west and down to the Atherton Tablelands in the east (DAWE 2020c). There is a relatively recent record approximately 60 km to the east of the terrestrial ecology study area (CSIRO 2020). Connectivity of habitat for the species is high.<br>The offset area is well connected to other large tracts of remnant vegetation and potential habitat for the species. |
| Species stocking rate | 1/3 | There have not been any recent records from near Broome, Cape York Peninsula or some historical sites in the NT (Barrett et al. 2003; Higgins 1999). The closest records of species are near Aurukun to north-west of the offset area. Similar to the impact site, the offset area is considered to have a moderate likelihood of occurrence due to the presence of potentially suitable habitat and being in an area of likely distribution. |
| Time until ecological benefit | 20 years | This is the estimated time it will take the habitat to improve for the offset to be realised. It is estimated that it will take up to **20 years** for the quality of the remnant vegetation in the offset site to be raised one point. Management actions will seek to protect existing hollows from hot bushfires, increase number of large trees and canopy cover, exclude or manage grazing regime to improve native species ground cover, increase recruitment and species diversity as well as woody debris. Feral animal populations will also be reduced.<br>To achieve the performance outcomes 20 years is proposed. |
| Risk of loss (%) without offset | 1% | It is acknowledged the risk that Masked Owl habitat on the offset area would be completely lost from future development is low. The property is not within a mining area on bauxite plateau. However, it is an active cattle station. The landholder may undertake some clearing under current lawful exemptions such as track maintenance, clearing around buildings, clearing for fencelines and native forestry. Grazing by livestock also has potential to have a detrimental impact on habitat quality.<br>The risk of loss without the offset has been set at **1%.** |

## Table D.10 Offset Area 2: EPBC offset assessment guide input justification – Masked Owl

<table>
<tr><th>Aspect</th><th>Score</th><th>Justification</th></tr>
<tr><td>Future quality without offset (1-10)</td><td>4/10</td><td>A habitat quality score was allocated based on the start quality of the habitat and the existing threatening processes that would continue to impact the offset site habitat and species without the offset being in place.<br>It has been assessed that habitat quality will go down at least one point over a 20 year period due to:<br>• regular and hot bushfires occurring which are showing to have a number of detrimental impacts on Masked Owl such as:<br>– creating more open canopy woodlands with lack of understorey<br>– preventing trees growing and forming new hollows<br>– loss of existing hollow-bearing trees used for breeding<br>– reduction in prey being small to medium sized mammals due to too frequent or too hot fires or feral cats<br>• changes in land use; grazing by livestock is a recognised threat to the species.<br>Without the offset and associated management activities, degradation of the offset site from these threats are assessed as reducing the future habitat quality score to a 4 out of 10.</td></tr>
<tr><td>Risk of loss (%) with offset</td><td>0%</td><td>With the offset in place, which includes legal security on title, preventing future clearing, and implementing an approved offset management plan that will include regular ecological monitoring the risk of loss is very low.<br>The risk of loss with the offset has been set at 0%.</td></tr>
<tr><td>Future quality with offset (1-10)</td><td>6/10</td><td>This is the habitat quality score estimated for the offset within the time until ecological benefit. For Masked Owl the habitat quality score is estimated to increase by one point to 6 out of 10 within 20 years due to the implementation of management measures.<br>The largest change proposed is to the fire regime. Inappropriate fire regimes are a significant threat to Masked Owl (Woinarski, 2004). Fires can have a detrimental impact on number of small and medium sized mammals in an area. The reduction of Masked Owl prey is one of the most likely causes of their decline.
<table>
<tr><th>Management action</th><th>Conservation outcome</th></tr>
<tr><td>Implement a fire management regime in the offset area that is designed to prevent hot bushfires coming through every year and moving to cooler, mosaic burns earlier in the dry season.</td><td>• Protection of existing hollows from hot bushfires<br>• Increasing number of large trees that will form hollows in the future<br>• Increasing number of small and medium sized native mammals<br>• Increase in ground cover, woody debris and species recruitment through changed fire management regimes</td></tr>
<tr><td>Implement a feral animal management program</td><td>• Reduction of feral pig populations<br>• Reduction of feral cat populations<br>• Improvement in habitat quality of ecosystems<br>• Increasing number of small and medium sized native mammals</td></tr>
<tr><td>Implement a weed management program</td><td>• Reduction of non-native plant cover<br>• Reduction in fuel load and likelihood of hot bushfires occurring<br>• Improvement in habitat quality of ecosystems</td></tr>
</table></td></tr>
</table>

## Table D.10 Offset Area 2: EPBC offset assessment guide input justification – Masked Owl

| Aspect | Score | Justification | |
|---|---|---|---|
| | | Manage land use | • Manage land use to ensure no damage occurs to creeks, wetlands and open woodlands such as from vehicle use<br>• Restricted access<br>• Reduced likelihood of unplanned fires occurring<br>• No vegetation clearing unless authorised under OAMP<br>• No grazing or restricted grazing to ensure groundcover is maintained, regeneration of flora species can occur, and small and medium size mammal populations aren't impacted by grazing |
| | | Implement a species monitoring program | • Targeted surveys over 20 years to detect presence of species.<br>• Confirm any active roost sites<br>• Demonstrated increase in small and medium sized mammals<br>• Improved understanding of relationship between fire regimes and small and medium sized mammal populations |
| Confidence in result (%) | 80% Risk of loss<br>80% habitat gains | This describes the confidence in managing the risk of loss with introduction of the proposed offset and the confidence in the evaluated change in quality of the offset site. The level of confidence that **risk of loss is averted by the offset is 80%.**<br>The level of confidence that habitat quality gains will be achieved is assessed at **80%**. To achieve a one-point increase in habitat quality over 20 years is reasonable and achievable through the management actions proposed.<br>Management actions proposed are believed to be shown as effective and performance outcomes set for Masked Owl would be achievable in the timeframe provided for. Also regular monitoring will occur to ensure effectiveness of management actions.<br>Management actions proposed including moving to cooler, mosaic burns early in dry season to actively discourage intense and extensive bushfires has shown effective in other large properties in Cape York including Rio Tinto's land and conservation reserves such Piccaninny Plains. This fire regime is demonstrated to have multiple benefits and a number of regulators and stakeholder groups are working together to reduce late season, hot wildfires. The Australian Wildlife Conservancy (AWC) carry out Australia's largest non-government prescribed burning program which has reduced destructive wildfire by 50% across their northern sanctuaries. The extent of wildfire has been reduced by 64% on Piccaninny Plains Wildlife Sanctuary in Cape York which is confirmed to support Red Goshawk and Black-footed Tree Rat.<br>For the Amrun project also on western Cape York in one year (2021) they humanely destroyed 709 pigs as part of their feral pig control program. Highest levels of pig activity were found along creeks and aerial shooting was the most effective. The feral animal control program in 2021 also removed 12 feral cats and 11 feral dogs (Rio Tinto 2022). | |
| Area of offset required | 28,000 | The calculator was prepared to calculate the amount of habitat required to satisfy the offset liability for the loss of 8,781 ha of remnant vegetation within the impact footprint. | |
| % of impact offset | 100% | Based on inputs of 28,000 ha of habitat the calculator states **100%** is delivered. | |

## Table D.11 Offset Area 2: EPBC offset assessment guide input justification – Black-footed Tree-Rat

| Aspect | Score | Justification |
|---|---|---|
| Time over which loss is averted (max 20 years) | 20 years | This is the time over which changes in the level of risk can be considered and is equivalent to the time over which the offset area is proposed to be actively managed. A timeframe of 20 years has been applied as this is the length of time over which active management of the property will be in place and is consistent with the offset assessment guide. |
| Start quality (1-10) | 5/10 | The quality of Black-footed Tree-Rat habitat in the impact site is assessed as follows using the *Offsets Assessment Guide.* The quality of Black-footed Tree-Rat habitat in the impact site is assessed as being a 5 out of 10. |
| Site condition | 2/4 | The species inhabits Eucalypt forests and woodlands particularly in forests where suitable large hollows are plentiful. The species has also been known to den in large rainforest trees containing suitable hollows. Watson River Station supports a diversity of remnant REs that provide suitable habitat for the Black-footed Tree-Rat and all remnant habitats within the offset area should be assumed to potentially provide habitat for the species. The offset area was observed to support potentially suitable hollow-bearing trees required for denning.<br>From initial assessments these communities appear to be in moderate condition with a more open canopy than the impact site. Cattle grazing occurs on the property and there was a lack of understorey noted. Threats to vegetation condition and function on the offset area would include feral pigs, weeds, grazing and bushfire. |
| Site context | 2/3 | The distribution of the Black-footed Tree-Rat in Australia is poorly known. It has been recorded mostly from eucalypt forests and woodlands (but not rainforests) around Mareeba, but there are records sparsely across Cape York Peninsula (TSSC 2015). The project site is well connected to other large tracts of remnant vegetation and habitat for the species. |
| Species stocking rate | 1/3 | No Black-footed Tree-rats have been observed on the offset area; however, Atlas of Living Australia records exist in the region and are known from the area, with the closest ALA record being 35 kms away. |
| Time until ecological benefit | 20 years | This is the estimated time it will take the habitat to improve for the offset to be realised. It is estimated that it will take up to **20 years** for the quality of the remnant vegetation in the offset site to be raised one point. Management actions will seek to protect existing hollows from hot bushfires, increase number of large trees and canopy cover, exclude or manage grazing regime to improve native species ground cover, increase recruitment and species diversity as well as woody debris. Feral animal populations will also be reduced.<br>To achieve the performance outcomes 20 years is proposed. |
| Risk of loss (%) without offset | 1% | It is acknowledged the risk that Black-footed Tree-rat habitat on the offset area would be completely lost from future development is low. The property is not within a mining area on bauxite plateau. However, it is an active cattle station. The landholder may undertake some clearing under current lawful exemptions such as track maintenance, clearing around buildings, clearing for fencelines and native forestry. Grazing by livestock also has potential to have a detrimental impact on habitat quality.<br>The risk of loss without the offset has been set at **1%.** |

## Table D.11 Offset Area 2: EPBC offset assessment guide input justification – Black-footed Tree-Rat

<table>
<tr><th>Aspect</th><th>Score</th><th>Justification</th></tr>
<tr><td>Future quality without offset (1-10)</td><td>4/10</td><td>A habitat quality score was allocated based on the start quality of the habitat and the existing threatening processes that would continue to impact the offset site habitat and species without the offset being in place.<br>It has been assessed that habitat quality will go down at least one point over a 20-year period due to:<br>• inappropriate fire regimes which are known to have a number of detrimental impacts on Black-footed Tree-Rat such as:<br>– creating more open canopy woodlands with lack of understorey<br>– preventing trees growing and forming new hollows<br>– loss of existing hollow-bearing trees used for denning<br>– direct loss of individuals from hot fires<br>– loss of food resources<br>• predation from feral cats (Felis catus)<br>• land use primarily grazing of cattle.<br>Fire regime on Watson River Station has been fewer hot fires as fuel load is reduced from grazing and burns are generally occurring earlier in dry season. However, fire regimes are dependent on landholders, and it is possible the fire regime could change in the future.<br>Without the offset and associated management activities, degradation of the offset site from these threats are assessed as reducing the future habitat quality score to a 4 out of 10.</td></tr>
<tr><td>Risk of loss (%) with offset</td><td>0%</td><td>With the offset in place, which includes legal security on title, preventing future clearing, and implementing an approved offset management plan that will include regular ecological monitoring the risk of loss is very low.<br>The risk of loss with the offset has been set at 0%.</td></tr>
<tr><td>Future quality with offset (1-10)</td><td>7/10</td><td>This is the habitat quality score estimated for the offset within the time until ecological benefit. For Black-footed Tree-rat the habitat quality score is estimated to increase by two points to 7 out of 10 within 20 years due to the implementation of management measures.<br>The largest change proposed is to the fire regime and grazing. Inappropriate fire regimes are a significant threat to Black-footed Tree-rats and is likely to be a causal factor in the species decline (Winter & Atherton, 1985). In some areas frequent, high-intensity fires are destroying denning trees directly and also prohibiting other trees from growing and creating hollows.
<table>
<tr><th>Management action</th><th>Conservation outcome</th></tr>
<tr><td>Implement a suitable fire management regime in the offset area that is designed to prevent high intensity bushfires coming through every year in late dry season, and moving to a mosaic of different burn intervals and intensities is proposed.</td><td>• Protection of existing hollows from hot bushfires<br>• Increasing number of large trees that will form hollows in the future<br>• Improve availability of foraging resources for Black-footed Tree Rat from implementation of appropriate fire regimes<br>• Increase in ground cover, woody debris and species recruitment through changed fire management regimes<br>• Reducing likelihood of late season bushfires occurring by actively managing fuel loads. Increasing time between burns of habitat patches to allow a mosaic of different burn intervals providing refuge for various fauna species and ensuring foraging resources aren’t completely removed from large areas</td></tr>
</table></td></tr>
</table>

**Table D.11 Offset Area 2: EPBC offset assessment guide input justification – Black-footed Tree-Rat**

| Aspect | Score | Justification | |
|---|---|---|---|
| | | Implement a feral animal management program | • Reduction of feral pig populations<br>• Reduction of feral cat populations<br>• Improvement in habitat quality of ecosystems |
| | | Implement a weed management program | • Reduction of non-native plant cover<br>• Reduction in fuel load and likelihood of hot bushfires occurring<br>• Improvement in habitat quality of ecosystems |
| | | Manage land use | • Manage land use to ensure no damage occurs to creeks, wetlands and open woodlands such as from vehicle use<br>• Restricted access<br>• Reduced likelihood of unplanned fires occurring<br>• No vegetation clearing unless authorised under OAMP<br>• No or restricted grazing |
| | | Implement a species monitoring program | • Improved understanding of species habitat utilisation and dispersal<br>• Increase in Black-footed Tree Rat populations utilising the offset area from year 1 to year 20 |
| Confidence in result (%) | 80%<br>Risk of loss<br>70%<br>habitat quality gain | This describes the confidence in managing the risk of loss with introduction of the proposed offset and the confidence in the evaluated change in quality of the offset site. The level of confidence that **risk of loss is averted by the offset is 80%.**<br>The level of confidence that habitat quality gains will be achieved is assessed at **70%**. To achieve a two-point increase in habitat quality over 20 years is reasonable and achievable through the management actions proposed.<br>Management actions proposed are believed to be shown as effective and performance outcomes set for Black-footed Tree-rat would be achievable in the timeframe provided for. Also regular monitoring will occur to ensure effectiveness of management actions.<br>Management actions proposed including moving to cooler, mosaic burns early in dry season to actively discourage intense and extensive bushfires has shown effective in other large properties in Cape York including Rio Tinto's land and conservation reserves such Piccaninny Plains. This fire regime is demonstrated to have multiple benefits and a number of regulators and stakeholder groups are working together to reduce late season, hot wildfires. The Australian Wildlife Conservancy (AWC) carry out Australia's largest non-government prescribed burning program which has reduced destructive wildfire by 50% across their northern sanctuaries. The extent of wildfire has been reduced by 64% on Piccaninny Plains Wildlife Sanctuary in Cape York which is confirmed to support Red Goshawk and Black-footed Tree Rat.<br>For the Amrun project also on western Cape York in one year (2021) they humanely destroyed 709 pigs as part of their feral pig control program. Highest levels of pig activity were found along creeks and aerial shooting was the most effective. The feral animal control program in 2021 also removed 12 feral cats and 11 feral dogs (Rio Tinto 2022). | |
| Area of offset required | 24,000 | The calculator was prepared to calculate the amount of habitat required to satisfy the offset liability for the loss of 6,996 ha of remnant vegetation within the impact footprint. | |
| % of impact offset | 102.15% | Based on inputs of 24,000 ha of habitat the calculator states **102.15%** is delivered. | |

