Annual Report

Olive Downs Coking Coal Project - Stage 1 offset

Prepared for Pembroke Resources
April 2023

EMM Brisbane
Level 1, 87 Wickham Terrace
Spring Hill QLD 4000

T 07 3648 1200
E info@emmconsulting.com.au

www.emmconsulting.com.au

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Olive Downs Coking Coal Project - Stage 1 offset

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Prepared by

Elliot Leach
Senior Ecologist
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Approved by

Sandra Walters
Associate Ecologist

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1 Introduction

1.1 Project background

Pembroke Olive Downs Pty Ltd (Pembroke) are the proponent for the Olive Downs Coking Coal Project (the Project). The Project is a greenfield metallurgical coal mine within the Bowen Basin, located approximately 40 kilometres (km) south-east of Moranbah, Queensland (Figure 1.1).

The coal resource will be mined in stages by conventional open cut mining methods, with product coal to be transported by rail to the Dalrymple Bay Coal Terminal. The Project will produce up to 20 mega-tonnes per annum (Mtpa) of run of mine coal over an anticipated operational life of approximately 79 years.

The Project was declared a 'controlled action' due to potential for the mine to have a significant impact on Matters of National Environmental Significance (MNES) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), including threatened fauna species and a threatened ecological community. An approval was granted by the Minister on 14 May 2020 (EPBC 2017/7867) for the Project components being the mine site and access road. EMM Consulting Pty Ltd (EMM) were subsequently engaged to prepare the Stage 1 Offset Area Management Plan (OAMP) in accordance with the EPBC approval (EPBC 2017/7867). The Stage 1 OAMP was approved by the Department of Agriculture, Water and Environment (DAWE) now Department of Climate Change, Energy the Environment and Water (DCCEEW) on 24 December 2020.

1.2 Purpose

As part of the Offset Area Management Plan, Pembroke are committed to delivering direct, land-based offsets. Pembroke has identified the Stage 1 Offset Area for approval, as shown in Figure 1.1. As part of the Offset Area Management Plan there is a requirement to conduct annual monitoring and prepare an annual report at the end of each calendar year. The report is to document measures that have been implemented across the offset area and describe progress towards achieving set performance outcomes and objectives.

Every five years, the data from the annual reports will be summarised into a five-yearly report to be submitted to Queensland's Department of Environment and Science (DES) and DCCEEW. The five-year interim report will track the past five years of monitoring and management actions. It will include a more detailed assessment against the performance criteria and five-year interim milestones for that project stage, any corrective actions that have been implemented, and any adaptive management learnings. The Offset Area Management Plan will be revised after these five-yearly interim reviews if required.

To inform future monitoring and management, baseline ecological surveys across the Stage 1 Offset Area were conducted in 2022, to establish the status of:

- habitat quality for MNES associated with the Project,
- weeds, and
- feral animals.

The following sections provide further details regarding the purpose of each survey, which were conducted as required by the Offset Area Management Plan.

1.2.1 Baseline habitat quality monitoring of MNES habitats

Habitat quality is assessed using a combination of indicators that measure the overall viability of the site and its capacity to support a prescribed environmental matter, such as an MNES. 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. A score is determined from site condition attributes and site context attributes, listed in Table 1.1.

Habitat quality assessments will be conducted at 49 sites on a biannual basis across the Stage 1 Offset Area. Each survey site's data will be scored individually against a BioCondition benchmark relevant to the regional ecosystem (RE) in which the site is located. Benchmarks will be sourced from the *BioCondition Benchmarks for Regional Ecosystem Condition Assessment* (DES 2019) and compared against a set of maximum scores defined in the *Guide to Determining Terrestrial Habitat Quality v1.2* (DES 2017) and *BioCondition: A Condition Assessment Framework for Terrestrial Biodiversity in Queensland* (BioCondition Manual) (DSITIA 2015). After each habitat quality monitoring event, habitat quality scores from each survey site will be compared to determine if management actions are resulting in an improvement to habitat attributes and ecological condition at that survey site over time. The habitat quality assessment sites will also include permanent photo monitoring points to assist in assessing any changes over time, and the success of management measures.

The same sites and methodology will be repeated during each monitoring event so that scores can be compared for each attribute.

Table 1.1 Habitat quality assessment attributes

Site condition attributes	Site context attributes
Number of large native trees – provide greater leaf material, nectar and bark-surface area for foraging purposes, and may contain hollows and crevices for nesting and sheltering purposes.	Size of patch - reflects the importance of large patches in the landscape, and is based on the size of a patch of either remnant vegetation, or regrowth vegetation, or a combination of remnant and regrowth vegetation.
Tree canopy height (emergent, canopy and sub-canopy) - indicative of development and site productivity.	Context - the amount of native vegetation that is retained in the landscape proximal to the site being assessed.
Recruitment of woody perennial species (in the ecologically dominant layer) - recruitment or regeneration is essential to the sustainability of any ecosystem.	Connectivity - aims to assess the degree to which the assessment unit is connected with adjacent native vegetation.
Tree canopy cover (emergent, canopy and sub-canopy) – characterises productivity and the distribution and abundance of biomass.	Ecological corridors – connections across the landscape that connect areas of habitat and support movement of fauna.
Native shrub layer cover – provides habitat quality for birds.	
Coarse woody debris – provides habitat for ground-dwelling fauna and can be used as a variable in the estimate of carbon biomass.	
Native plant species richness for trees, shrubs, grasses, and forbs/others - reflects biodiversity present on site.	
Non-native plant cover – causes major modifications to native species richness, abundance and ecosystem function.	

Table 1.1 Habitat quality assessment attributes

Site condition attributes	Site context attributes
Native perennial grass cover - reflects biodiversity present on site.	
Organic litter cover - key habitat component for wildlife and woodland functioning.	

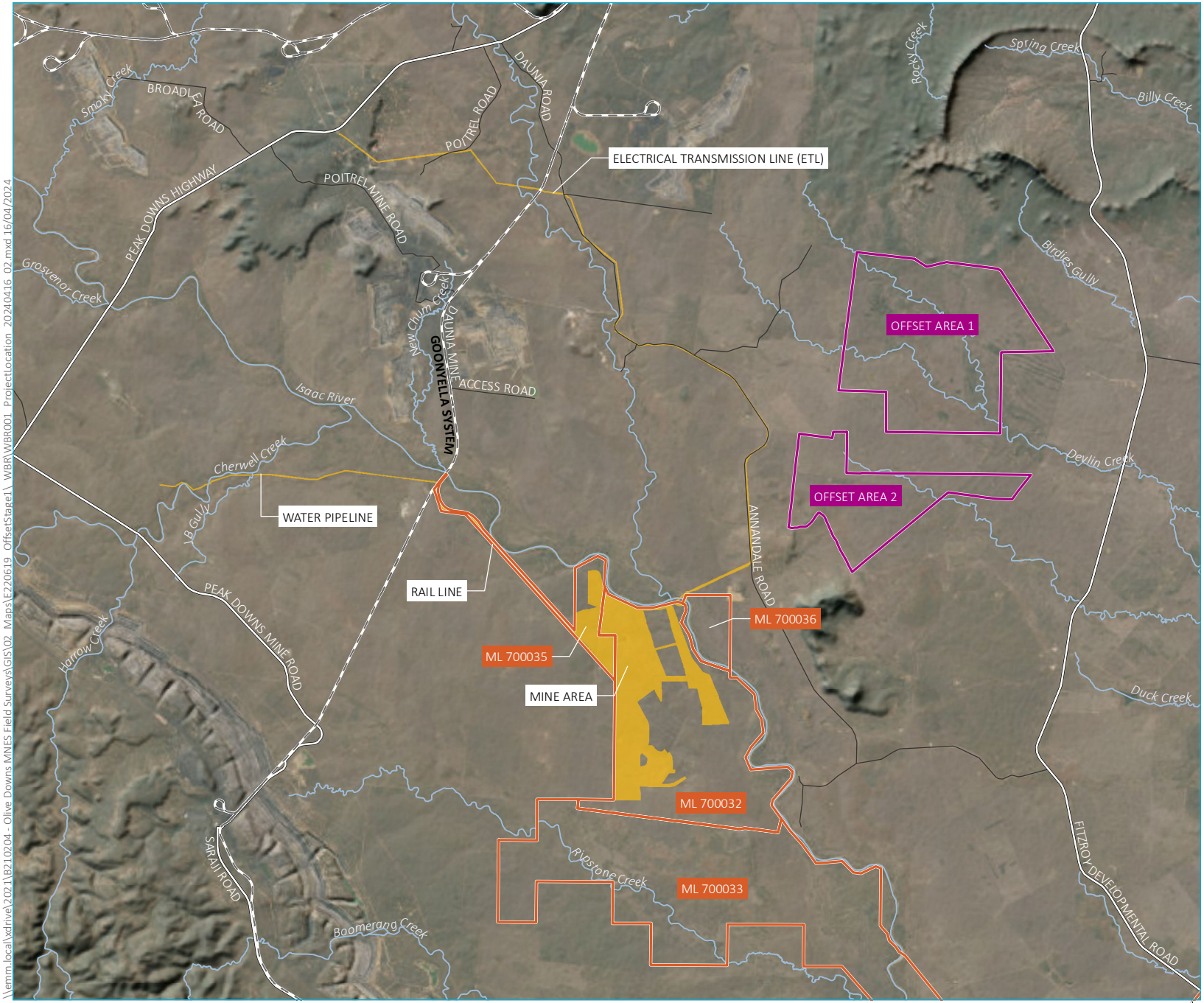
1.2.2 Weed monitoring sites

Weed monitoring across the Stage 1 Offset Area will be conducted on an annual basis. Baseline weed data was collected across the offset in 2022, predominantly along access tracks, and in strategic MNES habitat locations. Additional weed monitoring data was collected at the 49 permanent habitat quality (Biocondition) monitoring sites referred to in Section 1.2.1. Permanent photo monitoring points were established at 20 locations of high ecological significance, such as riparian corridors. This data, collectively, will form the basis for future comparison over the Project life to determine if management actions are resulting in a decline in weed abundance and/or diversity over time.

