

Mount Gibson Gold Project Targeted Investigations into Significant Fauna



Eucalypt woodland in the north of the study area (M. Bamford; September 2024)

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Executive Summary

In September 2024, targeted fauna investigations were conducted at the Mount Gibson Gold Project (MGGP) in Western Australia, focusing on Matters of National Environmental Significance (MNES) species: the Malleefowl (*Leipoa ocellata*), Southern Whiteface (*Aphelocephala leucopsis*) and Chuditch (*Dasyurus geoffroii*). Commissioned by Tetris Environmental Pty Ltd on behalf of Crimson Metals Pty Ltd, these studies aim to address the Department of Climate Change, Energy, Environment and Water (DCCEEW) guidelines and inform the environmental impact assessment for the proposed mine expansion.

Key Findings

Malleefowl

The 2024 surveys identified 169 mounds, with 16 classified as active, indicating at least 16 breeding pairs within the survey area. Two active mounds were located within the disturbance footprint. The estimated density of Malleefowl was 0.09 pairs/km², aligning with regional data. The birds in the disturbance footprint are part of an important population. Breeding activity was predominantly observed in Acacia and Allocasuarina shrublands (Vegetation Substrate Associations (VSAs) 1 and 2), which offer optimal nesting conditions. Within the disturbance footprint, these VSAs encompass approximately 562.3 hectares of breeding habitat; much of the remaining disturbance footprint (1,174 hectares) is foraging habitat. The proposed mine expansion is projected to result in the displacement of two breeding pairs and about 562.3 hectares of breeding habitat. Potential impact of greatest concern is increased mortality from roadkill; this can be minimised through education/awareness training and speed limits.

Southern Whiteface

Six records of the Southern Whiteface were documented in 2024, with one group observed just inside the development envelope. This species exhibits a patchy distribution, primarily associated with open Acacia shrublands interspersed with Eucalypt woodlands. Suitable core habitat within the development envelope is limited but more extensive in the broader region, particularly to the north. The local population does not meet DCCEEW criteria for an important population. Given the limited habitat within the disturbance footprint, the mine expansion's impact on this species is expected to be negligible.

Chuditch

No sightings of Chuditch were recorded during the 2024 investigations. However, the area is considered a potential dispersal corridor for the translocated population established by the Australian Wildlife Conservancy in the broader region. This can be considered an important population as the translocated Chuditch are the only Chuditch in the broader region. The development envelope provides suitable denning, foraging and dispersal habitat. Impacts are anticipated to be minimal, with no significant alterations to regional dispersal pathways.

Mitigation and Monitoring

To minimize potential impacts, the following measures are recommended:

Malleefowl

- Clearing of breeding habitat should occur outside breeding season where possible; if not possible conduct pre-clearing surveys to avoid active Malleefowl mounds,
- Implement feral predator management programs,
- Monitor mound activity annually in collaboration with the National Malleefowl Monitoring Program. This to focus on ongoing assessment of Malleefowl mound activity and detecting changes in breeding pairs within the development envelope throughout the project's duration.
- Check for active mound close to roads and implement speed limits where birds are at high risk.
- Reduce speed limits during breeding season, increase signage and awareness.

Chuditch

- Collaborate with regional conservation programs to support population recovery (such as feral predator management programs).

Southern Whiteface

- No mitigation or management actions are recommended.

Conclusion

The targeted investigations confirm the presence of significant MNES species within the MGGP disturbance envelope and provide a robust framework for assessing and mitigating potential impacts associated with the proposed mine expansion. With the implementation of the recommended mitigation and monitoring measures, the project is expected to align with environmental protection standards and DCCEE guidelines.

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1 Introduction

Crimson Metals Pty Ltd (a subsidiary of Capricorn Metals Ltd) is proposing to recommence mining at the Mount Gibson Gold Project (MGGP), located in the midwest region of Western Australia. For the purpose of environmental impact assessment and approval, Crimson Metals has undertaken a number of investigations into the fauna of the MGGP area. To support these previous studies and to respond to comments provided by the federal Department of Climate Change, Energy, Environment and Water (DCCEEW), Bamford Consulting Ecologists (BCE) was commissioned by Tetris Environmental Pty Ltd (Tetris), on behalf of Crimson Metals, to conduct targeted fauna investigations in the Project area. The focus of these investigations was species of conservation significance, and in particular the Malleefowl and Southern Whiteface. This report provides the results of those surveys in context to the proposed development.