## Table D.12 Offset Area 2: EPBC offset assessment guide input justification – Red Goshawk

| Aspect | Score | Justification |
|---|---|---|
| Time over which loss is averted (max 20 years) | 20 years | This is the time over which changes in the level of risk can be considered, and is equivalent to the time over which the offset area is proposed to be actively managed. A timeframe of 20 years has been applied as this is the length of time over which active management of the property will be in place and is consistent with the offset assessment guide. |
| Start quality (1-10) | 6 | The quality of Red Goshawk habitat in the offset site is assessed as follows using the *Offsets Assessment Guide*:<br>The quality of Red Goshawk in the offset site is assessed as being a **6 out of 10.** |
| Site Condition | 2 | Red Goshawk inhabits coastal and sub-coastal tall open forests and woodlands, tropical savannas traversed by wooded or forested rivers, and the edges of rainforests, usually on fertile soils (TSSC 2015a). The species is known to avoid very dense and very open habitats that don't provide enough coverage for ambush of prey or inhibit fast flight and manoeuvring when hunting. This species' nests are restricted to trees taller than 20 m and within 2.5 km of a watercourse or wetland.<br>The offset site supports a high number of streams including larger watercourses being Watson River and Merkunga Creek which provide good refuge and likely breeding habitat for the species. The surrounding remnant vegetation within approximately 2.5 km of these persistent water features are likely to be preferred as breeding/nesting habitat. All other remnant habitats within offset site are considered to provide either potential breeding/nesting, hunting/foraging and/or dispersal habitat for this species (i.e. 'coastal and sub-coastal tall open forests and woodlands').<br>From initial assessments, these communities appear to be in moderate condition with a more open canopy than the impact site. Cattle grazing occurs on the property and there was a lack of understorey noted. Threats to vegetation condition and function on the offset area would include feral pigs, weeds, grazing and bushfire. |
| Site Context | 3 | Red goshawks are currently known to breed from the Kimberley, east to Cape York Peninsula, and on the Tiwi Islands (MacColl et al. 2021). They may still breed at very low densities in the Wet Tropics and Einasleigh Uplands though record data are scarce (MacColl et al. 2021). Birds recorded from far outside the breeding range in central Australia (Aumann 2001) and the Pilbara (L Trotter pers. comm. cited in MacColl et al. 2021) likely include both dispersive juveniles (Aumann 2001) and seasonal migrants from further north.<br>The breeding range of red goshawks has significantly contracted since 1980. The species gradually declined to extinction in New South Wales over the 1980s and 1990s (Cooper et al. 2014) and populations in south-east Queensland largely disappeared before 2010 (Seaton 2014). Apart from the satellite-tracked birds, records south of Cape York Peninsula over the last decade are increasingly scant, although some places where the species has been recorded historically have not been surveyed recently (MacColl et al. 2021).<br>The offset area within Cape York is an important breeding, foraging and refugia area for Red Goshawk. The vast areas of habitat provide important connectivity for the species within the site and the greater region. Three of the major threats in the offset area are from inappropriate fire regimes, grazing and pest animals.<br>Due to recent uplisting of the species and known Red Goshawk populations in the project area, site context is considered high. |
| Species Stocking Rate | 1 | No Red Goshawks have been recorded on site however Atlas of Living Australia shows records nearby (within 30 km). A score of 1 out of 3 is given for offset site. |
| Time until ecological benefit | 20 years | This is the estimated time it will take the habitat to improve for the offset to be realised. It is estimated that it will take up to **20 years** for the quality of the remnant vegetation in the offset site to be raised one point. Management actions will seek to protect existing remnant, tall vegetation from hot bushfires, increase number of large trees and canopy cover, exclude or manage grazing regime to improve native species ground cover, increase recruitment and species diversity as well as woody debris. Feral animal populations will also be reduced.<br>To achieve the performance outcomes 20 years is proposed. |

## Table D.12 Offset Area 2: EPBC offset assessment guide input justification – Red Goshawk

<table>
<tr><th>Aspect</th><th>Score</th><th>Justification</th></tr>
<tr><td>Risk of loss (%) without offset</td><td>1%</td><td>It is acknowledged the risk that Red Goshawk habitat on the offset area would be completely lost from future development is low. The property is not within a mining area on bauxite plateau. However, it is an active cattle station. The landholder may undertake some clearing under current lawful exemptions such as track maintenance, clearing around buildings, clearing for fencelines and native forestry. Grazing by livestock also has potential to have a detrimental impact on habitat quality.<br>The risk of loss without the offset has been set at 1%.</td></tr>
<tr><td>Future quality without offset (1-10)</td><td>5/10</td><td>A habitat quality score was allocated based on the start quality of the habitat and the existing threatening processes that would continue to impact the offset site habitat and species without the offset being in place.<br>It has been assessed that habitat quality will go down at least one point over a 20-year period due to:<br>• regular and hot bushfires occurring which are showing to have a number of detrimental impacts on Red Goshawk such as:<br>– changing the composition of forest and woodland habitat to unsuitable hunting habitat (vegetation thickening)<br>– preventing trees growing to suitable nesting height<br>– loss of existing tall trees required for nesting<br>– reduction in prey being small to medium sized mammals due to too frequent or too hot fires or feral cats<br>• changes in land use. Possible grazing by livestock can impact on populations of small and medium size mammal populations.<br>Fire regime on Watson River Station has been fewer hot fires as fuel load is reduced from grazing and burns are generally occurring earlier in dry season. However, fire regimes are dependent on landholders, and it is possible the fire regime could change in the future.<br>Without the offset and associated management activities, degradation of the offset site from these threats are assessed as reducing the future habitat quality score to a 5 out of 10.</td></tr>
<tr><td>Risk of loss (%) with offset</td><td>0%</td><td>With the offset in place, which includes legal security on title, preventing future clearing, and implementing an approved offset management plan that will include regular ecological monitoring, the risk of loss is very low.<br>The risk of loss with the offset has been set at 0%.</td></tr>
<tr><td>Future quality with offset (1-10)</td><td>8/10</td><td>This is the habitat quality score estimated for the offset within the time until ecological benefit. For Red Goshawk the habitat quality score is estimated to increase by two points to 8 out of 10 within 20 years due to the implementation of management measures.<br>The largest change proposed is to the fire regime. Inappropriate fire regimes are a significant threat to Red Goshawk. Fires can have a detrimental impact on number of small and medium sized mammals in an area. The reduction of Red Goshawk suitable nesting trees and hunting habitat is one of the most likely causes of their decline.<br>The following actions will be implemented to improve habitat quality:<br><table><tr><th>Management action</th><th>Conservation outcome</th></tr><tr><td>Implement a suitable fire management regime in the offset area that is designed to prevent high intensity bushfires coming through every year in late dry season, and moving to a mosaic of different burn intervals</td><td>• Reducing likelihood of late season bushfires occurring by actively managing fuel loads, particularly adjacent to Aurukun Road where many fires start from<br>• Increasing time between burns of habitat patches to allow a mosaic of different burn intervals providing refuge for various fauna species and ensuring foraging resources aren’t completely removed from large areas</td></tr></table></td></tr>
</table>

**Table D.12 Offset Area 2: EPBC offset assessment guide input justification – Red Goshawk**

| Aspect | Score | Justification | |
|---|---|---|---|
| | | and intensities is proposed. | • Reduced likelihood Red Goshawk will abandon any existing nests by removing or reducing occurrence of high intensity bushfires<br>• Protection of existing large trees that Red Goshawk may nest in<br>• Improving native species canopy cover and height through changed fire management regimes<br>• Increasing ground cover, woody debris and species recruitment and maintaining suitable hunting grounds through changed fire management regimes<br>• Increasing number of small and medium sized native mammals<br>• Increase in number of large (20 m) trees from year 1 to year 20 |
| | | Implement a feral animal management program | • Reduction of feral pig populations<br>• Reduction of feral cat populations<br>• Increase in number of small and medium sized native mammals<br>• Improvement in habitat quality of ecosystems |
| | | Implement a weed management program | • Reduction of non-native plant cover<br>• Reduction in fuel load and likelihood of hot bushfires occurring<br>• Improvement in habitat quality of ecosystems |
| | | Manage land use | • Manage land use to ensure no damage occurs to creeks, wetlands and open woodlands such as from vehicle use<br>• Restricted access<br>• Reduced likelihood of unplanned fires occurring<br>• No vegetation clearing unless authorised under OAMP<br>• Managing or restricted grazing |
| | | Implement a species monitoring program | • Improved understanding of any active nest sites of Red Goshawk in the offset area so they can be better managed<br>• Improved understanding of species habitat utilisation and dispersal<br>• Demonstrated increase in small and medium sized mammals<br>• Improved understanding of relationship between fire regimes and small and medium sized mammal populations |
| Confidence in result (%) | 80%<br>Risk of loss<br>70% habitat gains | This describes the confidence in managing the risk of loss with introduction of the proposed offset and the confidence in the evaluated change in quality of the offset site. The level of confidence that **risk of loss is averted by the offset is 80%.**<br>The level of confidence that habitat quality gains will be achieved is assessed at **70%**. To achieve a two point increase in habitat quality over 20 years is reasonable and achievable through the management actions proposed. | |

## Table D.12 Offset Area 2: EPBC offset assessment guide input justification – Red Goshawk

| Aspect | Score | Justification |
|---|---|---|
| | | Management actions proposed are believed to be shown as effective and performance outcomes set for Red Goshawk would be achievable in the timeframe provided for. Also regular monitoring will occur to ensure effectiveness of management actions.<br>Management actions proposed including moving to cooler, mosaic burns early in dry season to actively discourage intense and extensive bushfires has shown effective in other large properties in Cape York including Rio Tinto's land and conservation reserves such Piccaninny Plains. This fire regime is demonstrated to have multiple benefits and a number of regulators and stakeholder groups are working together to reduce late season, hot wildfires.<br>For the Amrun project also on western Cape York in one year (2021) they humanely destroyed 709 pigs as part of their feral pig control program. Highest levels of pig activity were found along creeks and aerial shooting was the most effective. The feral animal control program in 2021 also removed 12 feral cats and 11 feral dogs (Rio Tinto 2022). |
| Area of offset required | 38,000 | The calculator was prepared to calculate the amount of habitat required to satisfy the offset liability for the loss of 8,781 ha of remnant vegetation within the impact footprint. |
| % of impact offset | 104.36% | Based on inputs of 38,000 ha of habitat the calculator states **104.36%** is delivered. |

# Appendix E

## Habitat mapping and threatened species records in Project area

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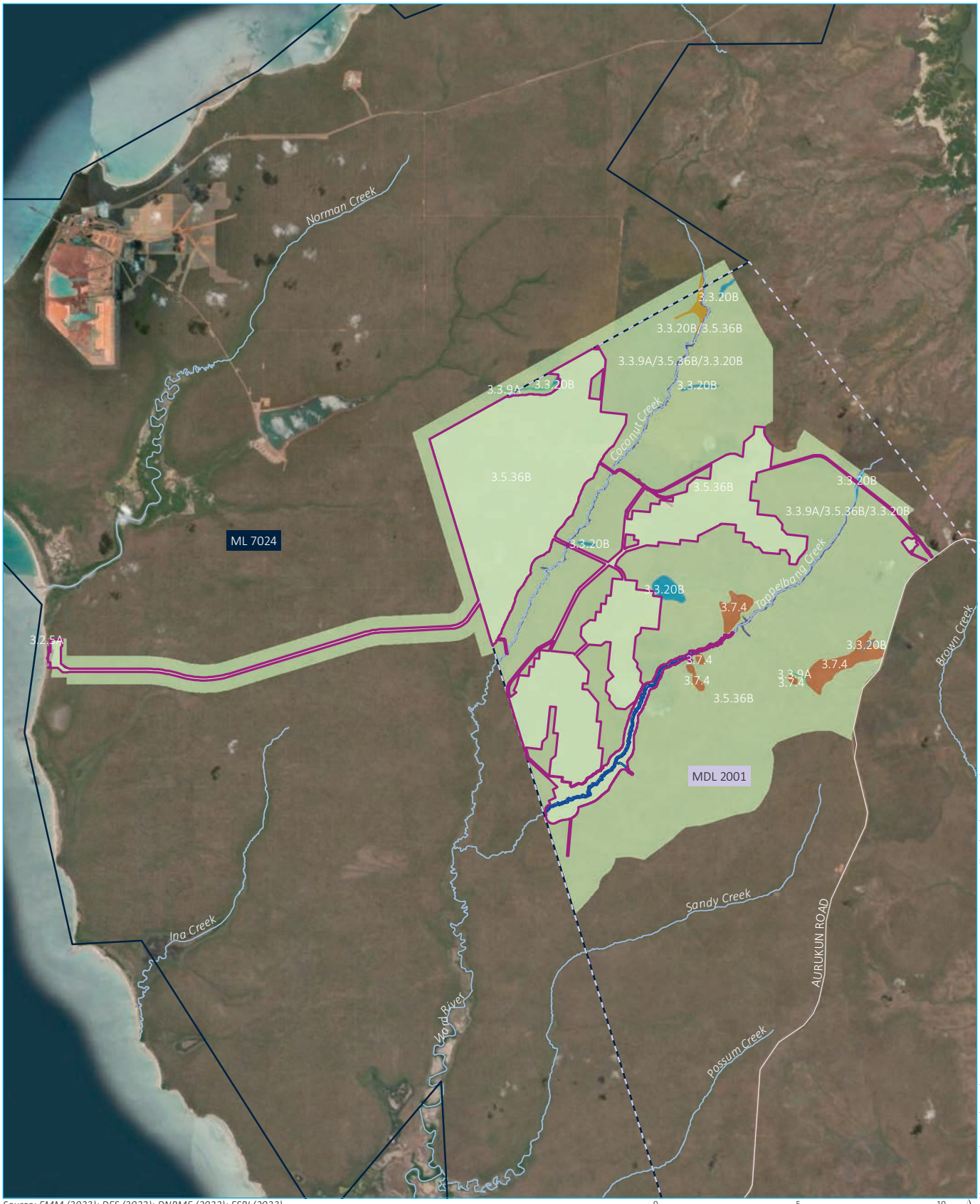
## E.1 Ground-truthed regional ecosystem mapping




Source: EMM (2023); DES (2022); DNRME (2023); ESRI (2023)

0 5 10 km

GDA 1994 MGA Zone 54

N

\\emmsvr1\EMM2\2022\E220921 - Aurukun Bauxite Mine Biodiversity Offsets\GIS\02_Maps\G006_ImpactSiteGTRE_20230503_03.mxd 23/05/2023

KEY

- Impact footprint
- Mining lease (ML 7024)
- Mineral development licence (MDL 2001)
- Minor road
- Named watercourse
- Impacted watercourse vegetation

Ground-truthed regional ecostems

Remnant - least concern (VM status)