1.2.3 Feral animal monitoring

Feral animal monitoring, conducted through the establishment of repeatable diurnal and nocturnal survey transects along with the deployment of remote cameras, will determine the relative abundance and distribution of feral animals within the Stage 1 Offset Area. Feral animal monitoring is to be conducted on an annual basis. This data will facilitate ongoing monitoring over the Project lifespan to evaluate if management actions are resulting in a decline in feral animal populations over time.

Feral animal monitoring is described in Section 2.4.



\\emm.local\xdrive\2021\B210204 - Olive Downs MNES Field Surveys\GIS\02 Maps\E220619 OffsetStage1\ WBR\WBR001 ProjectLocation 20240416 02.mxd 16/04/2024

Source: EMM (2024); Pembroke (2024); DNRME (2021)

Project location

Olive Downs Stage 1 Offset
2022 Annual Report Figure
1.1

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2 Methodology

2.1 Field survey timing and conditions

Baseline ecological monitoring surveys were conducted by suitably qualified EMM ecologists from February - October 2022 (habitat quality assessments); September - October 2022 (weed monitoring sites); and February - March 2022 (baseline feral animal monitoring).

Climatic conditions leading up to, and during, the field survey period(s) based on information recorded at the Moranbah Airport weather station (weather station 034035), are summarised in Table 2.1.

Table 2.1 Weather conditions at Moranbah Airport weather station (034035)

Month/year	Feb-22	Mar-22	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22
Total rainfall (mm)	12.2 (100.7)	20.6 (100.7)	41.8 (36.4)	108.6 (34.5)	0.2 (22.1)	133.2 (18.0)	3.6 (25.0)	75.4 (9.1)	47.2 (35.7)
Mean minimum temp (°C)	21 (21.8)	20.5 (20.2)	18.9 (17.6)	16.1 (14.2)	9.1 (11.2)	7.9 (9.9)	9.2 (11.1)	13.7 (14.1)	17.7 (17.6)
Mean maximum temp (°C)	35.6 (33.1)	35.8 (33.1)	31.0 (29.5)	25.7 (26.5)	23.4 (23.7)	20.9 (23.7)	24.9 (25.5)	28.2 (29.2)	31.5 (32.3)

1. Units within brackets represent the meteorological averages between years 1972 - 2012 (rainfall) and 1986 – 2012 (temperatures) at Moranbah Water Treatment Plant (weather station 034038). This data was used instead of the Moranbah Airport (weather station 034035) data due to the lack of long-term climate and rainfall data. The Moranbah Airport weather station replaced the Moranbah Water Treatment Plant weather station in 2012.

2.2 Baseline habitat quality monitoring of MNES habitats

Habitat quality is assessed through a strategic combination of indicators that measure the overall viability of the site and its capacity to support a prescribed environmental matter (such as MNES) (DES 2020). Habitat quality assessments were undertaken in accordance with the *Guide to Determining Terrestrial Habitat Quality v1.2* (DES 2017) and the BioCondition Manual (DSITIA 2015).

Forty-nine baseline survey sites were established during 2022 in representative patches of RE communities and MNES habitats as mapped in the Stage 1 Offset Area. Permanent photo monitoring sites (photos taken north, east, south and west of the starting point) were established at each site.

The location of habitat quality monitoring sites is illustrated in Figure 2.1.

2.2.1 Flora survey team

Habitat quality monitoring was led by Sandra Walters, who was supported by various ecologists (see *Olive Downs Stage 1 Offset Baseline habitat quality monitoring report* (EMM, 2023). Sandra is the Project Manager for the Stage 1 Offset with over 22 years' experience conducting ecology surveys, BioCondition assessments, protected plant surveys and carrying out environmental audits across Australia. Curricula vitae for lead EMM ecologists are provided in Appendix A.

2.3 Weed monitoring

2.3.1 General weed surveys

Weed data on the Stage 1 Offset site was collected with ESRI Field Maps whilst driving access tracks at ~10 kph, scanning 100 m either side of driveable tracks. Where polygon and point data was collected, the vehicle was stopped and the assessment was made. Data was collected as follows:

- Where <10 plants were identified, a weed species point was recorded;
- As vehicles are a common means of transport for weeds, polylines were recorded in Field Maps for extended infestations along tracks; and
- A polygon was created for observed infestations in open paddocks.

Each data record (point, polyline or polygon) recorded:

- General information including the observer, date, time, species name;
- The species percentage abundance (a score representing a percentage range);
- The number of individuals;
- The percentage density; and
- The observed health of the weed species.

Abundance scores rated 1-5:

- 1 = weeds absent;
- 2 = density <1%;
- 3 = density 1 – 10%;
- 4 = density 11-50%; and
- 5 = density >50%.

2.3.2 Permanent weed photo monitoring sites

Twenty permanent photo monitoring points have been sited at locations of high ecological significance, such as riparian corridors. At each monitoring point georeferenced photos are taken at four bearings (North, South, East and West) along with the density scores for any priority species present. See *Olive Downs Stage 1 Offset baseline weed monitoring report* (EMM 2023b) for further details.

2.3.3 Biocondition surveys (weed data collection)

In addition, as a part of the broader monitoring of Offset Area Stage 1, weed data was collected at all (49) BioCondition sites using the methodology outlined in the *BioCondition Assessment Manual - Version 2.2* (Eyre et al. 2015). Weed data that is collected at each 50m x 100m BioCondition survey site includes:

- Visual estimate of percentage non-native plant cover within the 50 m x 100 m plot
- Percentage cover of non-native annual and perennial grasses, forbs and shrubs within 5 x 1 m plots

Weed monitoring sites are illustrated in Figure 2.2.

2.3.4 Weed survey team

Weed monitoring surveys were conducted by Sandra Walters and several supporting ecologists. Sandra is an experienced terrestrial ecologist with over 22 years' experience conducting flora surveys,12 of which have been in Queensland. Curricula vitae for EMM lead ecologists are provided in Appendix A.

2.4 Feral animal monitoring

2.4.1 Vehicle transects

Vehicle transects were one kilometre in length, and were surveyed three times each over consecutive nights. During each transect the vehicle was driven at a maximum of 10km/h. A GPS track of the transect was recorded on a handheld GPS device. Both occupants of the vehicle scanned the track ahead and the surrounding habitat for feral animals, using the vehicle lights, high powered spotlights and headtorches. Animals were identified using binoculars when necessary. The location of each feral animal was recorded on a handheld GPS device. Other information recorded included the start and end time of each transect as well as the temperature and weather conditions at the time of survey. Sixteen vehicle transects were located along existing tracks in Area 1. An additional eight transects were located in Area 2.