1.1 Description of survey area

The MGGP is located within the Merredin subregion of the Avon Wheatbelt bioregion, as defined by the Interim Biogeographic Regionalisation for Australia (IBRA). The project lies on unallocated crown land adjacent to the privately owned ex pastoral station – Mt Gibson Private Nature Reserve. The MGGP is approximately 50 km north-east of Wubin and 70 km south-west of Paynes Find (the ‘survey area’, see Figure 1).

1.2 Previous Mt Gibson Surveys

Recent fauna studies conducted in the project area (Biota 2022, 2023) have included Basic (level 1), Targeted and Detailed (level 2) fauna investigations (Bancroft and Bamford 2024). As a result of these investigations, five vertebrate species of conservation significance under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act – therefore Matters of National Environmental Significance; MNES) were considered potentially present in the project area, with the status of these, and conclusions regarding their presence in the project area, summarised by Bancroft and Bamford (2024). Of these five species, three species were considered likely to be present in the project area: Malleefowl *Leipoa ocellata*, Southern Whiteface *Aphelocephala leucopsis* and Chuditch *Dasyurus geoffroii*. All are listed as Vulnerable under the EPBC Act. In the Bancroft and Bamford (2024) survey, Malleefowl was found to be abundant, the Southern Whiteface was detected only outside the survey area, and the Chuditch was not recorded but occurs in the broader region as a result of the release of animals on Mt Gibson ex pastoral station by the Australian Wildlife Conservancy. The survey concluded that the remaining two MNES species, the Gilled Slender-bluetongue and the Western Spiny-tailed Skink, were almost certainly absent.

1.3 Key findings from Bancroft and Bamford (2024)

The 2023 survey recorded 90 vertebrate species within the Mount Gibson Gold Project area. This included 59 bird species, 24 reptile species and 7 mammal species, with no fish or frog species detected during the survey.

Malleefowl was a key conservation focus, with 47 potential nest mounds identified within the project area during an earlier survey using Lidar (Biota 2022, 2023), and many of these subsequently revisited. Of these, 28 were located within the mine development envelope. Only one mound was found to be

active, but several were classified as recently active, suggesting use within the past five years. Malleefowl presence was indicated by tracks and other signs, particularly in Acacia and Allocasuarina shrublands, which provided suitable nesting habitat.

Southern Whiteface was not observed within the survey area. However, a small flock was seen approximately 8 km northwest of the boundary, indicating potential connectivity beyond the immediate area. The survey area offered some foraging and shelter habitats, though it lacked the dense, low shrubs typical of core breeding habitat for the species. Chuditch was also assessed and while no sightings of Chuditch occurred, the area could serve as a dispersal corridor for this species that has been reintroduced nearby by the Australian Wildlife Conservancy (AWC).

The survey area recorded Eight major vegetation and substrate associations (VSAs) in relation to fauna in the survey area:

- VSA 1. Acacia Shrubland.
- VSA 2. Allocasuarina Shrubland.
- VSA 3. Callitris Woodland.
- VSA 4. Eucalypt Woodland.
- VSA 5. Mallee Woodland.
- VSA 6. Mixed Shrubland.
- VSA 7. Rehabilitation.
- VSA 8. Cleared.

The distribution of these VSAs is given in Figure 2.

1.4 DCCEEW guidance

In response to previous studies conducted for the MGGP, DCCEEW prepared guidelines for the preparation of a Public Environment Report for the project. This has specific requests for information concerning vertebrate MNES of concern: the Malleefowl, Southern Whiteface and Chuditch (Table 1). In addition to the request for information on populations and habitat, the PER guidance requests information on impact assessment as outlined in Table 2. Table 3 summarises the key elements of Table 1 and Table 2.