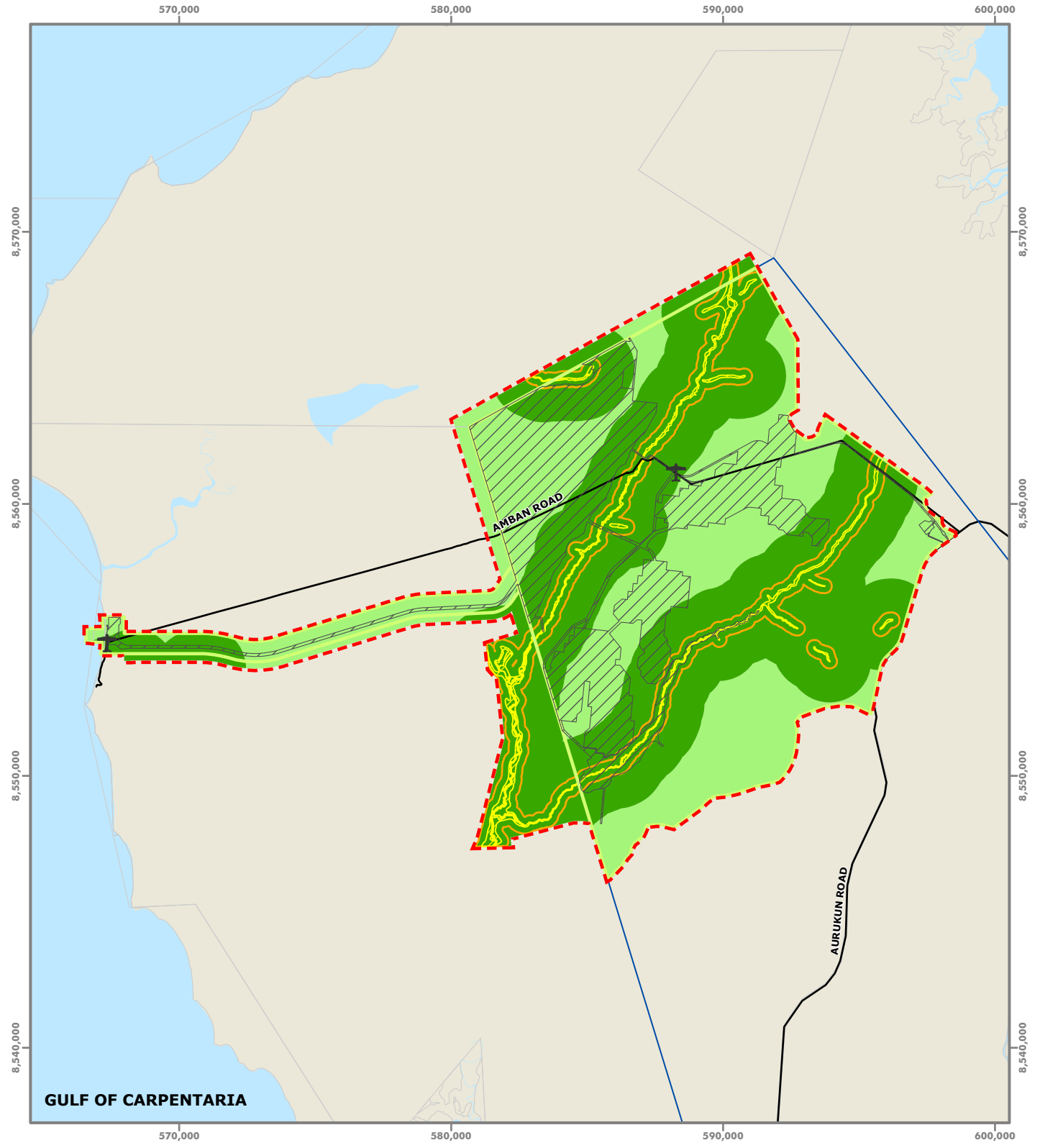
- 3.2.5a
- 3.3.20b
- 3.3.20b/3.5.36b
- 3.3.9a
- 3.3.9a/3.5.36b/3.3.20b
- 3.5.36b

## Ground-truthed vegetation communities

Aurukun Bauxite Project
Biodiversity Offset Strategy
Figure 2.5

EMM
creating opportunities

## E.2 Habitat mapping and threatened species records in Project area




**Legend**

- Ecology study area
- Project site
- Disturbance footprint
- Mineral development licence 2001
- Abandoned air strip
- Road
- Cadastral boundary

**Habitat mapping**

- Potential breeding and foraging habitat (Breeding Zones 1 - 6 and feeding zones 1 - 3)
- Highest potential breeding habitat (Breeding zone 1)
- Primary habitat for foraging/feeding and daytime refuge (Riparian vegetation)
- Limited use habitat

**Figure 15a : Palm Cockatoo habitat for the ecology study area**

Terrestrial Ecology Assessment
Aurukun Bauxite Project

Map Number: 22036_TEA_15_I
Date: 23 May 2023
Map Projection: GDA 1994 MGA Zone 54
Imagery: November 2018
Data: Roads, DCDB - (c)DNRM 2023

0 2 4 6 8 10
Kilometres

N

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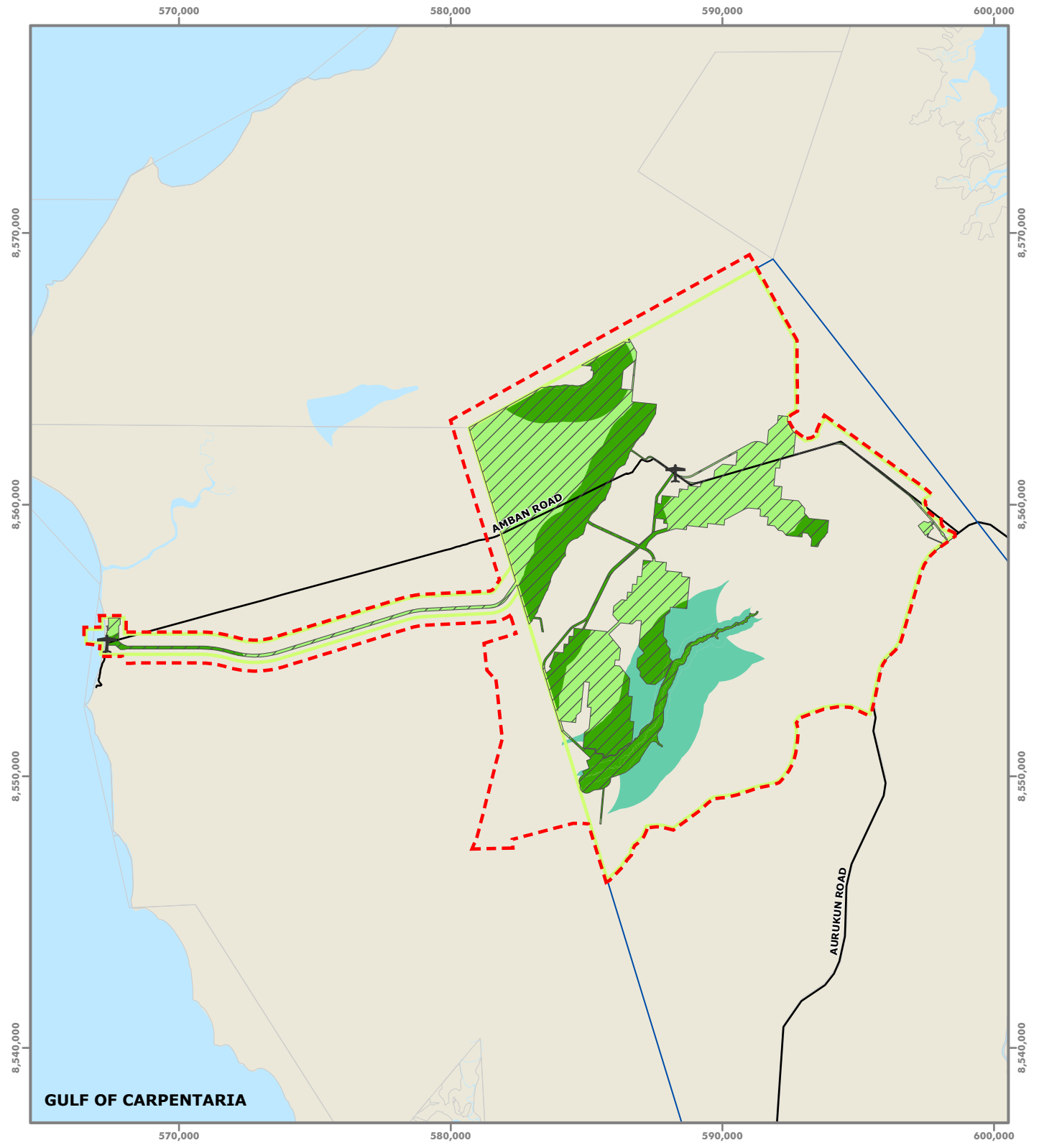


**Legend**

- Ecology study area
- Project site
- Disturbance footprint
- Mineral development licence 2001
- Abandoned air strip
- Road
- Cadastral boundary

**Clearing impacts**

- Potential breeding and foraging habitat (Breeding Zones 1 - 6 and feeding zones 1 - 3)
- Limited Use foraging and feeding habitat

**Indirect impacts**

- Potential breeding and foraging habitat (Breeding Zones 1 - 6 and feeding zones 1 - 3)

**Figure 15b : Palm Cockatoo habitat clearing and indirect impacts**

Terrestrial Ecology Assessment
Aurukun Bauxite Project

Map Number: 22036_TEA_15B_F
Date: 31 May 2023
Map Projection: GDA 1994 MGA Zone 54
Imagery: November 2018
Data: Roads, DCDB - (c)DNRM 2023

0 2 4 6 8 10
Kilometres

N

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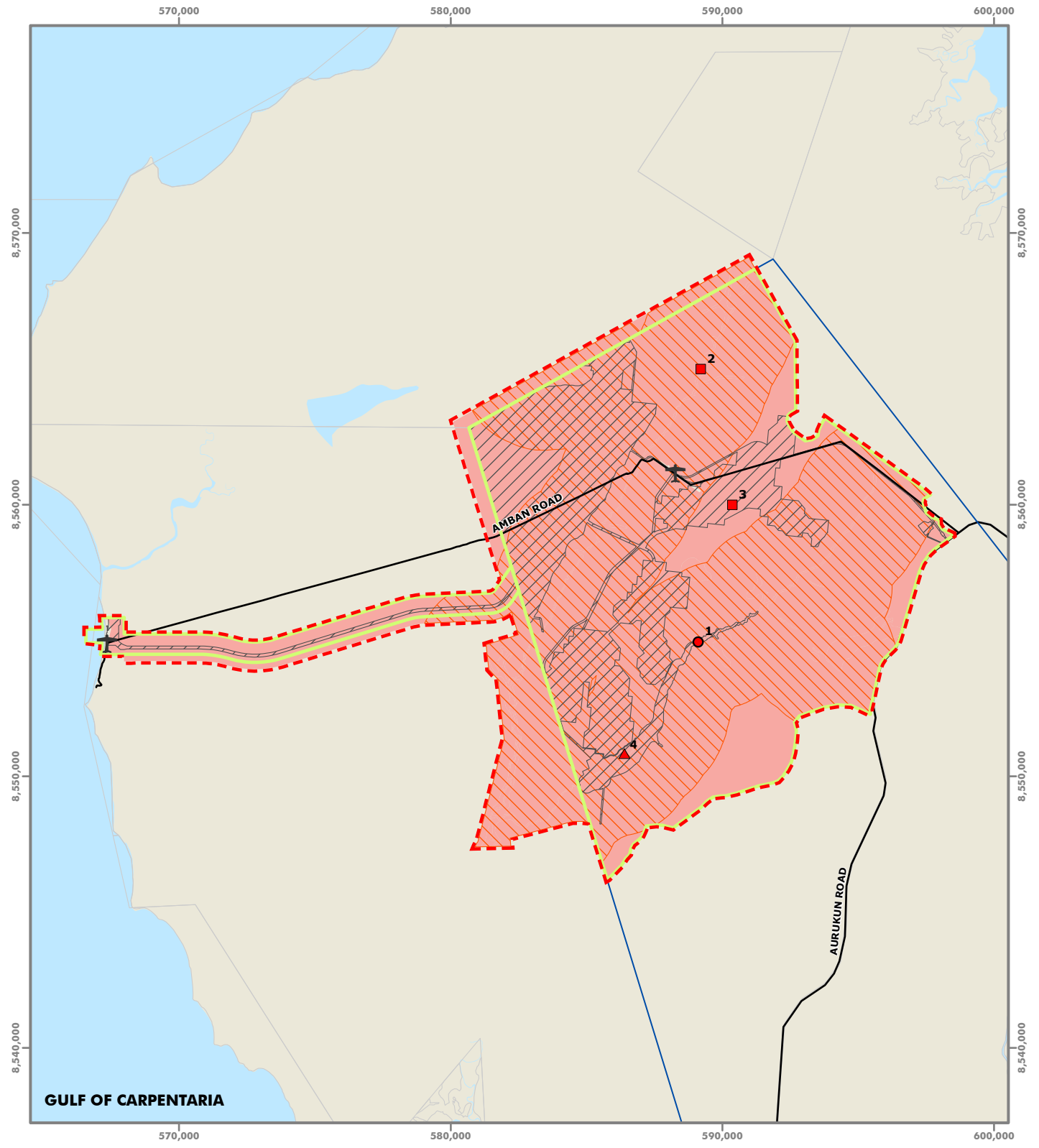


**Legend**

- Ecology study area
- Project site
- Disturbance footprint
- Mineral development licence 2001
- Abandoned air strip
- Road
- Cadastral boundary

**Red Goshawk (*Erythrotriorchis radiatus*) – Endangered (EPBC Act), Endangered (NC Act)**

**Recorded locations (Source & year of record)**

- EcoSM 2018
- EcoSM 2019
- Ecotone 2022

**Habitat mapping**

- Foraging/hunting, breeding/nesting and dispersal habitat mapping
- Preferred breeding/nesting habitat mapping

## Figure 16 : Red Goshawk habitat mapping and records for the ecology study area

Terrestrial Ecology Assessment
Aurukun Bauxite Project

Map Number: 22036_TEA_16_D
Date: 04 May 2023
Map Projection: GDA 1994 MGA Zone 54
Imagery: November 2018
Data: Roads, DCDB - (c)DNRM 2023