2.4.2 Walking transects

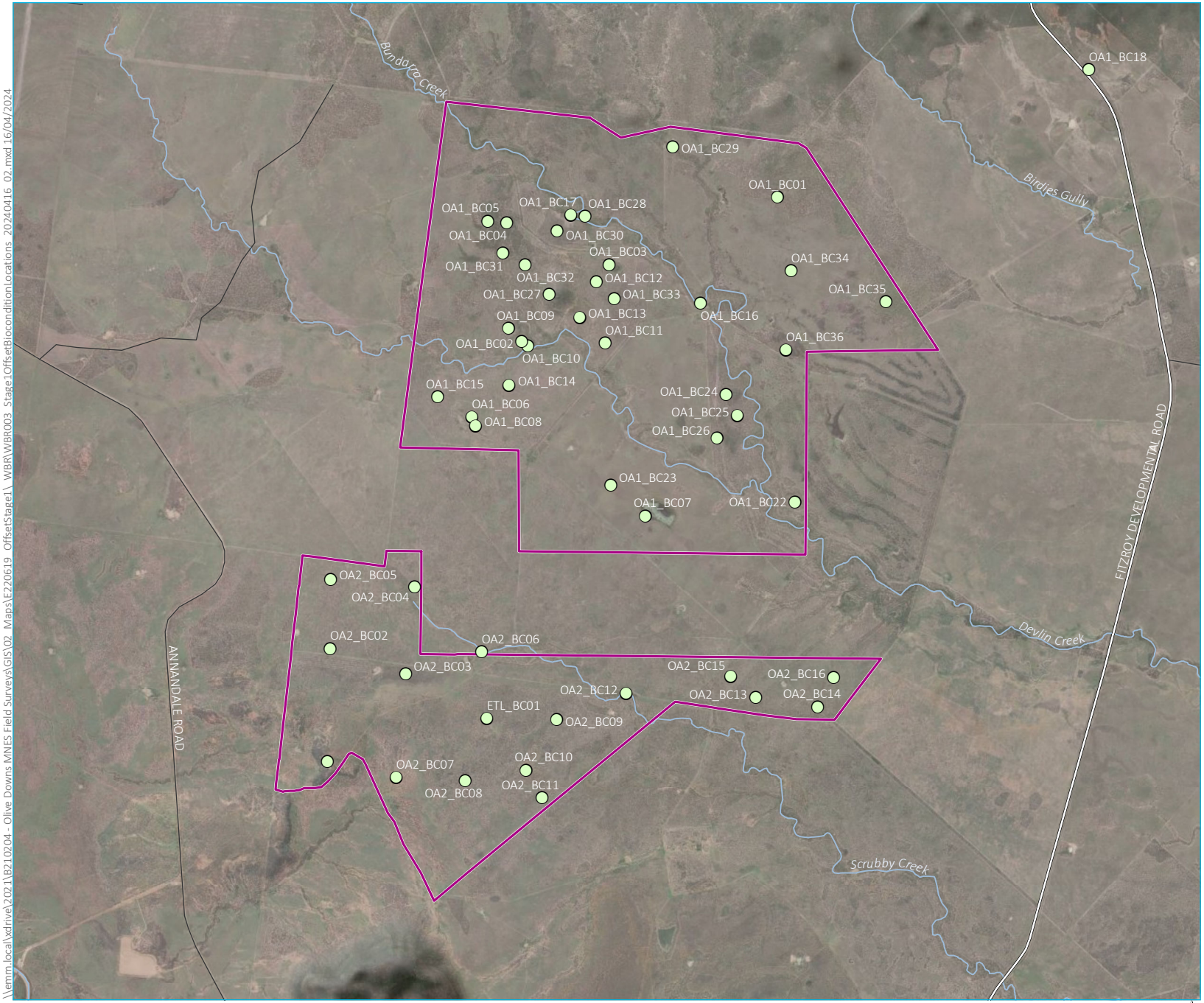
Walking transects were each one kilometre in length, and traversed areas difficult or impossible to access in vehicles. Each walking transect was surveyed once, with ecologists searching for feral animals or their distinctive sign with high-powered spotlights and headtorches. The transect was recorded on a handheld GPS device. Animals were identified using binoculars when necessary. The location of each feral animal was recorded on a handheld GPS device. Other information recorded included the start and end time of each transect as well as the temperature and weather conditions. Six walking transects were located along creeklines or forested areas in Area 1. Two additional transects were located along a creekline and rocky ridge in Area 2.

2.4.3 Remote cameras

Remote cameras were deployed along tracks, game trails and near water sources throughout the Stage 1 Offset Area. Cameras were attached to suitable trees or posts and, in general, were positioned approximately 0.5 m above ground level at a 45-degree angle. All cameras were unbaited. GPS coordinates of each deployed camera were recorded for subsequent survey replication. Fourteen cameras were deployed in Area 1 and six cameras were deployed in Area 2. Remote cameras were deployed in February 2022 and collected approximately one month later, in March 2022. Remote camera locations are illustrated in Figure 2.3.

2.4.4 Feral animal survey team

Feral animal monitoring surveys were conducted by Andrew Jensen and several supporting ecologists. Andrew is an experienced fauna ecologist with over 10 years' experience conducting fauna surveys throughout Queensland. Curricula vitae for EMM lead ecologists are provided in Appendix A.



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Source: EMM (2024); Pembroke (2024); DNRME (2021)

Stage 1 Offset
biocondition survey locations

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Figure 2.1

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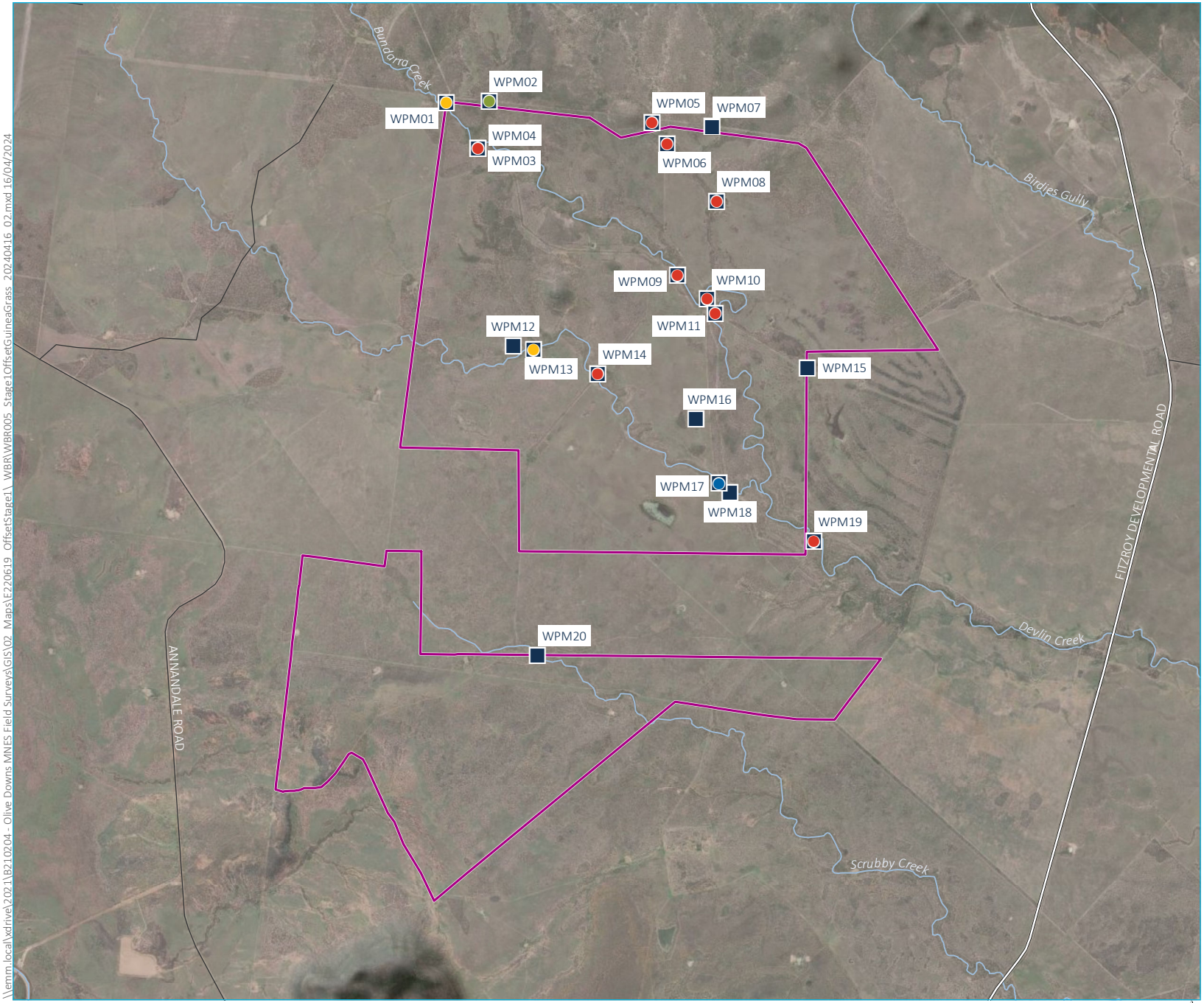

KEY

- Stage One Offset Area boundary
- Weed photo monitoring point

Guinea Grass location (density)

- High (>30%)
- Medium (20-30%)
- Low (10-20%)
- Scattered (<10%)

Existing environment

- Major road
- Minor road
- Named watercourse

Source: EMM (2024); Pembroke (2024); DNRME (2021)

0 2.5 5 km

GDA 1994 MGA Zone 55

N

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Permanent Weed Monitoring Sites