The guidance concludes by requesting discussion around key threatening processes with respect to each MNES species. These are drawn from the DCCEEW SPRAT database and species recovery plans for each species. These are:

- Population decline due to habitat clearing and degradation
- Population decline due to habitat fragmentation
- Mortality during operation (construction and life of mine)
- Fire regime
- Noise and vibration
- Lighting
- Dust
- Invasive species including feral predators
- Changes to surface and groundwater conditions

Note that DCCEEW provides no guidance on how to measure the significance of impacts from these threatening processes, but BCE has developed its own guidelines which are presented in Table 4.

Table 1. Information on populations and habitat requested by DCCEEW (PER Guidelines)

Malleefowl
Establish whether this population is an important population of Malleefowl, with reference to data and relevant information sources. This must include discussion of:
Whether the population is important for the species' long-term survival and recovery
Whether they are key source populations either for breeding or dispersal
Whether they are necessary for maintaining genetic diversity
Whether it is a population that is near the limit of the species' range.
Using information available, estimate the size and range of this population.
Southern Whiteface
Provide a map of suitable habitat for breeding, foraging and dispersal. The Southern Whiteface occurs in the surrounding area in Callitris woodland and acacia/melaleuca shrubland sites. Justify the level of suitability of the different Vegetation Substrate Associations on site and assess the potential for occurrence in each
Chuditch
Map the potential breeding, foraging and dispersal habitat for Chuditch

Table 2. Information for impact assessment requested by DCCEEW (PER Guidelines)

Malleefowl
a) Taking into account the potential impacts of the proposed action, assess the impacts of the action on:
- The size of the important population
- The area of occupancy
b) Provide a map to demonstrate the amount of habitat that will be impacted indirectly from the proposed action, including habitat affected by noise and vibration, if applicable.
c) Provide a conservative estimate of the number of mounds (of any activity status) that are within range to be affected by noise and vibration associated with the proposed action. Provide a map that identifies the range of impact and affected mounds.
d) Assess the impacts on east west dispersal of Malleefowl.
Provide an assessment of how the ecological functions of the Malleefowl population (breeding, foraging and dispersal) will be affected over the life of the mine
Southern Whiteface
a) Assess the impacts of the action on Southern whiteface foraging, breeding and dispersal
Chuditch
a) Specify and map the amount of suitable habitat in the DF and its quality for Chuditch, and the presence of suitable habitat features.
Given records near the site, translocated Chuditch are likely to use the site. Conduct an impact assessment on the translocated population of Chuditch.

Table 3. Summary of information request from DCCEEW for each MNES

DCCEEW Comment
Assessment of the quality and importance of known or potential habitat for each MNES within the proposed action area and surrounding areas, including whether the habitat is critical habitat or supporting habitat, and whether it hosts an important population.
Consider the regional context, describing the connectivity of habitat in the broader landscape for each MNES
Highlight critical and supporting habitat types for each MNES.
The total amount of each type of habitat (e.g., breeding, foraging, dispersal, important habitat, roosting, etc.) (in hectares) in the proposal area for each MNES.
Map of suitable habitat for breeding, foraging and dispersal for each MNES
Estimated size of Malleefowl area of occupancy.
Assess the impacts on east west dispersal of Malleefowl.
Assessment of how the ecological functions of each MNES population (breeding, foraging and dispersal) will be affected over the life of the mine.

Table 4. Assessment criteria for impacts upon fauna.

Impact Category	Observed Impact
Negligible	Effectively no population decline; at most few individuals impacted and any decline in population size within the normal range of annual variability.
Minor	Population decline temporary (recovery after end of project such as through rehabilitation) or permanent, but < 1% within 15 km radius of centre-point of impact area (or within bioregion if this is smaller). No change in viability or conservation status of taxon.
Moderate	Permanent population decline 1-10% within 15 km radius. No change in viability or conservation status of taxon.
Major	Permanent population decline 10-50% within 15 km radius. No change in viability or conservation status of taxon.
Critical	Taxon decline > 50% (including local extinction) within 15 km and/or change in viability or conservation status of taxon.

The information requested by DCCEEW is intended to inform the risk that the proposal poses to populations of MNES in the area. Based on the DCCEEW requests outlined above (Tables 1 to 3), the requested information is further summarised below. These summary points were used to guide field investigations and the presentation of information.