0 2 4 6 8 10
Kilometres

N

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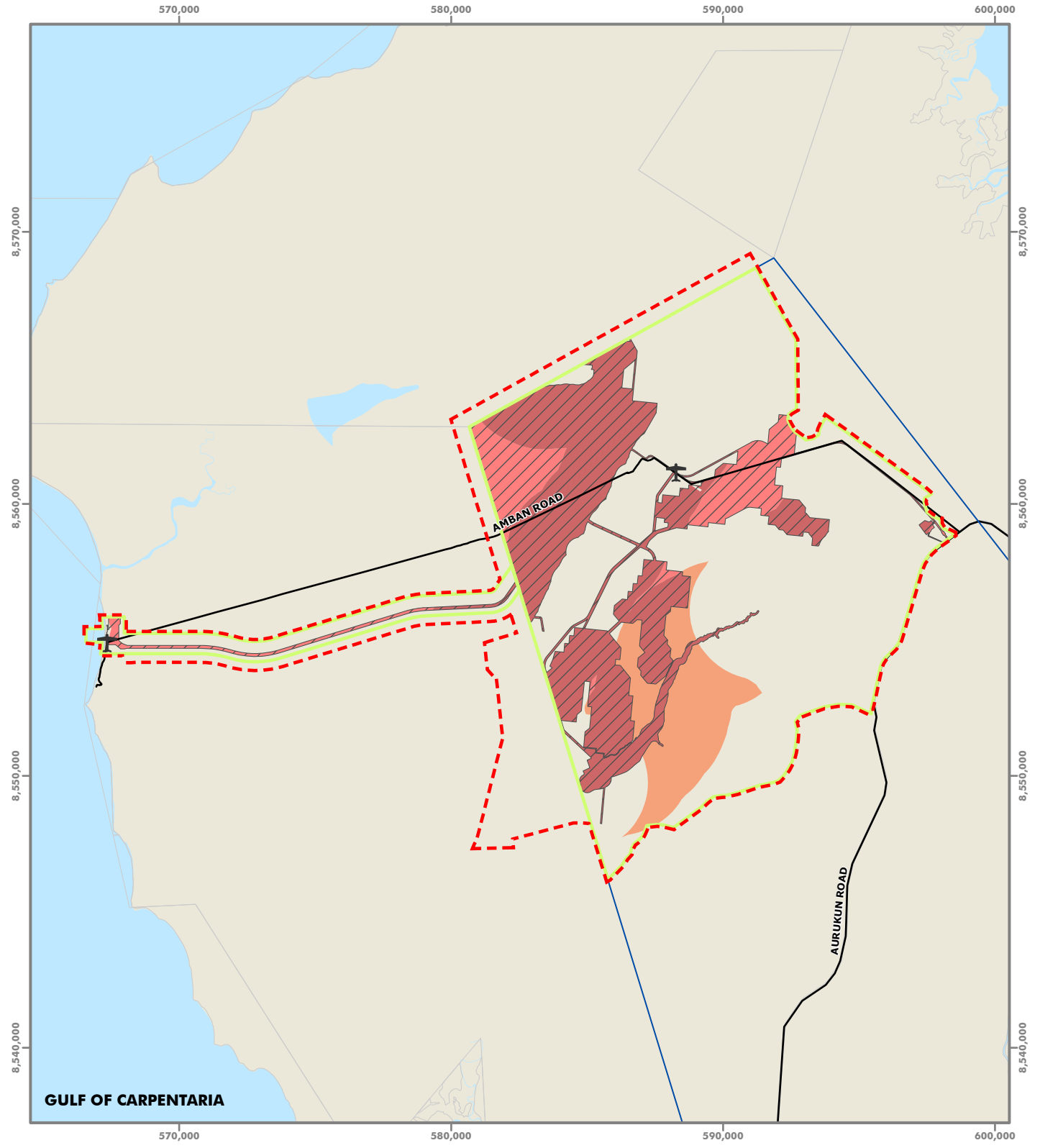


**Legend**

- Ecology study area
- Project site
- Disturbance footprint
- Mineral development licence 2001
- Abandoned air strip
- Road
- Cadastral boundary

**Clearing impacts**

- Breeding/nesting habitat
- Foraging/hunting and dispersal habitat

**Indirect impacts**

- Breeding/nesting habitat

**Figure 16b : Red Goshawk habitat mapping clearing and indirect impacts**

Terrestrial Ecology Assessment
Aurukun Bauxite Project

Map Number: 22036_TEA_16B_B
Date: 31 May 2023
Map Projection: GDA 1994 MGA Zone 54
Imagery: November 2018
Data: Roads, DCDB - (c)DNRM 2023

0 2 4 6 8 10
Kilometres

N

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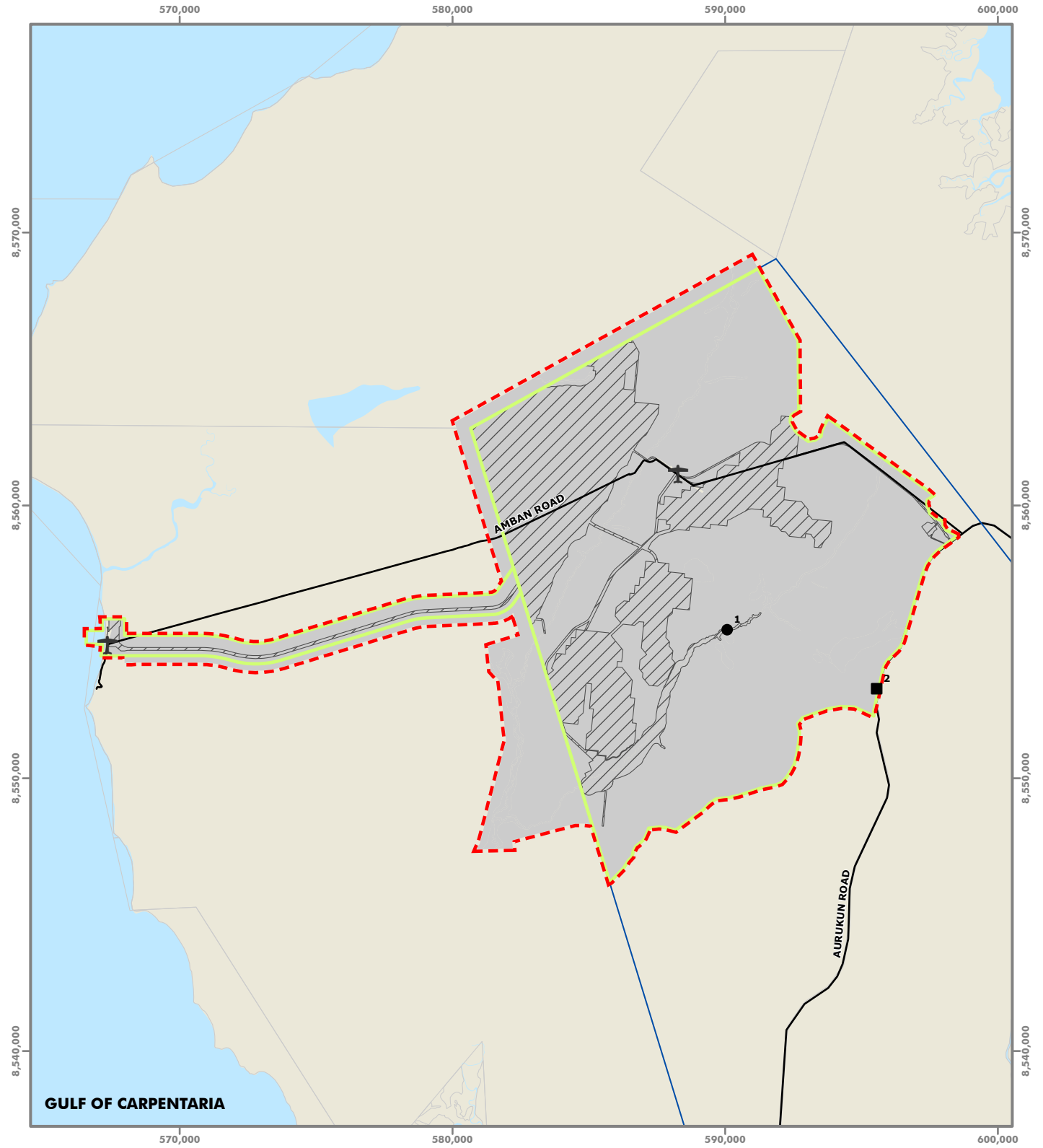


**Legend**

- Ecology study area
- Project site
- Disturbance footprint
- Mineral development licence 2001
- Abandoned air strip
- Road
- Cadastral boundary

**Black-footed Tree-rat (*Mesembriomys gouldii rattoides*) – Vulnerable (EPBC Act), Least concern (NC Act)**

**Recorded locations (Source & year of record)**

- EcoSM 2018
- EcoSM 2019

**Habitat mapping**

- Foraging, breeding and dispersal habitat mapping

**Figure 17 : Black-footed Tree-rat habitat mapping and records for the ecology study area**

Terrestrial Ecology Assessment
Aurukun Bauxite Project

Map Number: 22036_TEA_17_D
Date: 04 May 2023
Map Projection: GDA 1994 MGA Zone 54
Imagery: November 2018
Data: Roads, DCDB - (c)DNRM 2023

0 2 4 6 8 10
Kilometres

N

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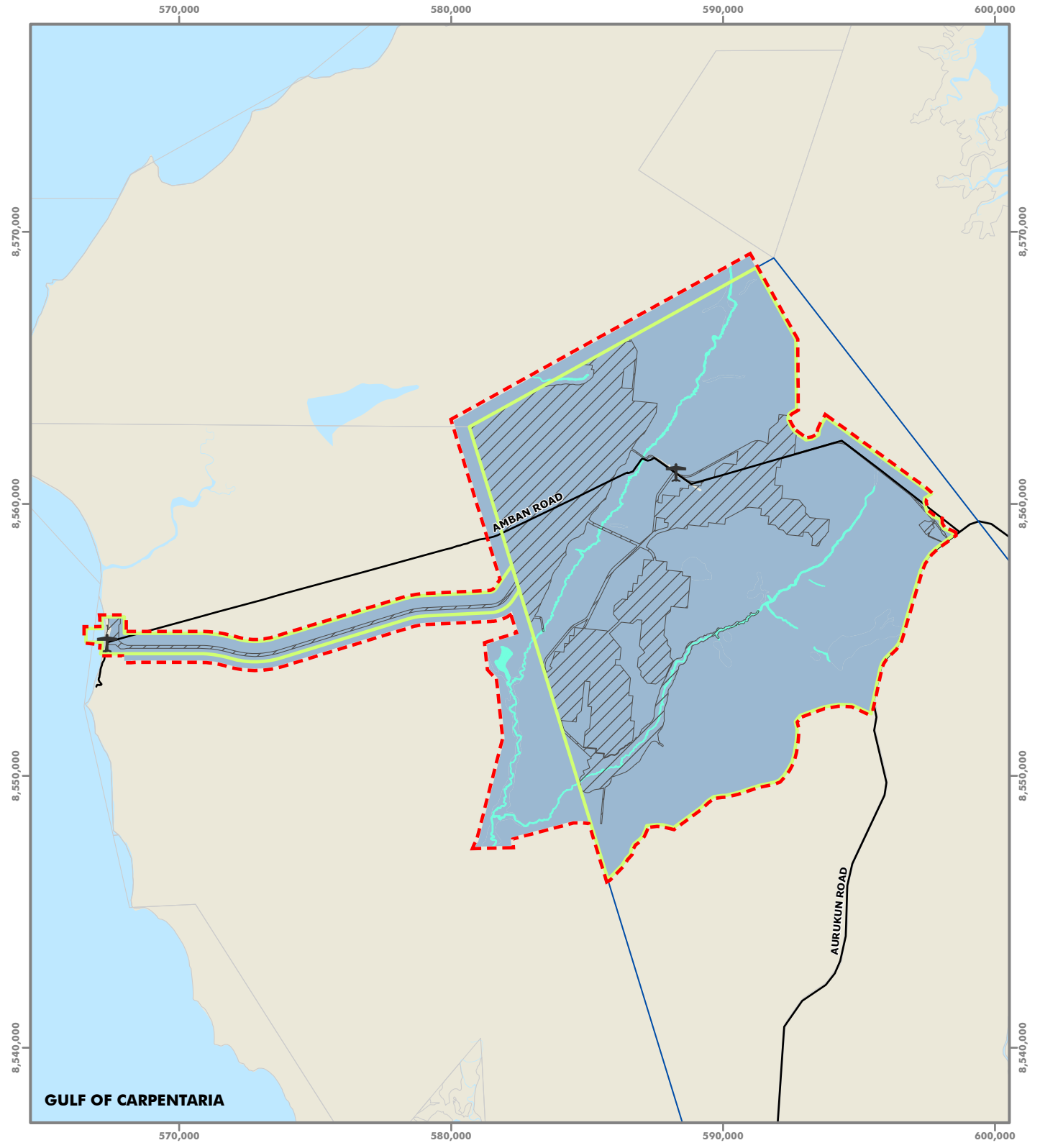


**Legend**

- Ecology study area
- Project site
- Disturbance footprint
- Mineral development licence 2001
- Abandoned air strip
- Road
- Cadastral boundary

**Masked Owl (*Tyto novaehollandiae kimberli*) - Vulnerable (EPBC Act and NC Act)**

- Preferred roosting habitat
- Foraging, roosting, nesting/breeding and dispersal habitat mapping

**Figure 18 : Masked Owl habitat mapping for the ecology study area**

Terrestrial Ecology Assessment
Aurukun Bauxite Project

Map Number: 22036_TEA_18_C
Date: 02 May 2023
Map Projection: GDA 1994 MGA Zone 54
Imagery: November 2018
Data: Roads, DCDB - (c)DNRM 2023

0 2 4 6 8 10
Kilometres

N

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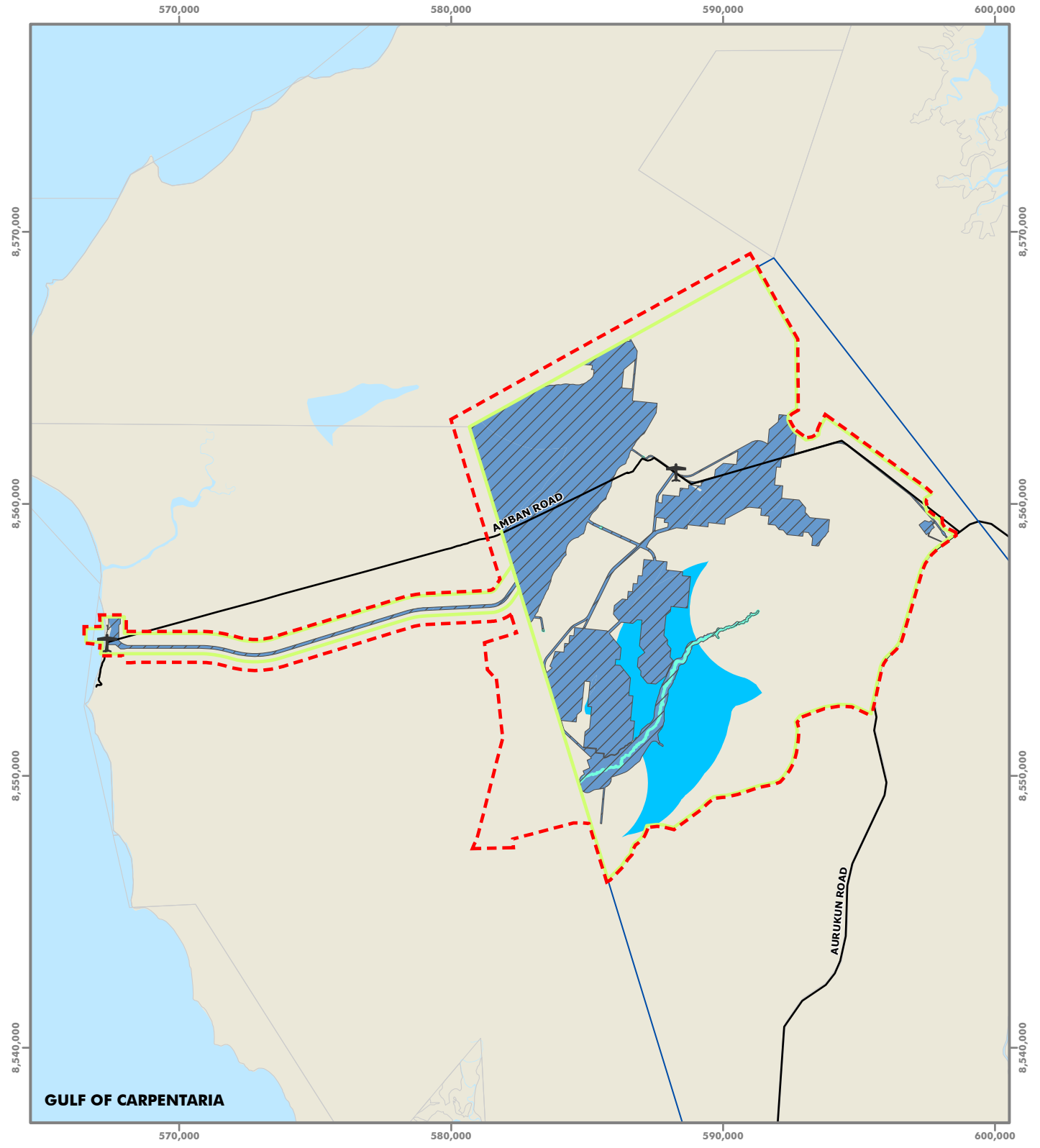