2022 Annual Report
Figure 2.2

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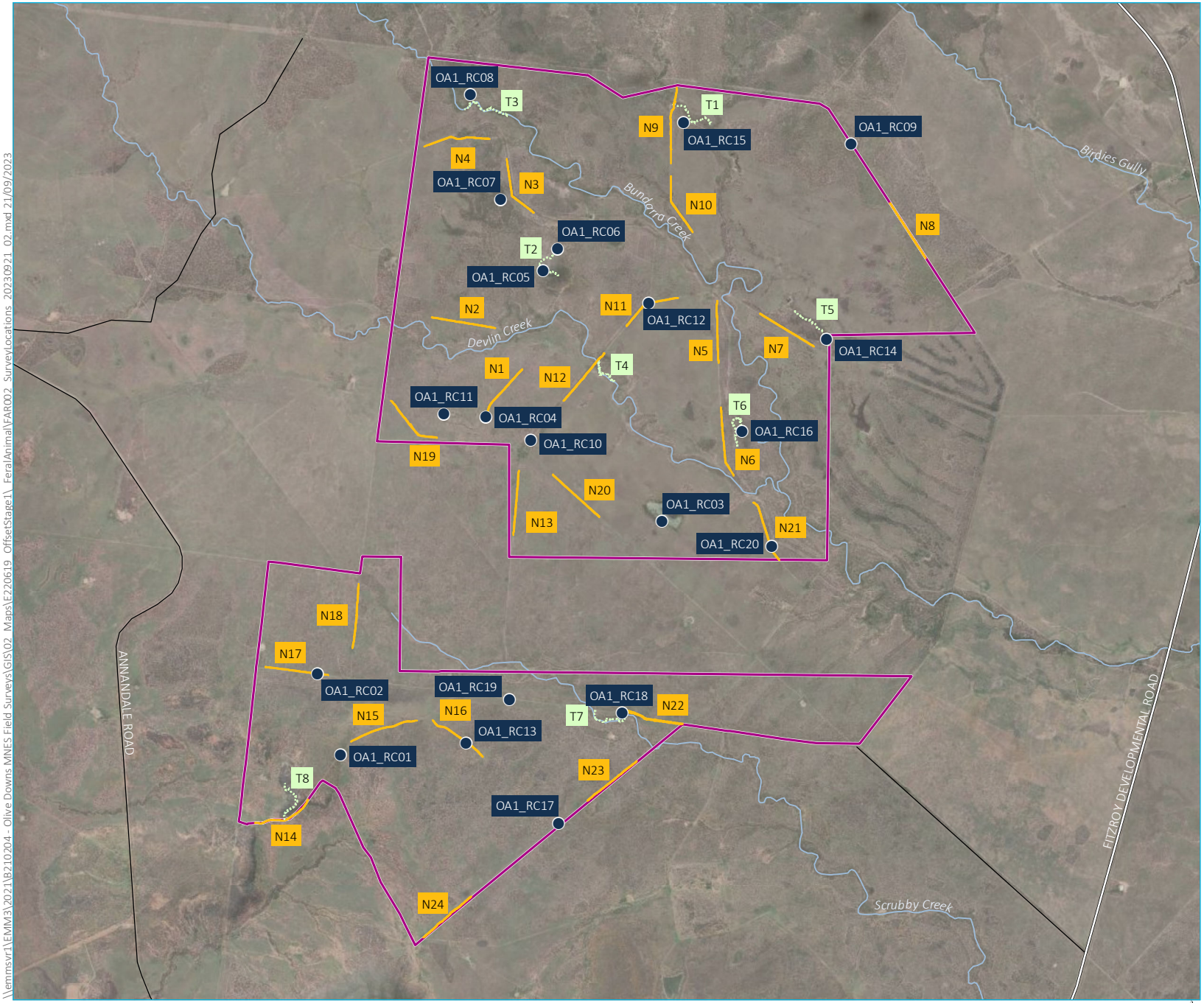

KEY

- Stage One Offset Area boundary
- Camera trap location

Feral animal transect

- Vehicle
- Walking

Existing environment

- Major road
- Minor road
- Named watercourse

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

0 2.5 5 km

GDA 1994 MGA Zone 55

N

Feral Animal Survey locations

2022 Annual Report
Figure 2.3

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3 Results

3.1 Baseline habitat quality monitoring of MNES habitats

3.2 Vegetation communities

A total of 15 REs were identified on the Stage 1 offset area during BioCondition surveys (EMM, 2023a). In several cases, discrepancies between the ground-truthed RE (GTRE) layer initially provided by DPM were identified during EMM's surveys. This was particularly apparent in the areas mapped as non-remnant. EMM corrected the mapping of these areas (where possible) to facilitate the habitat quality scoring process. Broadly speaking, non-remnant areas across the Stage 1 offset area were in homogenous condition, and were degraded by historical grazing activity.

3.3 Baseline habitat quality scoring of matter areas

A summary of the habitat quality scoring for each matter area is provided in Table 3.1. BioCondition site profiles, including scoring of site-based and site context attributes, is provided in *Olive Downs Stage 1 Offset Baseline habitat quality monitoring report* (EMM, 2023a). Baseline habitat quality scoring spreadsheets, including the area, size weighting and weighted habitat quality scores for each assessment unit, as well as the final scores for each matter unit assessed, are also presented in that report.

Table 3.1 Baseline habitat quality scoring across the Stage 1 offset area

Matter area	Assessment unit	Weighted HQ score	Baseline HQ score
Ornamental Snake Existing Habitat	AU 4 – RE11.3.27f remnant	0.03	2.95*
	AU 5 – RE11.3.35 regrowth	0.91	
	AU 6 – RE11.4.8 regrowth	0.50	
	AU 7 – RE11.4.8 remnant	0.21	
	AU 8 – RE11.4.9 regrowth	0.64	
	AU 9 – RE11.4.9 remnant	0.47	
	AU 10 – RE11.5.17 remnant	0.14	
	AU 11 – RE11.5.3 regrowth	0.05	
Squatter Pigeon Existing Habitat	AU 2 – RE11.3.2 remnant	2.23	6.36
	AU 10 – RE11.5.17 remnant	0.20	
	AU 12 – RE11.5.3 remnant	2.01	
	AU 13 – RE11.5.9 remnant	1.92	
Squatter Pigeon Restoration Habitat	AU 1 – RE11.3.2 regrowth	0.94	4.01*
	AU 11 – RE11.5.3 regrowth	3.04	
	AU 15 – RE11.7.2 regrowth	0.03	

Table 3.1 Baseline habitat quality scoring across the Stage 1 offset area

Matter area	Assessment unit	Weighted HQ score	Baseline HQ score
Greater Glider Existing Habitat	AU 2 – RE11.3.2 remnant	1.92	6.23
	AU 3 – RE11.3.25 remnant	0.72	
	AU 4 – RE11.3.27f remnant	0.02	
	AU 10 – RE11.5.17 remnant	0.17	
	AU 12 – RE11.5.3 remnant	1.73	
	AU 13 – RE11.5.9 remnant	1.65	
	AU 14 – RE11.12.7 remnant	0.02	
Greater Glider Regrowth Habitat†	NA	NA	NA
Greater Glider Future Habitat	AU 1 – RE 11.3.2 regrowth	0.80	3.22*
	AU 11 – RE11.5.3 regrowth	2.40	
	AU 15 – RE11.7.2 regrowth	0.02	
Koala Existing Habitat	AU 2 – RE11.3.2 remnant	1.92	6.25
	AU 3 – RE11.3.25 remnant	0.72	
	AU 4 – RE11.3.27f remnant	0.06	
	AU 10 – RE11.5.17 remnant	0.17	
	AU 12 – RE11.5.3 remnant	1.73	
	AU 13 – RE11.5.9 remnant	1.65	
	AU 14 – RE11.12.7 remnant	0.01	
Koala Regrowth Habitat	AU 1 – RE 11.3.2 regrowth	0.44	4.01*
	AU 11 – RE11.5.3 regrowth	3.57	
Koala Future Habitat	AU 1 – RE 11.3.2 regrowth	1.35	3.36*
	AU 11 – RE11.5.3 regrowth	1.97	
	AU 15 – RE11.7.2 regrowth	0.05	
Australian Painted Snipe Breeding Habitat	AU 4 – RE11.3.27f remnant	0.83	4.77
	AU 10 – RE11.5.17 remnant	3.93	

3.4 Weed monitoring sites

Baseline weed surveys across the Stage 1 Offset identified identified three Weeds of National Significance (WONS) and five which are listed under Qld's *Biosecurity Act 2014* (BS Act) as Category 3 restricted invasive plants. These weeds are summarised in Table 3.2. Category 3 plants must not be given away, sold, or released into the environment. The BS Act requires everyone to take all reasonable and practical steps to minimise the risks associated with invasive plants under their control.

Table 3.2 Summary of Stage 1 OAMP weeds recorded on Stage 1 Offset

Species	Common name	BA status	WONS status	Presence in Stage 1 offset areas	Management outcomes identified in OAMP
Harrisia martini	Harrisia Cactus	Category 3	N/A	Widespread and abundant, particularly along fence lines	Reduction in weed cover across offset area.
Lantana camara	Lantana	Category 3	WONS	Scattered, mostly along watercourses	Reduction in weed cover across offset area.
Opuntia tomentosa	Velvety Tree Pear	Category 3	WONS	Widespread, scattered	Reduction in weed cover across offset area
Parthenium hysterophorus	Parthenium	Category 3	WONS	Widespread, particularly along access tracks, some dense infestation in black soil areas	No new weed infestations.
Senecio madagascariensis	Fireweed	Category 3	N/A	Single plants or multiple scattered individuals	Not included in Stage 1 OAMP.