- Distribution and abundance of each species within the project area. This is related to their preferred habitat, which can often be linked to vegetation type or grouping of vegetation types (Vegetation and Substrate Associations). Habitat therefore needs to be described. Although the DCCEEW guidelines suggests that different functional habitat types should be identified (e.g. foraging, roosting, breeding, dispersal), for the MNEs being considered this is not necessarily possible. For example, Malleefowl nest, forage and roost in the same area, and probably forage somewhat more widely in habitat not suited for nesting. In this case, core (breeding) habitat can be identified, but all other areas of native vegetation are supporting habitat.
- Extent of suitable habitat. This provides an indication of how widespread the species might be. There are practical limits to survey effort, but if the habitat is understood, a surrogate for regional distribution can be Land Systems and/or Pre-European Vegetation.
- The function of the project area for each species. 'Function' can include breeding, foraging, shelter and dispersal, but such functions can often not be interpreted at the level of vegetation or landscape type. Function can be at a small scale (such as logs that provide denning habitat for Chuditch). Landscape connectivity might be important where a species relies on linear features or where extensive habitat loss has reduced landscape permeability, making species sensitive to further habitat fragmentation. In the case of the Chuditch, DCCEEW expressed concern with how the proposed development might interact with dispersal of translocated Chuditch.
- Conclusions regarding the importance of the population within the project area. This depends upon the abundance of the species within the project area and the context, such as the nature of the surrounding environment and the availability of other records. For example, is there very extensive habitat of a similar (or better) value for the species, with confirmation that these areas are occupied (or confidence they are likely to be occupied), or is the population within the project area substantially restricted to that area. There is no simple way to define the importance of a population in a project area, but there are guidelines on what constitutes a significant site (e.g. Ramsar defines an important site for waterbirds as one that supports 1% of the total population of a taxon (species, sub-species or distinctive regional population), and what constitutes a significant impact (Significant Impact Guidelines 1.2; DotE 2013).