**Legend**

- Ecology study area
- Project site
- Disturbance footprint
- Mineral development licence 2001
- Abandoned air strip
- Road
- Cadastral boundary

**Clearing impacts**

- Preferred roosting habitat
- Foraging, roosting, nesting/breeding and dispersal habitat

**Indirect impacts**

- Foraging, roosting, nesting/breeding and dispersal habitat

## Figure 18b : Masked Owl habitat mapping clearing and indirect impacts

Terrestrial Ecology Assessment
Aurukun Bauxite Project

Map Number: 22036_TEA_18B_B
Date: 31 May 2023
Map Projection: GDA 1994 MGA Zone 54
Imagery: November 2018
Data: Roads, DCDB - (c)DNRM 2023

0 2 4 6 8 10
Kilometres

N

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# Appendix F

## Summary of significant residual impact assessments

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## F.1 MNES assessments

**Table F.1 MNES significant, residual impact assessment results**

| MNES | Impact assessment summary | Significant impact yes/no |
|---|---|---|
| Red Goshawk | The extent of proposed clearing of habitat critical to the survival of this species and the potential impacts and disruption to breeding territory and activities (up to 8,781.1 ha) of one to two breeding pairs, may result in a significant impact to the Red Goshawk. | Yes |
| Palm Cockatoo | As a result of the extent of proposed habitat clearing and potential loss of habitat function on 8,531.8 ha including 4,558.5 ha of potential breeding and foraging habitat (including refugial habitat), there is potential for the project to significantly impact the Palm Cockatoo. | Yes |
| Black-footed Tree-rat | As a result of the proposed clearing of approximately 6,885 ha of potential foraging and breeding habitat for the project, there is potential for the project to significantly impact the north Queensland subspecies of Black-footed Tree-rat. | Yes |
| Masked Owl (northern) | The extent of proposed potential habitat clearing for the project, up to 8,781.0 ha, has the potential to contribute to the species' decline locally through reduced availability of preferred roosting, breeding and foraging resources within multiple breeding territories and therefore, has the potential to result in a significant impact to the Masked Owl subpopulation on Cape York Peninsula. | Yes |
| White-throated Needletail | The project is unlikely to cause a significant impact to the White-throated Needletail as this species is almost exclusively aerial, is known to forage over disturbed areas, and the species does not breed in Australia. In addition, it is considered unlikely that the population that is likely to overfly the terrestrial ecology study area is an important population. | No |
| Spectacled Monarch | It is considered there is a low risk of significant impacts to this species, given the activity is unlikely to substantially modify, destroy or isolate important habitat, and the terrestrial ecology study area does not support an ecologically significant proportion of this species. | No |
| Black-faced Monarch | It is considered there is a low risk of significant impacts to this species given that the terrestrial ecology study area is not located within the range of this species. | No |
| Satin Flycatcher | It is considered there is low risk of significant impacts to this species, given the activity is unlikely to substantially modify, destroy or isolate important habitats, and the terrestrial ecology study areas does not support an ecologically significant proportion of this species. | No |
| Oriental Cuckoo | It is considered there is low risk of significant impacts to this species, given the activity is unlikely to substantially modify, destroy or isolate important habitats, and the terrestrial ecology study areas does not support an ecologically significant proportion of this species. | No |
| Fork-tailed Swift | It is considered there is low risk of significant impacts to this species, given the activity is unlikely to substantially modify, destroy or isolate important habitats, and the terrestrial ecology study areas does not support an ecologically significant proportion of this species. Additionally, the marine study area does not support important habitat or an ecologically significant proportion of the species. | No |
| Rufous fantail | It is considered there is low risk of significant impacts to this species, given the activity is unlikely to substantially modify, destroy or isolate important habitats, and the terrestrial ecology study areas does not support an ecologically significant proportion of this species. | No |

## Table F.1 MNES significant, residual impact assessment results

| MNES | Impact assessment summary | Significant impact yes/no |
|---|---|---|
| Eastern Osprey | It is considered there is low risk of significant impacts to this species, given the activity is unlikely to substantially modify, destroy or isolate important habitats, and the terrestrial ecology study areas does not support an ecologically significant proportion of this species. Additionally, the marine study area does not support important habitat or an ecologically significant proportion of the species. | No |
| Glossy Ibis | Glossy Ibis habitat is limited in the terrestrial ecology study area, being restricted to the Paperbark woodlands and sedgelands areas in the south of the ecology study area. This potential habitat area is not within the project site, is outside the project disturbance footprint and is not proposed to be cleared for the project. Therefore, the significance of impacts to this species were not assessed further. Additionally, the marine study area does not support important habitat or an ecologically significant proportion of the species. | No |
| Largetooth Sawfish (*Pristis Pristis*) | Supporting studies for the EIS have found the project will have negligible influence on the Ward River (from the freshwater to estuarine reaches) and, as such, the project is not predicted to give rise to significant impact on the Largetooth Sawfish. | No |
| Estuarine Crocodile (*Crocodylus porosus*) | It is considered there is a low risk of significant impacts to this species, given the activity may result in a positive impact to the residential Estuarine Crocodile population through the creation of a dam. Additionally, the marine study area is not expected to support an ecologically significant proportion of the population of Estuarine Crocodile, is not considered to support habitat critical to particular lifestyle phases and does not represent an area where the species is declining or at the extent of occurrence. | No |
| Green Turtle (*Chelonia mydas*) | Activities that may impact these species will be avoided, mitigated or managed to minimise effects on the species. Therefore, it is considered there will be no significant impact to the species. | No |
| Hawksbill Turtle (*Eretmochelys imbricata*) | | |
| Loggerhead Turtle (*Caretta caretta*) | | |
| Olive Ridley Turtle (*Lepidochelys olivacea*) | | |
| Flatback Turtle (*Natator depressus*) | | |
| Lesser Sand Plover (*Charadrius mongolus*) | The area impacted by the project is small comparative to available habitat in the immediate surrounds and broader region. Therefore, it is considered there will be no significant impact to the species. | No |
| Eastern Curlew (*Numenius madagascariensis*) | The area impacted by the project is small comparative to available habitat in the immediate surrounds and broader region. Therefore, it is considered there will be no significant impact to the species. | No |
| Dwarf Sawfish (*Pristis clavata*) | The project would not increase any of the main threats to the Dwarf Sawfish and critical lifecycle activities including pupping would occur outside the study area. Therefore, it is considered there will be no significant impact to the species. | No |
| Green Sawfish (*Pristis zijsron*) | The project would not increase any of the main threats to the Green Sawfish and critical lifecycle activities including pupping would occur outside the study area. Therefore, it is considered there will be no significant impact to the species. | No |

## Table F.1 MNES significant, residual impact assessment results

| MNES | Impact assessment summary | Significant impact yes/no |
|---|---|---|
| Common Sandpiper (*Actitis hypoleucos*) | The marine study area does not support important habitat for, and does not support an ecological significant proportion of, any of the relevant international migratory shorebirds. Therefore, it is considered that there will be no significant impact to the species. | No |
| Whimbrel (*Numenius phaeopus*) | | |
| Oriental Plover (*Charadrius veredus*) | | |
| Grey-tailed Tattler (*Tringa brevipes*) | | |
| Pacific Golden Plover (*Pluvialis fulva*) | | |
| Common Greenshank (*Tringa nebularia*) | | |
| Marsh Sandpiper (*Tringa stagnatilis*) | | |
| Lesser Frigatebird (*Fregata ariel*) | Although the study area is likely to support an ecologically significant proportion of these species, the project is not expected to cause direct or indirect impact to any of these populations, and breeding areas are not known to be present in the marine study area. | No |
| Crested Tern (*Thalasseus bergii*) | | |
| Brown Booby (*Sula leucogaster*) | | |
| Common Tern (*Sterna hirundo*) | The marine study area does not support important habitat for, and does not support an ecological significant proportion of, any of the relevant international migratory shorebirds. Therefore, it is considered that there will be no significant impact to the species. | No |
| Black-naped Tern (*Sterna sumatrana*) | | |
| Great Frigatebird (*Fregata minor*) | | |
| Little Tern (*Sternula albifrons*) | | |
| Australian Humpback Dolphin (*Sousa sahulensis*) | The marine study area is not considered to support important habitat for these species, is not at the boundary of occurrences of any of the species and is not an area in which they are known to be in decline. Therefore, it is considered that there will be no significant impact to the species. | No |
| Indian Ocean Bottlenose dolphin (*Tursiops aduncus*) | | |
| Australian Snubfin Dolphin (*Orcaella heinsohni*) | | |

### Table F.1 MNES significant, residual impact assessment results

| MNES | Impact assessment summary | Significant impact yes/no |
|---|---|---|
| Orca (*Orcinus orca*) | The marine study area is not considered to support important habitat for this species as it does not support an ecologically significant proportion of the population, is not of critical importance to lifecycle phases, is not at the limit of the species range and is not an area in which the species is declining. | No |
| Dugong (*Dugong dugon*) | The marine study area is not considered to support important habitat for this species as it does not support an ecologically significant proportion of the population, is not of critical importance to lifecycle phases, is not at the limit of the species range and is not an area in which the species is declining. | No |
| Narrow Sawfish (*Anoxypristis cuspidate*) | The proposed works will not involve any habitat modification, direct or indirect impacts on Norman Creek. Therefore, no disruption to lifecycle activities is expected. | No |
| Reef Manta Ray (*Mobula alfredi)* | The marine study area is not considered to support important habitat for this species as it is unlikely to support an ecologically significant proportion of the Australian population, is not of critical importance to lifecycle phases and is not at the edge of the species range. | No |

## F.2 MSES assessments

### Table F.2 MSES significant, residual impact assessment results

| MSES | Impact assessment summary | Significant impact yes/no |
|---|---|---|
| Short-beaked Echidna | The study area is unlikely to be particularly important for the species and due to the widespread availability of similar habitats within the regional landscape the project is considered unlikely to have a significant impact on the species. | No |
| Rufous Owl (Cape York subspecies) | It is considered possible that the project may impact some individuals of the local sub-population of the species, but that overall, the clearing for the project is unlikely to result in a significant impact to the Queensland distribution of this species. | No |
| Beach Stone Curlew (*Esacus magnirostris*) | The proposed works represent a negligible habitat loss comparative to available habitat in the immediate surrounds and broader region. Therefore, the project is considered unlikely to have a significant impact on the species. | No |
| Remnant vegetation that intersects with mapped vegetation management wetland | No areas within the project site are mapped as wetland on the Vegetation Management Wetlands Map. One wetland is mapped within the broader study area, but it is outside the proposed project site. | No |
| Wetland Protection Area | None located within the study area | No |
| High Ecological Significance (HES) wetland | The project is not predicted to give rise to significant impact on the Ward River (mapped as a HES wetland) as the Ward River is outside the project area and the measurable effects to the river are expected to be negligible. | No |
| Wetland or watercourse in High Ecological Value waters (HEV waters) | The project is likely to have a significant impact on Tapplebang Creek (a HEV watercourse) through construction of Tapplebang Dam, which will artificially modify the types of aquatic habitat present in the dam lake area in the upstream reaches of Tapplebang Creek. | Yes |

## Table F.2 MSES significant, residual impact assessment results

| MSES | Impact assessment summary | Significant impact yes/no |
|---|---|---|
| Strategic Environmental Areas | None located within project site. | No |
| Area of essential habitat on the essential habitat map | Essential habitat is present relating to Estuarine Crocodile, Eastern Curlew and Rufous owl. There were no significant impacts for any of these species therefore no significant impact for this matter.<br>The Cooktown Orchid was also identified in essential habitat mapping adjacent to the study area but was not found within the study area and the habitat adjacent to the mapped area was not considered to support the species | No |
| Connectivity areas | The DES's Landscape and Fragmentation and Connectivity Tool determined that the project would not result in a significant impact on connectivity areas. | No |
| HRA on the flora trigger map | The two HRAs identified in mapping (one within the study area, one adjacent to it) were extensively surveyed and no Threatened or Near-Threatened flora species were recorded. | No |
| An area not shown on the flora survey trigger map that contains Endangered or Vulnerable plants | No Endangered or Vulnerable plants were identified in the project site during the field surveys, despite extensive and targeted surveys over multiple seasons. None are considered likely to occur within the project site. | No |
| Habitat for Endangered, Vulnerable or Special Least Concern fauna | The project is likely to have significant residual impact on the Palm Cockatoo (Australian), Red Goshawk, Black-footed Tree-rat (north Queensland) and Masked Owl (northern) | Yes |
| Waterway providing for Fish Passage | Impacts on fish passage from the construction of Tapplebang Dam will be mitigates by the inclusion of a fishway passage in the dam design. Therefore, no significant impacts on fish passage are predicted. The construction of watercourse crossing on Coconut Creek is not predicted to have a significant impact on fish passage. | No |

# Appendix G

## Friendly Fires assessment and NAFI reports

EMM
creating opportunities

FFEC
Friendly Fire
Ecological Consultants

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**OVERVIEW:**

One of the well documented main threats to the natural environment and biodiversity comes from continuous, large, single event wildfires late in the year. These large wildfires tend to consume all flammable vegetation in their path and leave little or no unburnt areas within their fire scar. Habitat trees can be destroyed by wildfires and damage caused to other trees. Riparian vegetation, the principal wildlife corridors, again can be greatly reduced. There can be virtually no areas of long-unburnt vegetation remaining. It is known that while most wildlife will escape from wildfire, the principal threat then comes from predation and the lack of suitable ground cover and feed.

There will always be wildfires, they are part of the Northern Australia fire landscape but a fire regime of mosaic or continuous burning throughout the fire season should result in 'filtered wildfire' where late season wildfires cannot develop large fronts due to the smaller patch burns throughout the landscape.

A fire regime where approximately 30-50% of an estate is burnt in any given year is a desired outcome. A figure of 70% burnt in any year *including wildfire* should be considered the maximum limit.

**OFFSET AREA 1**

**Part of Lot 211 on plan SP241404 Shire of Aurukun**

**Description:**

Woodlands bordered by the Aurukun Road, Mekunga & Soy Creeks and the boundary with Watson River Station being part of Aurukun Shire estate.

Research shows that this parcel of land has been subject to what can only be described as a 'Wildfire regime' for at least the previous twenty years from when accurate fire mapping became available. It is easy to surmise that most of the fires have originated from the Aurukun Road which forms the northern boundary to the offset area.

Unauthorised roadside burning is a land management problem throughout Cape York and may only be changed by education and possibly the visible evidence of a well-executed fire management plan.

Figures from twenty years of data show that approximately 81% of the offset area is burnt every year with the majority of the burns occurring between August and October. A smaller percentage of burns occur during the November - December period when fires can be the most destructive.