Following baseline weed surveys, a refined list of priority weeds requiring treatment and/or monitoring on the Stage 1 Offset was developed, based on their threat to MNES values. This refined list is provided in Table 3.3.

Table 3.3 Refined Priority Weed Species list for the Stage 1 Offset Area

Species	Common name	BA status	WONS status	Presence in Stage 1 offset areas	Treatment priority
Acacia farnesiana	Mimosa Bush	N/A	N/A	Scattered individuals, especially near dams	No new weed infestations.
Cenchrus ciliaris	Buffel Grass	N/A	N/A	Widespread and abundant	Reduction in weed cover across offset area
Cryptostegia grandiflora	Rubber Vine	Category 3	WONS	Not observed	No new weed infestations.
Harrisia martini	Harrisia Cactus	Category 3	N/A	Widespread and abundant, particularly along fence lines	Reduction in weed cover across offset area.
Jatropha gossypiifolia	Bellyache Bush	Category 3	WONS	Not observed	No new weed infestations.
Lantana camara	Lantana	Category 3	WONS	Scattered, mostly along watercourses	Reduction in weed cover across offset area.

Table 3.3 Refined Priority Weed Species list for the Stage 1 Offset Area

Species	Common name	BA status	WONS status	Presence in Stage 1 offset areas	Treatment priority
Megathyrsus maximus	Green Panic / Guinea Grass	N/A	N/A	Widespread and abundant, particularly along watercourses	Reduction in weed cover across offset area. Key focus is to reduce infestations along watercourses.
Opuntia tomentosa	Velvety Tree Pear	Category 3	WONS	Widespread, scattered	Reduction in weed cover across offset area
Parthenium hysterophorus	Parthenium	Category 3	WONS	Widespread, particularly along access tracks, some dense infestation in black soil areas	No new weed infestations.
Parkinsonia aculeata	Parkinsonia	Category 3	WONS	Not observed	Key focus is to reduce infestations along watercourses.
Ricinus communis	Castor Oil Plant	N/A	N/A	Not observed	Reduction in weed cover across offset area.
Senecio madagascariensis	Fireweed	Category 3	N/A	Single plants or multiple scattered individuals	Not included in Stage 1 OAMP.
Solanum seaforthianum	Brazilian Nightshade	N/A	N/A	Scattered, mostly in riparian areas, no high-density infestations observed	No new weed infestations.
Xanthium occindentale	Noogoora Burr	N/A	N/A	Not observed	Reduction in weed cover across offset area.

A full list of weeds recorded on the Stage 1 Offset site is provided in Appendix B and further detail regarding the distribution and abundance of the priority weeds requiring treatment and / or monitoring is provided in the *Olive Downs Stage 1 Baseline Weed Report* (EMM, 2023b).

3.5 Feral animal monitoring

Detailed results from the baseline feral animal monitoring conducted between February and March 2022 is presented in the *Olive Downs Stage 1 Offset Area – Feral Animal Baseline Survey Report* (EMM 2023a). A summary of the results is presented below.

3.5.1 Vehicle transects

Ninety-six vehicle transects were completed as planned between 14-20 February 2022.

Several feral animals were recorded on these transects, as well as numerous native species. The feral animals recorded, and the number of transects they were encountered on, is summarised below.

- Cane Toad (recorded on two transects).
- Chital Deer (recorded on two transects).
- European Hare (recorded on four transects).
- European Rabbit (recorded on seven transects).

No feral predators (Dingoes or Feral Cats) were recorded on vehicle transects.

3.5.2 Walking transects

Eight walking transects were completed as planned between 14-20 February 2022. Cane Toads (recorded on three transects) and Chital Deer (heard 'barking' on one transect) were the only feral animals encountered, though sign of Feral Pigs was noted in several locations. Of interest were the frequent detections of Central Greater Gliders (*Petauroides armillatus*) and signs of Koalas (*Phascolarctos cinereus*) made along the creek lines and in remnant vegetation.

3.5.3 Remote cameras

Twenty remote cameras were deployed across the offset area in February and March 2022. Of these, two failed to record any data (the first misfired, and the second was dislodged by cattle). Of the remaining 18 cameras, 13 recorded at least one feral animal. In total, 645 trap nights of data were collected by the cameras, and they recorded six species of feral animal, namely:

- Chital Deer (Photograph 3.1),
- Feral Cat (Photograph 3.2),
- Dingo (Photograph 3.3),
- Feral Pig,
- European Rabbit, and
- Eurasian Hare.

Table 3.3 details the feral animals recorded on each camera, the number of nights they were recorded, the total number of trap nights collected by that camera, and the proportion of trap nights in which feral animals were recorded.

Table 3.4 Remote camera results

Camera ID	Deployment dates (total trap nights)	Feral species	Trap nights	% total
OA1_RC01	15 Feb to 25 Mar 2022 (38)	None recorded		
OA1_RC02	15 Feb to 25 Mar 2022 (38)	None recorded		
OA1_RC03	15 Feb to 24 Mar 2022 (37)	Dingo	1	0.02
OA1_RC04	15 Feb to 27 Mar 2022 (40)	Dingo	1	0.02
		Feral Cat	2	0.05
OA1_RC05	16 Feb to 26 Mar 2022 (18)	None recorded		
OA1_RC06	16 Feb to 26 Mar 2022 (39)	Dingo	1	0.02
		European Rabbit	1	0.05
OA1_RC07	15 Feb to 27 Mar 2022 (40)	Dingo	1	0.02
		Feral Cat	2	0.05

Table 3.4 Remote camera results

Camera ID	Deployment dates (total trap nights)	Feral species	Trap nights	% total
OA1_RC08	NA (misfiring)	NA	NA	NA
OA1_RC09	15 Feb to 27 Mar 2022 (40)	Dingo	6	0.15
		Feral Pig	1	0.02
OA1_RC10	17 Feb to 25 Mar 2022 (36)	Dingo	1	0.02
		European Rabbit	1	0.02
		Feral Cat	3	0.08
OA1_RC11	17 Feb to 27 Mar 2022 (38)	Dingo	3	0.05
		Feral Pig	2	0.02
OA1_RC12	17 Feb to 25 Mar 2022 (36)	Dingo	2	0.02
		Feral Cat	2	0.02
OA1_RC13	17 Feb to 25 Mar 2022 (38)	Dingo	2	0.02
OA1_RC14	18 Feb to 27 Mar 2022 (37)	Dingo	2	0.05
		Feral Cat	1	0.02
OA1_RC15	18 Feb to 29 Mar 2022 (39)	Dingo	4	0.1
		European Hare	6	0.15
		Feral Cat	3	0.07
OA1_RC16	18 Feb to 24 Mar 2022 (34)	None recorded		
OA1_RC17	NA (dislodged by cattle)	NA	NA	NA
OA1_RC18	19 Feb to 23 Mar 2022 (32)	None recorded		
OA1_RC19	19 Feb to 24 Mar 2022 (33)	Dingo	1	0.03
OA1_RC20	20 Feb to 24 Mar 2022 (32)	None recorded		

Photograph 3.1 **Chital Deer recorded on camera OA1_RC07**

Photograph 3.2 **Feral Cat recorded on camera OA1_RC14**

Photograph 3.3 Dingo recorded on camera OA1_RC14

4 Conclusion and recommendations

4.1 Baseline habitat quality monitoring of MNES habitats

The habitat scoring system involves scores out of 10, whereby a maximum score of 10 represents a fully intact system representative of a benchmark score. Scores of 4, 5 and 6 may indicate good quality regrowth or medium value habitat, and a minimum score of 1 would indicate a totally cleared area (DES 2020).

Scoring of the ten matter areas ranged between a low of 2.95 (Ornamental Snake Existing Habitat) and a high of 6.36 (Squatter Pigeon Existing Habitat). However, several large non-remnant areas were not scored as EMM identified discrepancies in the RE mapping across the site, and there is currently insufficient data to provide accurate scores. EMM recommends that:

1. Existing GTRE mapping should be updated in some areas across the Stage 1 offset area to better represent on-ground conditions; the updated layer should be used for area calculations and HQ scoring in future. In particular, the non-remnant areas overlapping MNES habitat should be assessed, and grouped into broader categories if possible.

2. Once the non-remnant areas have been assessed, additional AUs can be allocated (and BioCondition sites completed within same). This will allow baseline habitat quality scoring to be completed for the non-remnant portions of each relevant matter area. To date, limited management actions have been completed in these areas and therefore the baseline assessment will still be relevant, despite occurring later than originally planned.