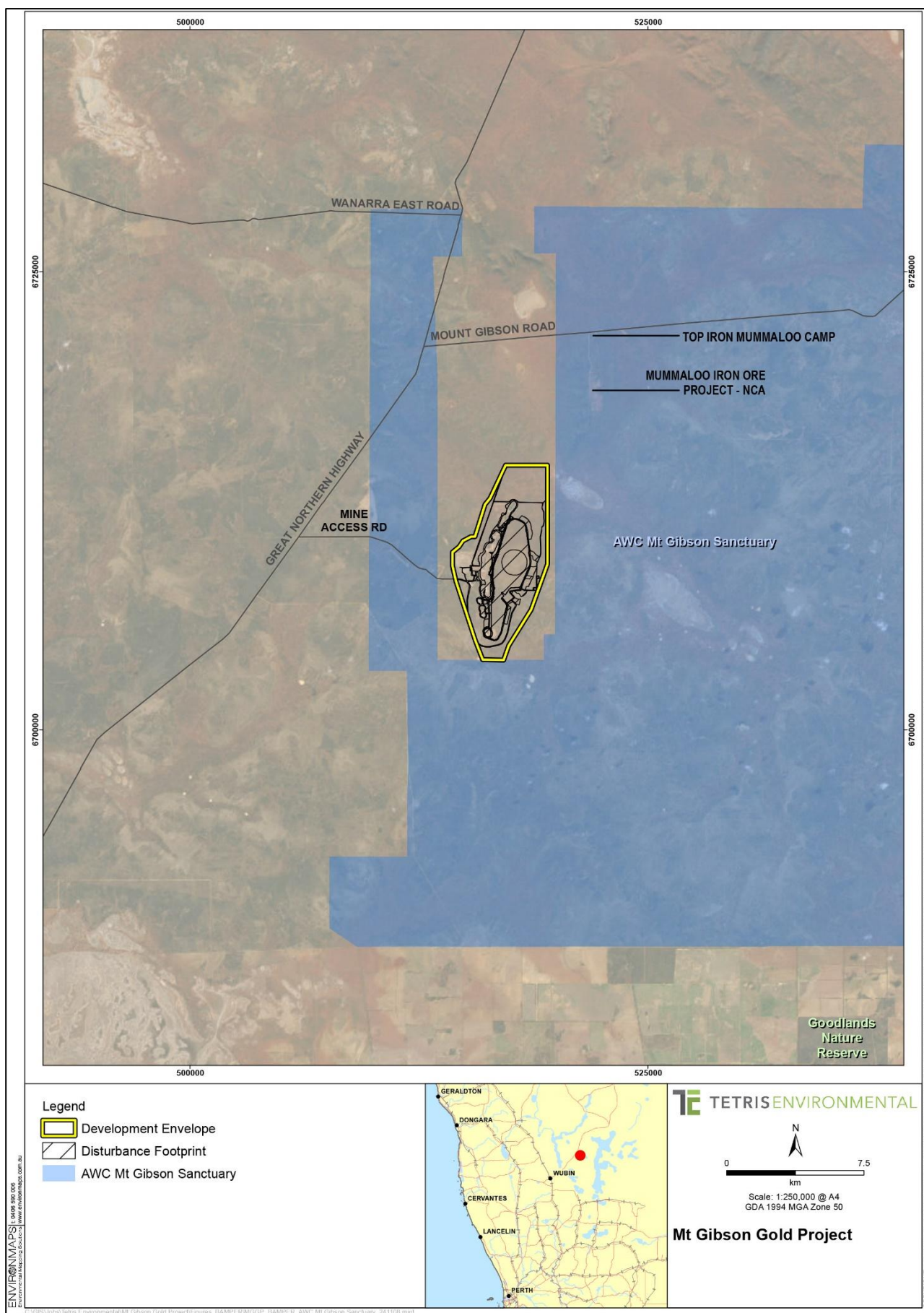


Figure 1. Location of the MGGP area

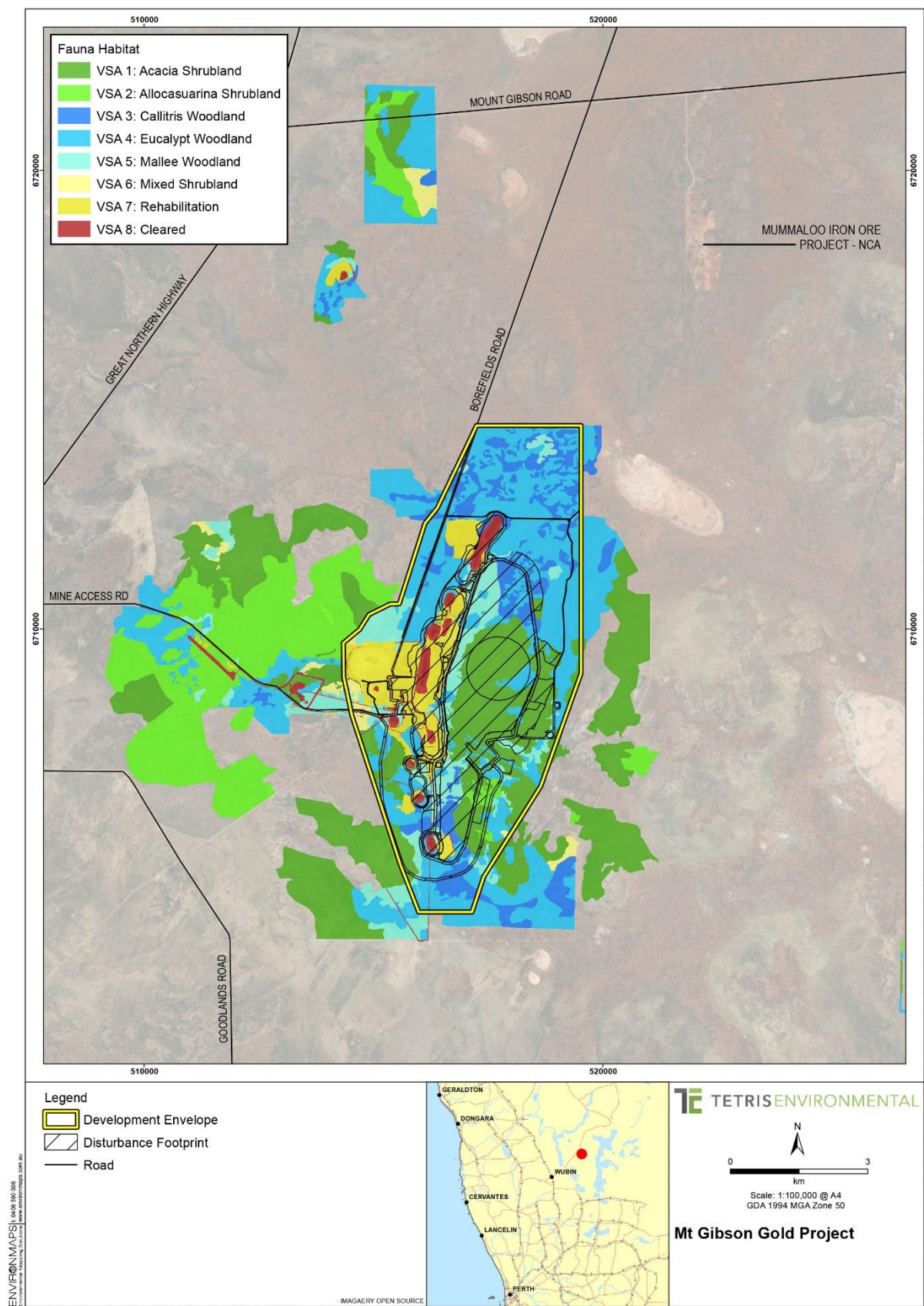


Figure 2. Distribution of Vegetation and Substrate Associations (VSAs) in the Development Envelope and surrounds.

3 Methods

3.1 Overview

3.1.1 *Spatial terminology*

A range of terms are used through the report to refer to the spatial environment around the proposed project, and these are defined below:

- Survey area – the outermost boundary of where investigations were undertaken. This includes the Development Envelope and surrounding areas where investigations were carried out. The survey area therefore extends beyond the following defined areas.
- Development Envelope – the area within which development is proposed.
- Disturbance Footprint – the expected extent of land clearing and/or development. This lies within the Development Envelope.

3.2 Desktop assessment

A desktop assessment of the fauna assemblage was carried out as part of the original investigations (Bancroft and Bamford 2024). For the purpose of the current report, where investigations were focussed on three MNES species, Birddata and the Atlas of Living Australia were sourced for records of the Malleefowl and Southern Whiteface within about 100km of the Development Envelope. The Chuditch is extinct in the region and natural wild populations survive only in the extreme south-west of Western Australia, but records from the AWC were checked to confirm locations of recent records of translocated animals.

3.3 Field investigations

3.3.1 *Dates*

The field investigations were undertaken between the 16th of September and the 21st of September 2024.

3.3.2 Personnel