It would appear that in most years roadside burning commences as soon as the country 'hays off' sufficiently to burn and continues until the entire roadside has been burnt and by the end of October there is often little left to burn.

Fortunately most of these fires would be back-burning off the road into the prevailing south east winds and would be of a lower intensity than on the other side of the road where fires would tend to run with the

wind and have a greater intensity. The constant lighting of fires also results in a mosaic of different burn timings, albeit all in the one year which isn't desirable, but this would be slightly preferable to large, single event fires.

Major watercourses to the south and east, Mekunga and Soy Creeks support limiting the further spread of fires in these directions.

Based on an accepted fire interval of 2-3 years it can be assumed that there will be an ongoing detrimental impact on biodiversity in the offset area if this fire regime continues. This could include loss of habitat trees for Palm Cockatoos and Red Goshawks and the lack of late season refugia areas for ground mammals.

Possible measures to improve the fire regime in the offset area could include:

- An aerial incendiary run parallel to the Aurukun Road at a distance of approximately one kilometre from the roadway in July or August, weather / local conditions dependant. This aerial run would not provide a complete fire break from roadside burns, it would be aimed at reducing the front of subsequent fires from the roadside and would help create pockets of unburnt country as refugia.
- Promoting on-ground mosaic burn patterns throughout the offset area by supporting Traditional Owners access and capacity to implement these burns. This would also involve assisting the Traditional Owners in obtaining the necessary skills and qualifications for this work.
- An educational program to promote these TO activities and help reduce the number of roadside burns.
- Promote riparian growth by lighting fires as close as possible to creek lines so fires burn away from this vegetation.

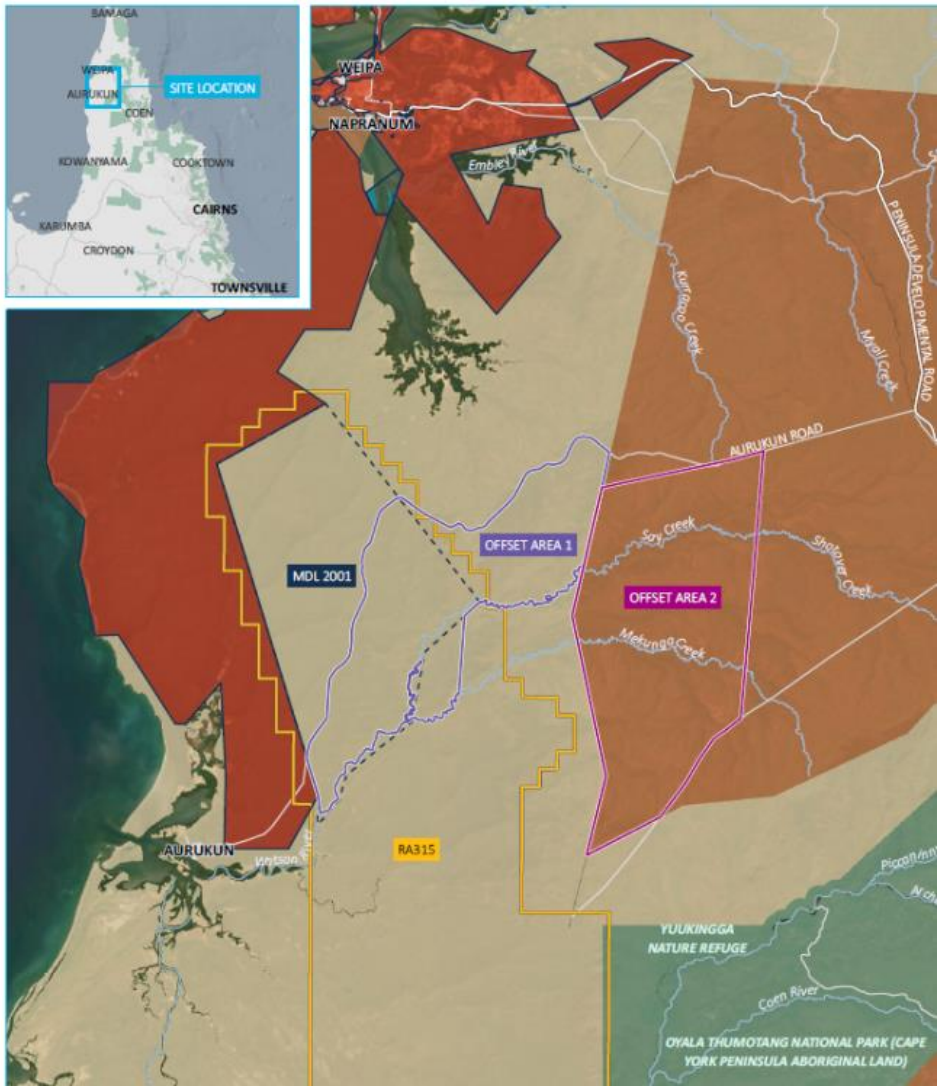


**Figure 1 (Courtesy of EMM Consulting)**

**OFFSET AREA 2**

**Part of Lot 1 on plan YK4 Shire of Cook**

**Description:**

Woodlands being a section of Watson River Station, the offset area is bordered by the Aurukun Road to the north and cleared fence lines south of Soy Creek on all sides.

This offset area can be divided into two separate blocks for management purposes. The northern block, bordered by the Aurukun Road and Soy Creek, has been subject to a similar fire regime as Offset Area 1, due to the fires lit from the Aurukun Road.

The southern block has more secure boundaries such as cleared fence-lines and significant watercourses. Fire scar mapping indicates these boundaries and associated management activities have largely protected this area from the large single event wildfires which have affected surrounding areas. Fire scar mapping would also suggest that selected fire management has been carried out in this block for many years, no doubt to compliment the grazing activities of the property.

Should this Offset Area continue to be used for grazing purposes, the present fire regime may be considered suitable for ongoing habitat maintenance in the southern area of the block.

In the absence of grazing a greater mosaic burning fire regime would need to be implemented. This could be achieved by ongoing on-ground mosaic burning throughout the fire season complimented by aerial burns if required. This would also be extended to the northern section of the offset block with similar considerations as to Offset area 1.

This could be achieved by:

- An aerial incendiary run parallel to the Aurukun Road at a distance of approximately one kilometre from the roadway in July or August, weather / local conditions dependant.
- Promoting on-ground mosaic burn patterns throughout the offset area by supporting Traditional and or property owners' access and capacity to implement these burns. This could also involve assisting the Traditional Owners / Land managers in obtaining the necessary skills and qualifications for this work.
- Promote riparian growth by lighting fires as close as possible to creek lines so fires burn away from this riparian vegetation.
- An educational program to promote these activities and help reduce the number of roadside burns.

These recommendations are a broad overview based on extensive experience of fire management on Cape York and have not been subject to a ground proofing exercise. More detailed planning would be required prior to the commencement of an on-going fire regime in either Offset area.

Michael J Blackman
Principal Consultant / Director
Friendly Fire Ecological Consultants

# Michael J Blackman

Curriculum Vitae

***Professional Employment History***

| | |
|---|---|
| 1971 – 88 | Various positions held across rural Northern Australia (self employed and paid employment) including work in mining, agricultural / fencing camps and on cattle stations. |
| 1988 – 2002 | Qld National Parks & Wildlife Service, Ranger in Charge of several remote National Parks on Cape York Peninsula (including Iron Range and New Laura / Lakefield) |
| 2002- 2004 | Australian Bush Heritage, Manager, Carnarvon Station via Augathella, Qld |
| 2004 – 2010 | Australian Wildlife Conservancy, Manager, Brooklyn Station, Far North Qld. |
| 2009 – present | Friendly Fire Ecological Consultants, Principal Consultant/Director, Far North Qld. |

***Specialist Fire Management expertise***

- Development of Fire Management plans for new acquisitions of National Park estate, private conservation organisations, Aboriginal organisations and a number of other clients such as Government Departments, mining companies and private companies/organisations.
- Liaison with neighbouring landholders to develop integrated prescribed burning programs
- Integration of training and landscape scale burning programs
- Extensive experience implementing fire management plans for a diverse range of clients across Northern Australia
- Property assessment and advice on burning program implementation
- Extensive aerial incendiary and navigational skills
- Providing accredited training in fire operations
- Burning on rural properties for weed control and pasture improvement

***Specialist Fire Management projects in 2020-24***

Project: Carpentarian Grasswren Recovery Program
Client: Southern Gulf NRM
Duties: Develop and implement aerial burning program over project area (> 1M hectares). Oversee on-ground burns with participating land owners / managers.

Project: Olkola Fire Program
Client: Olkola Aboriginal Corporation
Duties: Develop fire management plans for Olkola estate. Liaise with neighbours regarding plan implementation and combined burns. Mentor Olkola Land Managers in the implementation of the 2020 on-ground burns. Carry out aerial burns over the project area (880K hectares). Instruct selected Olkola staff in aerial operations.

Project: Girringun Rangers Fire Program
Client: Girringun Aboriginal Corporation
Duties: Mentor the Girringun Rangers in the implementation of a number of contracted on-ground burns.

Project: Rio Tinto Weipa annual fire program
Client: Rio Tinto Weipa
Duites: Develop and implement annual fire program of both aerial and on-ground operations over 350K hectares of RTW estate. Oversee RTW staff in wildfire suppression activities.

***Weed control***

- Competent at operating most weed spraying equipment including commercial vehicle mounted units down to backpack sprays and hand tools.
- Competent in the preparation and application of herbicides i.e. measuring, mixing and keeping records of herbicide usage. Identifying the correct herbicides to use and the appropriate delivery method.
- Development of specialised weed management programs.
- Identification and documentation of weeds and infestations. Basic plant morphology and identification
- Development and ongoing maintenance of nurseries including commercial operations. Propagation and care of native plant species.
- Knowledge of the techniques of bushland rehabilitation due to mining activity, overgrazing, agricultural activity and erosion.

***Feral animal control***

- Considerable experience in the development and implementation of feral animal control programs in both a micro environment and landscape scale management.
- Considerable experience in the safe use of fire-arms in both on-ground and aerial applications. Completed a DPI Aerial Marksmanship Course.

***OH&S, staff and volunteers***

- Worked extensively with indigenous people and groups
- Assisted with medical evacuations from isolated areas
- Have delivered basic first aid
- Overseen diverse groups such as volunteers, youth groups and school camps
- Liaison with a number of government departments and local environment groups
- Camp establishment and management in remote areas

# Custom area

## Fire Scars by Year Report

Report generated from Infonet website (www.ntinfonet.org.au) on 1 May, 2024.

**About the fire scar data used in these reports**

The fire scar data in this report are derived from satellite imagery sourced from the Moderate Resolution Imaging Spectroradiometer (MODIS) sensor on the NASA *Terra* and *Aqua* satellites. Spatial Resolution: 250m x 250m pixels (at Nadir).

Areas where suitable fire scar mapping exists for reporting:

- northern WA and Qld down to 20 degrees S
- the entire NT

Full metadata descriptions are available by downloading the fire history and fire scar data from NAFI. Go to the "Download Data" area in the menu.

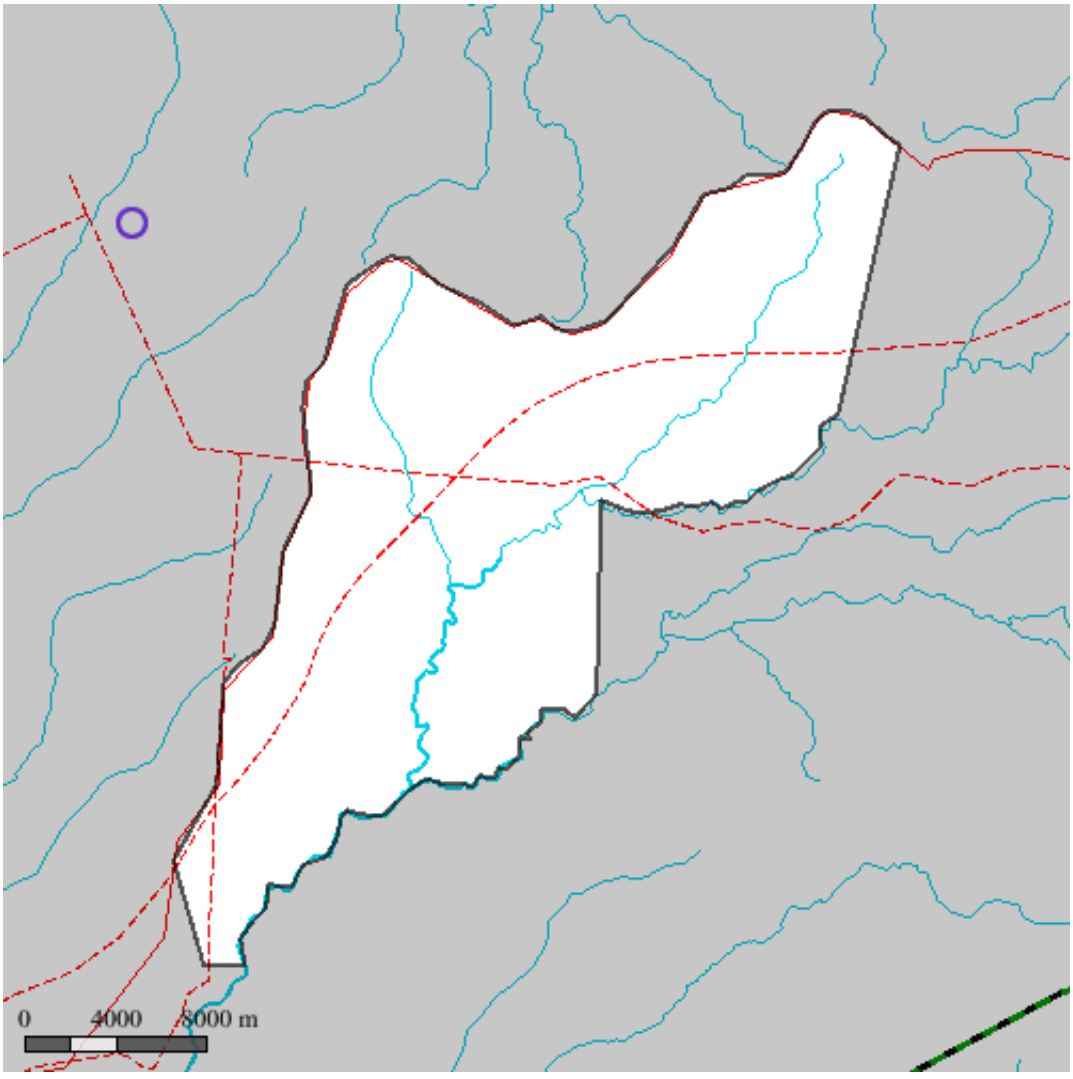
**About the sources of uncertainty in this report**

The most recent fire scar mapping in the open savanna country north of 20 degrees S has been validated using waypoints collected along aerial transects in various locations throughout the 2012 fire season. Surveys involving over 6,000 waypoints showed the fire scars were 88% accurate.

The area estimates for selected areas and the consequent estimates of areas burnt as a % of the selected areas are dependent on algorithms that use pixel-based area measurements and, for hand-drawn selected areas, may in error by up to 2% depending on the shape drawn.

# Location Map for Custom area

Custom area encompasses an area of 452.16 sq km extending from 12 deg 58.0 min to 13 deg 18.0 min S and 141 deg 49.0 min to 142 deg 7.0 min E.
Reports are based on data recorded from the highlighted area.