For existing sites, and in surrounding areas where poor habitat quality scores were recorded, management actions need to be prioritised around reducing weed cover, improving recruitment of native species, and increasing organic litter and debris. The Stage 1 Offset Area also requires time to recover from historical clearing and grazing, which will allow native species to grow and thrive. Grazing has largely been removed from the area which will assist over time to improve recruitment of native flora species.

4.2 Weed monitoring sites

In general, the weed management area was found to have a high weed prevalence. The area had historically been cleared and has been grazed by cattle for a long period of time, allowing weeds to proliferate. Cattle have been removed from the majority of the Stage 1 offset with the goal of having cattle excluded from MNES habitats wherever appropriate.

The most widespread weeds were Buffel Grass (*Cenchrus ciliaris*), Guinea Grass (*Megathyrsus maximus*), Lantana (*Lantana camara*), Harrisia cactus (*Harrisia martini*) and Velvety Tree Pear (*Opuntia tomentosa*). Weed monitoring sites in riparian areas (10 sites, WPM01 through WPM20) had dense infestations of Guinea Grass. Lantana was also present at these sites, often at much lower density. Sites away from the Isaac River contained cattle grazing grasses such as Buffel Grass. Buffel Grass was also the dominant ground cover within Brigalow communities with Parthenium abundant on heavier soils particularly concentrated around tracks. Due to the high amount of rainfall received on site over 2022 this has led to substantial growth of both native and non-native plants.

A Weed Management Plan has been developed and will be implemented annually which includes target weed species, weed control methods and timing (EMM 2023d).

4.3 Feral animal monitoring

In general, during the feral animal baseline monitoring survey, abundance of feral animals was low. Despite this, feral animal species represent key threats to a number of threatened species to be managed within the Stage 1 Offset Area. Feral Cats, cattle, Chital Deer, rabbits, hares and Feral Pigs are the main pest vertebrate species found on the Stage 2 Offset Area that have the potential to damage or destroy native flora and fauna or their habitat.

Vehicle and walking transects detected feral herbivores, including Chital Deer, European Hare and European Rabbit, as well as Cane Toads. No feral predators were detected on these transects, but evidence of Feral Pigs was recorded. EMM ecologists also observed several Greater Gliders during these surveys.

The remote cameras detected every feral animal seen during the transects with the exception of Cane Toad. Additionally, the remote cameras detected two predatory species. Animals EMM identified as Dingoes were observed on 12 of the 20 cameras, and were the most frequently detected feral animal during the baseline monitoring. None of the Dingoes observed appeared to resemble so-called 'wild dogs' (loosely defined, but often assumed to be Dingo x escaped domestic dog hybrids). This observation is supported by recent research indicating that, contrary to popular belief, the occurrence of Dingo x domestic dog hybrids across the Australian continent is very rare (Cairns et al 2021[1]).

Dingoes have been present in the Australian landscape for at least 3000 years (Balme et al 2018[2]) and, as such, EMM argues that Dingoes should not be considered a 'pest' or a 'feral animal' within the confines of the Stage 1 Offset Area. All MNES threatened species within the Stage 2 Offset Area have ecological experience of the Dingo as a top-order predator and the benefits of Dingo presence within the offset area (i.e., '24/7' control of feral cats, a key threat to Ornamental Snake, Squatter Pigeon and Greater Glider) outweigh the possible benefits of their removal. EMM will continue to monitor Dingo abundance across the Stage 1 Offset area.

Feral Cats were the next most abundant feral animal observed, recorded on 6 of the 20 cameras. Feral Cats have been observed predating Greater Glider, along with numerous other native animals, on the Project Impact Area. Interestingly, Dingoes were recorded on every camera on which a Feral Cat was recorded. This is likely due to the fact that most cameras were deployed along tracks, which are often utilised by predators to facilitate their hunting (Vernes and Dennis 2001[3]) but indicates that Dingoes are likely hunting Feral Cats on the Stage 1 Offset Area.

European Rabbits were seen on 3 of the 20 cameras, and a European Hare was seen on one camera. Other feral animals observed included Chital Deer (a small herd of three adult females and a juvenile observed on one camera), which have the potential to become a serious threat to native flora. Feral Pigs were detected on two cameras.

Monitoring of feral animals on the Stage 1 Impact Area will continue on an annual basis until Year 5, with the next monitoring round planned for 2023.

4.4 Recommendations for next round of monitoring

For future annual monitoring surveys, it is recommended that the weed monitoring and feral animal monitoring surveys are conducted by one team of two (one suitably qualified ecologist and one support ecologist) over six days (plus two days of travel). A recommended monitoring program is described in Table 4.1.

Table 4.1 Recommended monitoring program for 2023

Ecological monitoring survey	Recommended methodology	Recommended timing
Habitat quality monitoring	The same sites and survey methodology (habitat quality assessments and photo monitoring points) will be repeated so that scores can be compared for each attribute. Site HQ2 is close to the constructed mine haul road which is on the very margin of the plot, so review suitability for continuing this site in 2023.	To be conducted during the day
Weed monitoring	The same sites and survey methodology (habitat quality assessments and photo monitoring points) will be repeated so that scores can be compared for each attribute.	
Feral animal monitoring	The same sites and transects will be repeated for remote cameras and nocturnal feral transects to compare with the baseline results. Continue to record % trap nights recorded and compare to 2022 data.	To be conducted during the night, between 1800 to 2300. Cameras can be set up and collected during the day.

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Department of Science, Information Technology, Innovation and the Arts (DSITIA) (2015). *BioCondition: A Condition Assessment Framework for Terrestrial Biodiversity in Queensland*. State of Queensland.

EMM Consulting Pty Ltd (EMM) 2022. Weed Action Plan (draft).

EMM, 2023a. *Olive Downs Stage 1 Offset Baseline habitat quality monitoring report.* Unpublished report to Pembroke Olive Downs. EMM Consulting, Brisbane.

EMM, 2023b. *Olive Downs Stage 1 Offset Baseline weed monitoring report*. Unpublished report to Pembroke Olive Downs. EMM Consulting, Brisbane.

EMM, 2023c. *Olive Downs Stage 1 Offset Baseline feral animal monitoring report*. Unpublished report to Pembroke Olive Downs. EMM Consulting, Brisbane.

EMM, 2023d. *Olive Downs Stage 1 Offset Weed Management Plan*. Unpublished report to Pembroke Olive Downs. EMM Consulting, Brisbane.

Vernes, K and Dennis, A 2001, Mammalian Diet and Broad Hunting Strategy of the Dingo (*Canis familiaris dingo*) in the Wet Tropical Rain Forests of Northeastern Australia, *Biotropica*, 33(2), 339-345.

Appendix A

Curricula vitae

Sandra Walters

Associate Ecologist
EMM Consulting Pty Limited

Professional Overview

Sandra has 22 years' experience in terrestrial ecology, having worked for the past 10 years in environmental consultancy, following ecology roles in state government and private not-for-profit conservation. Sandra is based in North Queensland (Airlie Beach) and has extensive experience in fauna and flora survey across northern Australia, including in tropical and sub-tropical rainforests.

Sandra has applied her technical skills in Terrestrial Ecology, Environmental Impact Assessment and Fire Management across a range of sectors including Defence, Mining and Gas, Energy, Rail, Construction, and State and Local Governments. Sandra has worked on projects in varied landscapes and all states and territories across Australia.

Qualifications and licences

Bachelor of Environmental Science, Charles Sturt University, 2010

Rainforest Plant Identification Certificate, JCU/ATH, 2013

QLD Department of Transport and Main Roads SOA E1 Technical Specialist, Ecology and Bushfire

'Suitably qualified person' QLD Protected Plants framework

Bushfire Attack Level Assessor, FPAA

Certified Environmental Practitioner (CEnVP) #1416, Environment Institute of Australia and New Zealand

Member, Environment Institute of Australia and New Zealand

Member, Birdlife Australia, Australasian Bat Society, Queensland Wader Study Group, Native Plants Queensland, Australian Mammal Society

Baseline Security Clearance, Australian Government Security Vetting Agency

Work Safely in the Construction Industry (White Card)

TLIF2080C Safely Access the Rail Corridor

TLIW2001A Operate Under Track Protection Rules

Standard 11 Surface Induction – RIISS00034 Surface Coal Mine Safety Skill Set

Coal Board Medical

S123 Mine Supervisor

Senior First Aid & CPR

BMA Defensive Driving Program

PMASUP236B Operate vehicles in the field (4WD course)

REIIVEH201A Operate Light Vehicle

All Terrain Vehicle Operator Accreditation Certificate (QPWS)

Certificate III Fire Communication Operations

Certificate II Public Safety (Firefighting Operations)

Specialisation

Terrestrial ecology (flora, fauna and freshwater aquatic)

Environmental impact assessment

Fire management

Mine rehabilitation

Contaminated land assessment

Representative experience

Flora and fauna ecology

- Eva Copper Mine Project (north of Cloncurry, QLD), Matters of State Environmental Significance (MSES) ecological assessment. Targeted field surveys for threatened fauna species (especially Purple-necked Rock-wallaby), bird surveys, Elliot, pitfall, funnel, Anabat and camera trapping, spotlighting, flora surveys, reporting. Lead ecologist.
- Port of Weipa, NQBP High Risk Species Management Program. Field surveys of Port of Weipa lands including surveys of Frigatebird roosts, general bird surveys, flora survey and mapping. Preparation of Animal Breeding Place Survey Report and Impact Management Plan.
- Olive Downs Project (new coking coal mine), Offset program. Project manager / lead ecologist. BioCondition flora surveys, weed and feral animal surveys, targeted MNES fauna surveys, development of Offset Area Management Plan and annual reporting of Offset Area Stage 1 and 2
- Moranbah Gas Pipeline environmental assessment. Flora and fauna surveys, reporting including MNES report, EPBC referral and MSES report (Queensland Pacific Metals), Lead ecologist.
- Boulder Creek Wind Farm bird utilisation surveys, support ecologist (Epuron).
- Pioneer Valley Mountain Bike Trails (PVMBT) project
- Mackay Port access road, detailed environmental assessments, project manager / lead ecologist (QLD Department of Transport and Main Roads)
- Mackay Kirkup Bridge Design, lead ecologist (QLD Department of Transport and Main Roads)
- Port of Mackay and Port of Hay Point, environmental constraints analysis, project manager / lead ecologist (North Queensland Bulk Ports)
- Eton Range Realignment Denison and Stockyard Creek, Koala exclusion fence monitoring, lead ecologist (QLD Department of Transport and Main Roads)
- Dalrymple Bay Coal Terminal 8X expansion EIS, lead ecologist (Dalrymple Bay Coal Terminal)
- Lake Lindsay Environmental Impact Assessment, senior ecologist (AngloAmerican)
- Kennedy Highway environmental assessment, lead ecologist (QLD Department of Transport and Main Roads)
- Peak Downs Highway Hazard Reduction, lead ecologist (QLD Department of Transport and Main Roads)

- Sandy Gully Bridge Replacement Environmental Assessment, lead ecologist (QLD Department of Transport and Main Roads)
- Wide Centreline environmental scoping report, Innisfail to Ingham, QLD, lead ecologist
  (QLD Department of Transport and Main Roads)
- Cape Gloucester Subdivision, senior ecologist (Aldabra Pty Ltd). Targeted surveys for Northern Quoll, general flora and fauna surveys, EPBC referral
- Warnervale Link Road Review of Environmental Factors, lead ecologist (NSW Central Coast Council)
- Wiggins Island Coal Export Terminal ecological assessments, fauna relocation management plan, Water Mouse trapping and radiotracking, senior ecologist (Wiggins Island Coal Export Terminal)
- Dysart Road Realignment, Peak Downs Coal Mine, senior ecologist (BHP Billiton Mitsubishi Alliance)
- Goyder River Crossing and Road Realignment, senior ecologist (Department of Construction and Infrastructure)
- Roma and Fairview Gas Fields, senior ecologist (Santos)

Species management programs

- Eastern Osprey High Risk Species Management Program, Dalrymple Bay Coal Terminal (DBCT). Project Manager, lead ecologist, author and implementation (DBCT)
- High Risk Species Management Plans for Port of Mackay, Port of Abbot Point, Port of Hay Point, and Port of Weipa, Project Manager / lead ecologist (North Queensland Bulk Ports)
- High Risk Species Management Plan (microbats & colonial breeding birds), Nulla Bridge, Project Manager, lead ecologist, author and implementation (North Queensland Bulk Ports)
- Broken River Platypus Species Management Program, Eungella, Project Manager, lead ecologist, author and implementation (QLD Department of Transport and Main Roads)
- Mackay Ring Road Fursden Creek, Platypus Species Management Program, lead ecologist, author and implementation (QLD Department of Transport and Main Roads)
- West Funnel Creek Bridge Replacement Platypus Species Management Program, lead ecologist, author and implementation (Mackay Regional Council)
- Bee Creek Bridge Replacement Ecological Assessment and Platypus Species Management Program, lead ecologist, author and implementation (Mackay Regional Council)
- Hutton and Christmas Creek, Fairview Gas Fields: Platypus surveys and preparation of Platypus SMP for the pipeline transmission project. Preparation of SMP for Roma and Fairview Gas Fields (Santos)

Weed and pest animal management

- NT Weed Management Program 2018-19 season, Project leader / lead ecologist – baseline weed surveys of 16 Defence properties, development of Weed Management Plans and treatment program for each property, management of site supervisor overseeing weed spraying contractors and final field audit and reporting of program
- Central Queensland Region Pest and Weed Survey: Part of a team that surveyed over 30,000 km of DTMR road network for declared weeds and pest animals over four weeks (Department of Transport and Main Roads)
- Ecological Field Assessments, QLD: Pre-clearance and Baseline Weed Surveys - Newlands system at Havilah and Jilalan Rail Yards (Aurizon)
- Prepared Pest Animal Management Plan for Gas Transmission Pipeline from Roma and Fairview Gas Fields to Gladstone (Santos)

Biodiversity offsets

- Olive Downs Coal Mine Project. Stage 1 and 2 Offset delivery, Project Manager, Lead Ecologist. Development of Stage 2 Offset Area Management Plan (OAMP) and implementation of Stage 1 OAMP, including BioCondition surveys, targeted threatened fauna species surveys, fuel load assessments, weed surveys and development of Weed Management Plan
- Specimen Hill Wind Farm Offset Program. BioCondition surveys to inform Offset Area Management Plan
- Preparation of Biodiversity Offset Plan for Heathcote Railway Station upgrade (Novorail)
- Offline storage area Biodiversity Offsets Assessment. Field surveys to verify mapped areas of suitable offset vegetation using Ecological Equivalence Methodology
  (Gladstone Area Water Board)

Department of Defence Projects

Ecology

- USSF Deep Space Radar Project, WA, lead ecologist
- Tully Training Area ecological assessment, lead ecologist
- Bradshaw Bush Blitz, expert mammal and bird ecologist
- NT Weed Management Program 2018-19 season, Project leader / lead ecologist – baseline weed surveys of 16 Defence properties, development of Weed Management Plans and treatment program for each property, management of site supervisor overseeing weed spraying contractors and final field audit and reporting of program
- Biodiversity monitoring strategy, NT, project leader / lead ecologist
- Cultana Training Area Expansion environmental report, lead ecologist / report author /reviewer
- Woomera Test Range ecological assessment, lead fauna ecologist / report author
- RAAF Tindal Mahogany Replacement Program, senior ecologist
- PDS Northern Australia Regional Environmental Lead, lead environmental advisor to Defence PDS Projects
- Halifax Bay Training Area, marine water and benthic environment surveys, field ecologist and reporting support

Publications and conference presentations

- Farrell, C & Walters, S, 2016 Combining multiple bushfire behaviour models for improved hazard assessment. Presentation at Fire Australia 2015 Conference, Fire Protection Association of Australia.

Andrew Jensen

Associate Ecologist | Team Leader - Ecology
EMM Consulting Pty Limited

Professional Overview

Andrew has 16 years' consulting experience across a range of environmental disciplines and industries including mining, renewables, infrastructure and oil and gas.

Key aspects of his work have included ecological reporting and leading field surveys, preparation of environmental impact statements, preparation of management plans, environmental offset plans, management of subcontractors and health and safety processes. Andy has also led preparation of a number of EPBC Act referrals including recently for a large wind farm and industrial facility near Townsville.

Andrew routinely reviews environmental technical studies and has developed environmental management plans and negotiated environmental approval conditions for clients. Andrew is a specialist fauna ecologist and familiar with survey guideline requirements at a State and Commonwealth level. Andrew also has experience in preparation of habitat mapping criteria for threatened species and habitat quality scoring that satisfies regulator expectations.