Note

# Fire scar areas by year

| 2023 | Area sq km | Area % |
|---|---|---|
| Jan | .0 | .0 |
| Feb | .0 | .0 |
| Mar | .0 | .0 |
| Apr | .0 | .0 |
| May | .0 | .0 |
| Jun | 3.6 | .8 |
| Jul | 64.1 | 14.2 |
| Aug | 92.0 | 20.4 |
| Sep | 40.0 | 8.9 |
| Oct | 56.8 | 12.6 |
| Nov | 78.2 | 17.3 |
| Dec | .0 | .0 |
| Unburnt | 117.4 | 26.0 |
| Total area: 452.2 | Total area burnt: 334.7 | Total area burnt % : 74.0 |
| 2022 | Area sq km | Area % |
| Jan | .0 | .0 |
| Feb | .0 | .0 |
| Mar | .0 | .0 |
| Apr | .0 | .0 |
| May | .0 | .0 |
| Jun | .0 | .0 |
| Jul | 32.0 | 7.1 |
| Aug | 49.7 | 11.0 |
| Sep | 165.3 | 36.6 |
| Oct | 60.7 | 13.4 |
| Nov | 2.9 | .6 |
| Dec | .0 | .0 |
| Unburnt | 141.5 | 31.3 |
| Total area: 452.2 | Total area burnt: 310.6 | Total area burnt % : 68.7 |
| 2021 | Area sq km | Area % |
| Jan | .0 | .0 |
| Feb | .0 | .0 |
| Mar | .0 | .0 |
| Apr | .0 | .0 |
| May | .0 | .0 |
| Jun | .0 | .0 |
| Jul | 59.0 | 13.0 |
| Aug | 22.1 | 4.9 |
| Sep | 277.7 | 61.4 |
| Oct | .5 | .1 |
| Nov | .0 | .0 |
| Dec | .0 | .0 |
| Unburnt | 92.9 | 20.5 |
| Total area: 452.2 | Total area burnt: 359.2 | Total area burnt % : 79.5 |

| 2020 | Area sq km | Area % |
|---|---|---|
| Jan | .0 | .0 |
| Feb | .0 | .0 |
| Mar | .0 | .0 |
| Apr | .0 | .0 |
| May | .0 | .0 |
| Jun | .0 | .0 |
| Jul | 42.3 | 9.4 |
| Aug | 29.5 | 6.5 |
| Sep | 117.5 | 26.0 |
| Oct | 86.0 | 19.0 |
| Nov | .0 | .0 |
| Dec | .0 | .0 |
| Unburnt | 176.8 | 39.1 |
| Total area: 452.2 | Total area burnt: 275.4 | Total area burnt % : 60.9 |

| 2019 | Area sq km | Area % |
|---|---|---|
| Jan | .0 | .0 |
| Feb | .0 | .0 |
| Mar | .0 | .0 |
| Apr | .0 | .0 |
| May | .0 | .0 |
| Jun | 1.3 | .3 |
| Jul | 59.1 | 13.1 |
| Aug | 69.5 | 15.4 |
| Sep | 24.3 | 5.4 |
| Oct | 164.6 | 36.4 |
| Nov | 80.8 | 17.9 |
| Dec | 2.1 | .5 |
| Unburnt | 50.4 | 11.2 |
| Total area: 452.2 | Total area burnt: 401.7 | Total area burnt % : 88.8 |

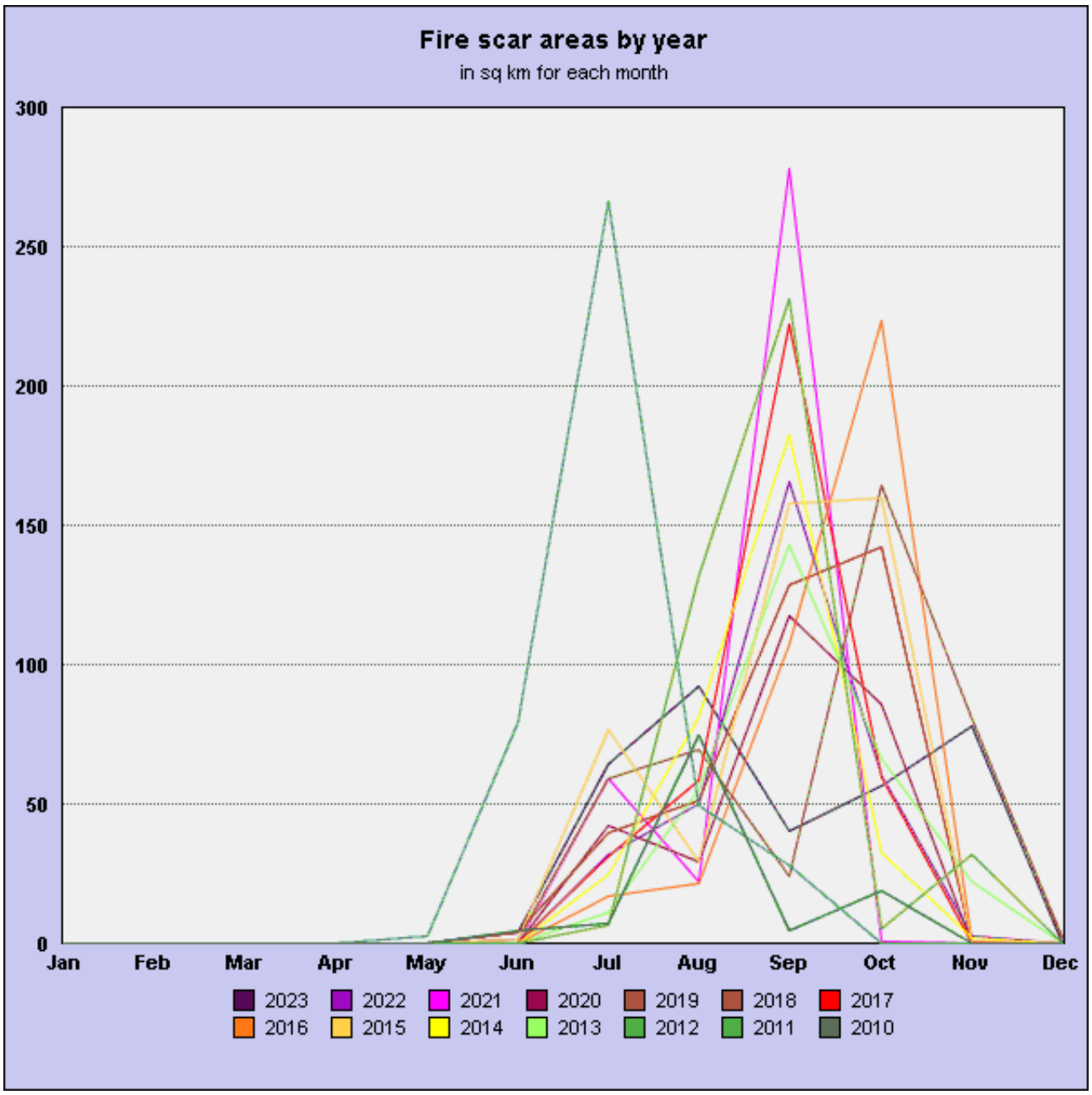
| 2018 | Area sq km | Area % |
|---|---|---|
| Jan | .0 | .0 |
| Feb | .0 | .0 |
| Mar | .0 | .0 |
| Apr | .0 | .0 |
| May | .0 | .0 |
| Jun | 4.2 | .9 |
| Jul | 39.4 | 8.7 |
| Aug | 51.4 | 11.4 |
| Sep | 128.5 | 28.4 |
| Oct | 142.1 | 31.4 |
| Nov | .0 | .0 |
| Dec | .0 | .0 |
| Unburnt | 86.5 | 19.1 |
| Total area: 452.2 | Total area burnt: 365.6 | Total area burnt % : 80.9 |

| 2017 | Area sq km | Area % |
|---|---|---|
| Jan | .0 | .0 |
| Feb | .0 | .0 |
| Mar | .0 | .0 |
| Apr | .0 | .0 |
| May | .0 | .0 |
| Jun | .0 | .0 |
| Jul | 31.3 | 6.9 |
| Aug | 58.5 | 12.9 |
| Sep | 222.2 | 49.1 |
| Oct | 59.5 | 13.2 |
| Nov | .0 | .0 |
| Dec | .0 | .0 |
| Unburnt | 80.6 | 17.8 |
| Total area: 452.2 | Total area burnt: 371.5 | Total area burnt % : 82.2 |

| 2016 | Area sq km | Area % |
|---|---|---|
| Jan | .0 | .0 |
| Feb | .0 | .0 |
| Mar | .0 | .0 |
| Apr | .0 | .0 |
| May | .0 | .0 |
| Jun | .0 | .0 |
| Jul | 16.9 | 3.7 |
| Aug | 21.3 | 4.7 |
| Sep | 107.3 | 23.7 |
| Oct | 223.1 | 49.3 |
| Nov | .9 | .2 |
| Dec | .0 | .0 |
| Unburnt | 82.7 | 18.3 |
| Total area: 452.2 | Total area burnt: 369.5 | Total area burnt % : 81.7 |
| 2015 | Area sq km | Area % |
| Jan | .0 | .0 |
| Feb | .0 | .0 |
| Mar | .0 | .0 |
| Apr | .0 | .0 |
| May | .0 | .0 |
| Jun | 1.3 | .3 |
| Jul | 76.6 | 16.9 |
| Aug | 29.4 | 6.5 |
| Sep | 158.0 | 34.9 |
| Oct | 159.6 | 35.3 |
| Nov | .0 | .0 |
| Dec | .0 | .0 |
| Unburnt | 27.3 | 6.0 |
| Total area: 452.2 | Total area burnt: 424.9 | Total area burnt % : 94.0 |
| 2014 | Area sq km | Area % |
| Jan | .0 | .0 |
| Feb | .0 | .0 |
| Mar | .0 | .0 |
| Apr | .0 | .0 |
| May | .0 | .0 |
| Jun | .0 | .0 |
| Jul | 24.8 | 5.5 |
| Aug | 81.1 | 17.9 |
| Sep | 182.2 | 40.3 |
| Oct | 32.2 | 7.1 |
| Nov | 1.9 | .4 |
| Dec | .0 | .0 |
| Unburnt | 130.0 | 28.7 |
| Total area: 452.2 | Total area burnt: 322.2 | Total area burnt % : 71.3 |
| 2013 | Area sq km | Area % |
| Jan | .0 | .0 |
| Feb | .0 | .0 |
| Mar | .0 | .0 |
| Apr | .0 | .0 |
| May | .0 | .0 |
| Jun | .0 | .0 |
| Jul | 10.8 | 2.4 |
| Aug | 55.0 | 12.2 |
| Sep | 142.6 | 31.5 |
| Oct | 66.2 | 14.6 |
| Nov | 21.9 | 4.8 |
| Dec | .0 | .0 |
| Unburnt | 155.7 | 34.4 |
| Total area: 452.2 | Total area burnt: 296.5 | Total area burnt % : 65.6 |

| 2012 | Area sq km | Area % |
|---|---|---|
| Jan | .0 | .0 |
| Feb | .0 | .0 |
| Mar | .0 | .0 |
| Apr | .0 | .0 |
| May | .0 | .0 |
| Jun | .0 | .0 |
| Jul | 6.5 | 1.4 |
| Aug | 132.0 | 29.2 |
| Sep | 231.4 | 51.2 |
| Oct | 5.0 | 1.1 |
| Nov | 32.1 | 7.1 |
| Dec | .0 | .0 |
| Unburnt | 45.0 | 10.0 |
| Total area: 452.2 | Total area burnt: 407.1 | Total area burnt % : 90.0 |
| 2011 | Area sq km | Area % |
| Jan | .0 | .0 |
| Feb | .0 | .0 |
| Mar | .0 | .0 |
| Apr | .0 | .0 |
| May | 2.8 | .6 |
| Jun | 79.5 | 17.6 |
| Jul | 266.3 | 58.9 |
| Aug | 49.4 | 10.9 |
| Sep | 27.7 | 6.1 |
| Oct | .0 | .0 |
| Nov | .0 | .0 |
| Dec | .0 | .0 |
| Unburnt | 26.5 | 5.9 |
| Total area: 452.2 | Total area burnt: 425.7 | Total area burnt % : 94.1 |
| 2010 | Area sq km | Area % |
| Jan | .0 | .0 |
| Feb | .0 | .0 |
| Mar | .0 | .0 |
| Apr | .0 | .0 |
| May | .0 | .0 |
| Jun | 4.8 | 1.1 |
| Jul | 7.2 | 1.6 |
| Aug | 74.5 | 16.5 |
| Sep | 4.8 | 1.1 |
| Oct | 18.9 | 4.2 |
| Nov | .0 | .0 |
| Dec | .0 | .0 |
| Unburnt | 342.1 | 75.6 |
| Total area: 452.2 | Total area burnt: 110.1 | Total area burnt % : 24.4 |

| Period | Monthly Averages sq km | Monthly Averages % |
|---|---|---|
| Jan | .0 | .0 |
| Feb | .0 | .0 |
| Mar | .0 | .0 |
| Apr | .0 | .0 |
| May | .2 | .0 |
| Jun | 6.8 | 1.5 |
| Jul | 52.6 | 11.6 |
| Aug | 58.2 | 12.9 |
| Sep | 130.7 | 28.9 |
| Oct | 76.8 | 17.0 |
| Nov | 15.6 | 3.4 |
| Dec | .1 | .0 |
| Unburnt | 111.1 | 24.6 |
| **Yearly Average Burnt** | **341.1** | **75.4** |



# Custom area

## Fire Scars by Year Report

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**About the fire scar data used in these reports**

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Areas where suitable fire scar mapping exists for reporting:

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- the entire NT

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**About the sources of uncertainty in this report**

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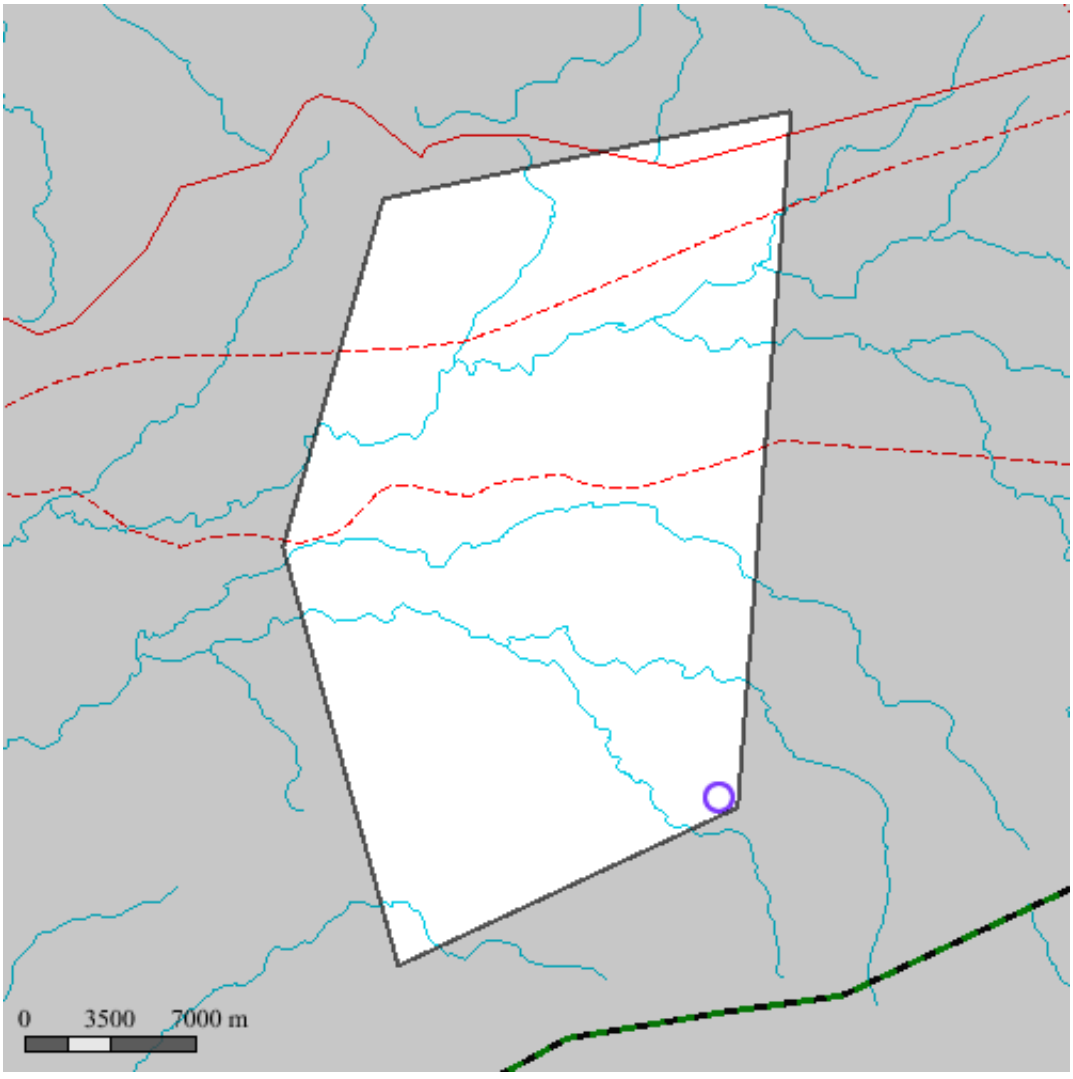
The area estimates for selected areas and the consequent estimates of areas burnt as a % of the selected areas are dependent on algorithms that use pixel-based area measurements and, for hand-drawn selected areas, may in error by up to 2% depending on the shape drawn.