Qualifications and licences

Bachelor of Science (Hons), University of St Andrews, 2003

Specialisation

Terrestrial ecology field surveys

Technical reporting

Ecological impact assessments and reporting

Representative experience

- Solquartz Project, Terrestrial Ecology surveys and reporting, Townsville QLD (Solquartz, 2023)
- QPM pipeline Moranbah, Terrestrial Ecology surveys and reporting, EPBC referral including significant impact assessments, Offset Strategy, Moranbah QLD (QPM, 2021)
- Specimen Hill windfarm, led seasonal terrestrial ecology surveys and technical reporting, preparation of Bird and Bat Management Plan, and EPBC referral including significant impact assessments, Flora & Fauna Management Plan, *Cycas megacarpa* Translocation Plan, Offset Strategy, Gladstone QLD (Epuron, 2020)
- Boulder Creek windfarm, supported seasonal terrestrial ecology surveys and technical reporting, preparation of Bird and Bat Management Plan, EPBC referral including significant impact assessments, Mount Morgan QLD (Epuron, 2020)
- Cooloola Great Walk, Review of EPBC referral, Brisbane QLD (Queensland Parks and Wildlife Service, 2020)
- Blackwater North Mine Expansion, led seasonal terrestrial ecology surveys, Technical Report including habitat criteria and mapping, significant impact assessments for MNES and MSES, Blackwater QLD (BHP, 2020)
- ARTC Inland Rail Project, Supplementary Fauna Surveys and reviewed technical reporting, Brisbane and SEQ QLD (ARTC, 2021)
- Olive Downs Coal Mine Project, MNES surveys and monitoring including spotlighting, camera trapping, preparation of monitoring reports, Moranbah QLD (Pembroke Resources, 2023-Current)
- Townsville Energy and Chemicals Hub Project, Terrestrial Ecology surveys and reporting, EPBC referral including significant impact assessments, Offset Strategy, Townsville QLD (QPM, 2020-2021)
- Townsville Energy and Chemicals Hub Project, identification of potential offset sites, surveying offset site to validate biodiversity values and determine management requirements, preparation of Environmental Offset Management Plan, Townsville QLD (QPM, 2020-2021)
- Queensland Coal Assets, Secondment to BHP supporting environmental approvals, compliance reporting, Brisbane QLD (BHP)
- ARTC Inland Rail Project, Preclearance surveys for Geotechnical Program, Brisbane and SEQ QLD (ARTC, 2020)
- Mole River Dam, Ecological Constraints Report and Scoping Report, Tenterfield NSW (Water NSW, 2021)
- Carmichael Coal Mine, Secondment to Adani Mining, Brisbane QLD (Adani Mining, 2017)
- Queensland Oil Refinery, Ecological Surveys, Gladstone QLD (Queensland Oil Refinery, 2019)
- Mount Fox Windfarm, Ecological Constraints Report, Brisbane QLD (Windlab, 2019)
- McPhillamys Gold Mine, Ecological Surveys and Biodiversity Assessment Report, Blayney NSW (Regis Resources, 2019)
- Tipton West Dalby Pipeline, Ecological Surveys, Dalby QLD (APA Group)
- Rugby Run Solar Farm, Secondment to Adani Renewables, Brisbane/Moranbah QLD (Adani Renewables)
- Reedy Creek Wallumbilla Pipeline, Ecological Surveys, Reedy Creek QLD (APA Group)
- Styx Coal Mine, Supplementary Ecological Surveys, Marlborough QLD (Waratah Coal)
- Bauxite Hills Mine, Ecological Surveys, north of Weipa QLD (Metro Mining)
- Williamtown Airport – expansions, Newcastle NSW (Defence Australia)
- Elk Antelope gas field, Preparation of ESIA, Papua New Guinea (Total E&P PNG Limited)
- Cape River Substation, Vegetation clearing permit, Pentland QLD (Windlab)
- Frieda River Project, Aquatic Ecology Impact Assessment, Papua New Guinea (PanAust)

- Kennedy Energy Park, Ecological assessment and EPBC referral, Hughenden QLD (Windlab)
- Chifley Road upgrade, Review of Environmental Factors, Chifley NSW (Roads and Maritime
- Granville Platform Upgrade, Review of Environmental Factors, Granville NSW (Sydney Trains)
- Erskineville platform upgrade, Review of Environmental Factors, Erskinville NSW (Sydney Trains)
- Menangle Park gas pipeline, Review of Environmental Factors, Menangle Park NSW (Jemena)
- Riverwood Bridge upgrade, Review of Environmental Factors, Riverwood NSW (Sydney Trains)
- P'nyang Project appraisal well, Preparation of ESIA, Papua New Guinea (Oil Search)
- P'nyang Project, Preparation of EIS, Papua New Guinea (Esso PNG P'nyang Ltd)
- Former Mary Kathleen uranium mine, Environmental Condition and Rehabilitation Assessment, near Mount Isa QLD (Queensland Government)
- Sarsfield Gold Mine Expansion Project Supplementary Report to the EIS, Ravenswood QLD (Carpentaria Gold)
- PNG LNG Pipeline Project, Preconstruction Environmental Surveys, Papua New Guinea (Spiecapag)
- PNG LNG Project, Secondment to ExxonMobil, Papua New Guinea (ExxonMobil)
- Moura Pipeline, Ecological Assessment and EPBC Referral, Moura QLD (Queensland Nitrates)
- Hillalong Project, Ecological Surveys for reassignment of vegetation mapping, Glenden QLD (Shandong Energy)
- Surat Gas Project, Supplementary Report to the EIS, Brisbane/Surat Basin QLD (Arrow Energy)
- Arrow LNG Plant, Supplementary Report to the EIS, Brisbane/Gladstone QLD (Arrow Energy)
- Moranbah Gas Project, Threatened Species Management Plan, Brisbane QLD (Arrow Energy)
- Arrow LNG Plant, Preparation of EIS, Brisbane/Gladstone QLD (Arrow Energy)
- Pagham Harbour Coastal Defence Scheme, Preparation of EIS, Pagham UK (Environment Agency)
- QE2 Teesport Berth Development, Preparation of EIS, Teesport UK (PD Teesport)
- Round 3 Offshore Windfarms, Review of Ecological Constraints, Edinburgh UK (Airtricity)
- Onshore Windfarm bird survey methodology design, Edinburgh UK (Enertrag)
- Dover Harbour Terminal 2 Development, Preparation of EIS, Dover UK (Dover Harbour Board)
- Dudgeon Offshore Windfarm, Preparation of EIS, Edinburgh UK (Dudgeon Offshore Wind)
- Elgin Flood Alleviation Scheme, Ecological Surveys, Elgin UK (Moray Council)
- Seaham Harbour Redevelopment, Preparation of EIS, Seaham UK (Durham Council)
- Titchwell Managed Realignment, Preparation of EIS, Norfolk UK (Royal Society for the Protection of Birds)
- Forres (River Findhorn) Flood Alleviation Scheme, Ecological Surveys and Preparation of EIS, Elgin UK (Moray Council)
- Helix Project Phase II, Ecological Surveys, Grangemouth UK (British Waterways)
- Forres (River Findhorn) Flood Alleviation Scheme, Ecological Surveys, Elgin UK (Moray Council)
- Proposed Firth of Forth Windfarm, Review of Constraints, Edinburgh UK (Airtricity)
- Seahouses seawall upgrade, Ecological Surveys, Seahouses UK (Northumbria Council)
- Thames Estuary Maintenance Dredging, Review of Ecological Data, London UK (Port of London Authority)
- BERR Offshore Energy Strategic Assessment, Review of Survey Method, Edinburgh UK (BERR)
- Bo'ness Harbour Development, Wintering Bird Management Plan, Bo'ness UK (ING Estate)
- Brent Decommissioning, Sensitivity Assessment and Environmental Risk, Edinburgh UK (Shell)
- Canvey Biodiesel Plant, Preparation of EIS Addendum, Canvey UK (Sure Green Fuels)
- Barrow Waterfront Harbour Revision Order, Preparation of EIS, Barrow UK (West Lakes Renaissance)
- Trow Quarry Remediation Project, Ecological Surveys and Preparation of EIS, Trow UK (South Tyneside Council)
- Isle of Grain Windfarm, Review of Ecological Data, Isle of Grain UK (British Petroleum)
- Newhaven Desalination Plant, Preparation of EIS, Newhaven UK (Clarity Ltd)
- Strangford Lough Marine Current Turbine, Preparation of EIS, Strangford UK (SeaGen Ltd)
- Thanet Offshore Windfarm, Preparation of EIS Addendum, Thanet UK (Warwick Energy)
- River Carron Forth Gateway Project, Ecological Surveys, Grangemouth UK (British Waterways)

Appendix B

Weed species list

Table B.1 Weed species recorded at monitoring sites

Scientific name	Common name	Biosecurity Act 2014 category	WONS
Acacia farnesiana	Mimosa Bush	x	x
Cenchrus ciliaris	Buffel Grass	-	×
Chloris guyana	Rhodes Grass	-	×
Chloris inflata	Purple Top Grass	-	x
Cryptostegia grandiflora and *Cryptostegia madagascriesis*	Rubber Vine	3	✓
Harrisia martinii	Harrisia Cactus	3	×
Lantana camara	Lantana	3	✓
Macroptilium lathyroides	Phasey Bean	-	x
Megathyrsus maximus	Guinea Grass	-	×
Melinis repens	Red Natal Grass	-	×
Opuntia tomentosa	Velvety Tree Pear	3	x
Parthenium hysterophorus	Parthenium	3	✓
Solanum seaforthanum	Brazilian Nightshade	-	x
Senecio madagascariensis	Fireweed	3	x
Xanthium occidentale, syn., X. pungens and *X. strumarium*)	Noogoora Burr	-	x

Appendix C

Feral Animal Species List

Table C.1 Feral animal species recorded at monitoring sites

Scientific name	Common name	Nocturnal
Canis familiaris	Wild Dog	
Felis catus	Feral Cat	x
Lepus europaeus	Eurasian Hare	
Oryctolagus cuniculus	European Rabbit	
Rhinella marina	Cane Toad	x
Sus scrofa	Feral Pig	