# Location Map for Custom area

Custom area encompasses an area of 497.8 sq km extending from 12 deg 58.0 min  to 13 deg 17.0 min S and 142 deg 4.0 min  to 142 deg 15.0 min E.
Reports are based on data recorded from the highlighted area.




Note

# Fire scar areas by year

| 2023 | Area sq km | Area % |
|---|---|---|
| Jan | .0 | .0 |
| Feb | .0 | .0 |
| Mar | .0 | .0 |
| Apr | .0 | .0 |
| May | .0 | .0 |
| Jun | .0 | .0 |
| Jul | 36.9 | 7.4 |
| Aug | .4 | .1 |
| Sep | .0 | .0 |
| Oct | .0 | .0 |
| Nov | .0 | .0 |
| Dec | .0 | .0 |
| Unburnt | 460.6 | 92.5 |
| **Total area: 497.8** | **Total area burnt: 37.2** | **Total area burnt % : 7.5** |
| **2022** | **Area sq km** | **Area %** |
| Jan | .0 | .0 |
| Feb | .0 | .0 |
| Mar | .0 | .0 |
| Apr | .0 | .0 |
| May | .0 | .0 |
| Jun | .0 | .0 |
| Jul | 117.5 | 23.6 |
| Aug | .0 | .0 |
| Sep | .0 | .0 |
| Oct | .0 | .0 |
| Nov | .0 | .0 |
| Dec | .0 | .0 |
| Unburnt | 380.3 | 76.4 |
| **Total area: 497.8** | **Total area burnt: 117.5** | **Total area burnt % : 23.6** |
| **2021** | **Area sq km** | **Area %** |
| Jan | .0 | .0 |
| Feb | .0 | .0 |
| Mar | .0 | .0 |
| Apr | .0 | .0 |
| May | .0 | .0 |
| Jun | .0 | .0 |
| Jul | 120.8 | 24.3 |
| Aug | .5 | .1 |
| Sep | .0 | .0 |
| Oct | .0 | .0 |
| Nov | .0 | .0 |
| Dec | .0 | .0 |
| Unburnt | 376.5 | 75.6 |
| **Total area: 497.8** | **Total area burnt: 121.3** | **Total area burnt % : 24.4** |

| 2020 | Area sq km | Area % |
|---|---|---|
| Jan | .0 | .0 |
| Feb | .0 | .0 |
| Mar | .0 | .0 |
| Apr | .0 | .0 |
| May | .0 | .0 |
| Jun | .0 | .0 |
| Jul | 144.7 | 29.1 |
| Aug | .3 | .1 |
| Sep | .0 | .0 |
| Oct | 7.7 | 1.6 |
| Nov | 7.4 | 1.5 |
| Dec | .0 | .0 |
| Unburnt | 337.7 | 67.8 |
| Total area: 497.8 | Total area burnt: 160.1 | Total area burnt % : 32.2 |

| 2019 | Area sq km | Area % |
|---|---|---|
| Jan | .0 | .0 |
| Feb | .0 | .0 |
| Mar | .0 | .0 |
| Apr | .0 | .0 |
| May | .0 | .0 |
| Jun | .0 | .0 |
| Jul | 156.8 | 31.5 |
| Aug | .0 | .0 |
| Sep | 7.3 | 1.5 |
| Oct | .0 | .0 |
| Nov | .0 | .0 |
| Dec | 87.4 | 17.6 |
| Unburnt | 246.3 | 49.5 |
| Total area: 497.8 | Total area burnt: 251.5 | Total area burnt % : 50.5 |

| 2018 | Area sq km | Area % |
|---|---|---|
| Jan | .0 | .0 |
| Feb | .0 | .0 |
| Mar | .0 | .0 |
| Apr | .0 | .0 |
| May | .0 | .0 |
| Jun | 7.7 | 1.5 |
| Jul | 107.7 | 21.6 |
| Aug | 2.0 | .4 |
| Sep | .3 | .1 |
| Oct | .0 | .0 |
| Nov | .0 | .0 |
| Dec | .0 | .0 |
| Unburnt | 380.2 | 76.4 |
| Total area: 497.8 | Total area burnt: 117.6 | Total area burnt % : 23.6 |

| 2017 | Area sq km | Area % |
|---|---|---|
| Jan | .0 | .0 |
| Feb | .0 | .0 |
| Mar | .0 | .0 |
| Apr | .0 | .0 |
| May | .0 | .0 |
| Jun | .0 | .0 |
| Jul | 84.4 | 17.0 |
| Aug | 4.2 | .8 |
| Sep | .0 | .0 |
| Oct | 47.1 | 9.5 |
| Nov | 16.7 | 3.4 |
| Dec | .7 | .1 |
| Unburnt | 344.8 | 69.3 |
| Total area: 497.8 | Total area burnt: 153.0 | Total area burnt % : 30.7 |

| 2016 | Area sq km | Area % |
|---|---|---|
| Jan | .0 | .0 |
| Feb | .0 | .0 |
| Mar | .0 | .0 |
| Apr | .0 | .0 |
| May | .0 | .0 |
| Jun | 9.6 | 1.9 |
| Jul | 110.8 | 22.3 |
| Aug | .0 | .0 |
| Sep | .0 | .0 |
| Oct | 14.5 | 2.9 |
| Nov | .0 | .0 |
| Dec | .0 | .0 |
| Unburnt | 362.9 | 72.9 |
| Total area: 497.8 | Total area burnt: 134.9 | Total area burnt % : 27.1 |

| 2015 | Area sq km | Area % |
|---|---|---|
| Jan | .0 | .0 |
| Feb | .0 | .0 |
| Mar | .0 | .0 |
| Apr | .0 | .0 |
| May | .0 | .0 |
| Jun | 22.8 | 4.6 |
| Jul | 124.7 | 25.1 |
| Aug | .0 | .0 |
| Sep | 1.9 | .4 |
| Oct | .0 | .0 |
| Nov | 44.4 | 8.9 |
| Dec | .0 | .0 |
| Unburnt | 304.0 | 61.1 |
| Total area: 497.8 | Total area burnt: 193.8 | Total area burnt % : 38.9 |

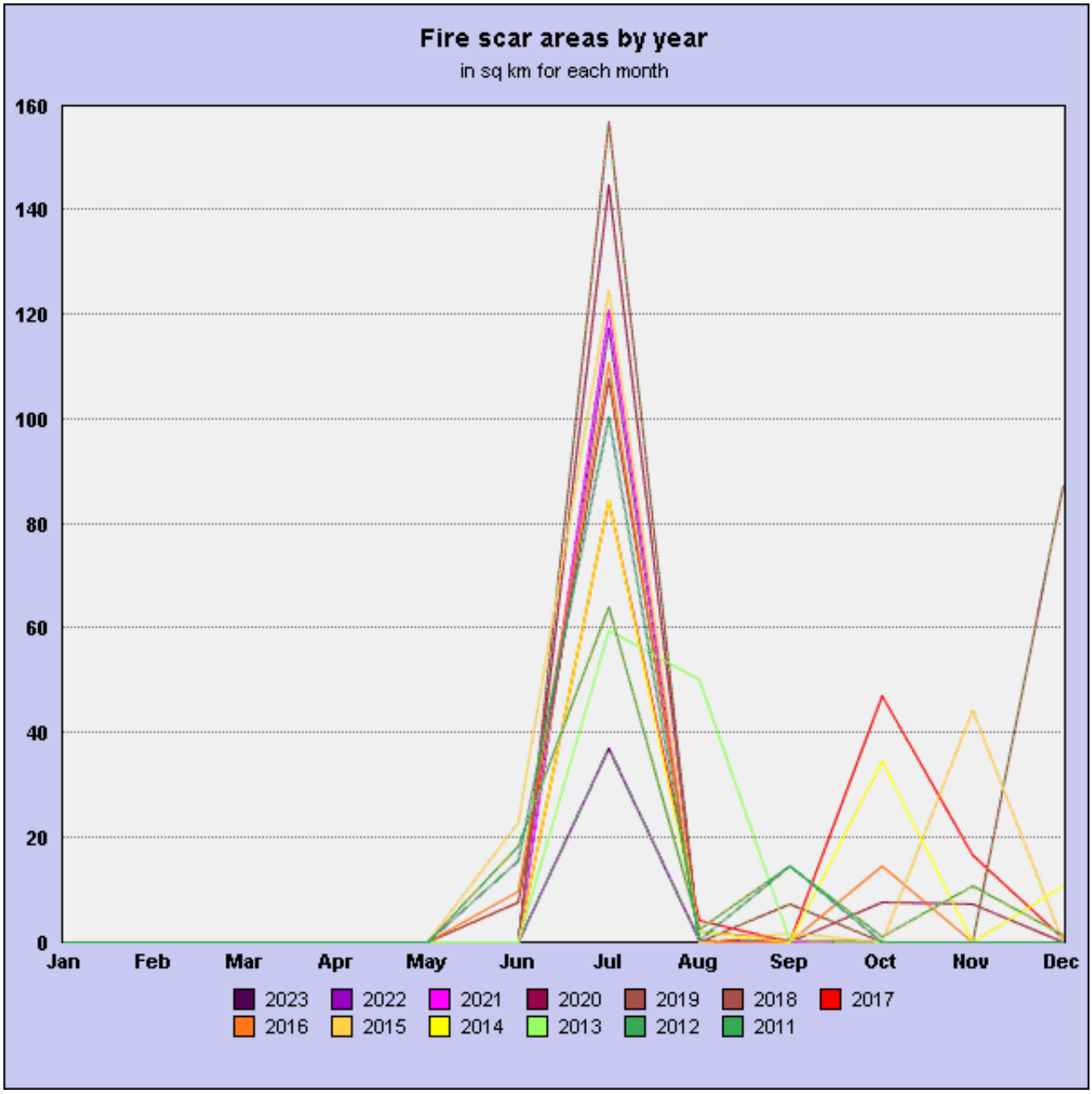
| 2014 | Area sq km | Area % |
|---|---|---|
| Jan | .0 | .0 |
| Feb | .0 | .0 |
| Mar | .0 | .0 |
| Apr | .0 | .0 |
| May | .0 | .0 |
| Jun | .0 | .0 |
| Jul | 84.4 | 16.9 |
| Aug | 2.2 | .4 |
| Sep | .0 | .0 |
| Oct | 34.7 | 7.0 |
| Nov | .0 | .0 |
| Dec | 10.7 | 2.2 |
| Unburnt | 365.8 | 73.5 |
| Total area: 497.8 | Total area burnt: 132.0 | Total area burnt % : 26.5 |

| 2013 | Area sq km | Area % |
|---|---|---|
| Jan | .0 | .0 |
| Feb | .0 | .0 |
| Mar | .0 | .0 |
| Apr | .0 | .0 |
| May | .0 | .0 |
| Jun | .0 | .0 |
| Jul | 59.7 | 12.0 |
| Aug | 50.1 | 10.1 |
| Sep | .3 | .1 |
| Oct | .0 | .0 |
| Nov | .0 | .0 |
| Dec | .0 | .0 |
| Unburnt | 387.8 | 77.9 |
| Total area: 497.8 | Total area burnt: 110.0 | Total area burnt % : 22.1 |

| 2012 | Area sq km | Area % |
|---|---|---|
| Jan | .0 | .0 |
| Feb | .0 | .0 |
| Mar | .0 | .0 |
| Apr | .0 | .0 |
| May | .0 | .0 |
| Jun | 18.5 | 3.7 |
| Jul | 64.0 | 12.9 |
| Aug | 2.3 | .5 |
| Sep | 14.5 | 2.9 |
| Oct | .9 | .2 |
| Nov | 10.8 | 2.2 |
| Dec | 1.5 | .3 |
| Unburnt | 385.1 | 77.4 |
| Total area: 497.8 | Total area burnt: 112.7 | Total area burnt % : 22.6 |

| 2011 | Area sq km | Area % |
|---|---|---|
| Jan | .0 | .0 |
| Feb | .0 | .0 |
| Mar | .0 | .0 |
| Apr | .0 | .0 |
| May | .0 | .0 |
| Jun | 15.6 | 3.1 |
| Jul | 100.4 | 20.2 |
| Aug | .3 | .1 |
| Sep | 14.4 | 2.9 |
| Oct | .0 | .0 |
| Nov | .0 | .0 |
| Dec | .0 | .0 |
| Unburnt | 367.1 | 73.8 |
| Total area: 497.8 | Total area burnt: 130.7 | Total area burnt % : 26.2 |

| Period | Monthly Averages sq km | Monthly Averages % |
|---|---|---|
| Jan | .0 | .0 |
| Feb | .0 | .0 |
| Mar | .0 | .0 |
| Apr | .0 | .0 |
| May | .0 | .0 |
| Jun | 5.7 | 1.1 |
| Jul | 101.0 | 20.3 |
| Aug | 4.8 | 1.0 |
| Sep | 3.0 | .6 |
| Oct | 8.1 | 1.6 |
| Nov | 6.1 | 1.2 |
| Dec | 7.7 | 1.6 |
| Unburnt | 361.5 | 72.6 |
| Yearly Average Burnt | 136.3 | 27.4 |


Fire scar areas by year
in sq km for each month
160
140
120
100
80
60
40
20
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011

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