Personnel involved in the field investigations and report preparation are listed in Table 5.

Table 5. Personnel involved in the field investigations and report preparation.

Personnel	Consulting Experience	Field Investigations	Report Preparation
Dr Mike Bamford <i>BSc (Biology), Hons (Biology), PhD (Biology)</i>	43 years	+	+
Mr Peter Smith <i>Dip Ag Sc</i>	40 years	+	
Dr Jamie Wadey <i>BSc (Zoology & Ecology), Hons (Ecology), PhD (Movement Ecology)</i>	10 years	+	+
Mr Nathan Ducker <i>BEd</i>	3 years	+	
Mr James Hesford <i>BSc (Env. Science/Biology) – Tetris Environmental</i>	25 years	+	

3.3.3 Permits

Field investigations carried out by Bancroft and Bamford (2024) were conducted under Department of Primary Industries and Regional Development's Wildlife Animal Ethics Committee (WAEC) Permit number WAEC 23-11-26, and under the Department of Biodiversity, Conservation and Attractions' Fauna taking (scientific or other purposes) Regulation 27 licence number BA27000966. While these permits were current for the 2024 investigations, no fauna trapping took place, and Malleefowl mounds were viewed from a distance (through binoculars when on foot) to avoid direct impact on mounds and to minimise the possibility of any disturbance of birds.

3.3.4 Malleefowl survey methods

Previous surveys at the site (Biota 2022, 2023) have identified (using lidar and high resolution aerial imagery) the locations of likely Malleefowl mounds in the area (see Figure 3 for the lidar survey area), some of which have been subsequently verified or assessed on foot for Malleefowl activity. In addition, other mounds have been recorded opportunistically by staff or contractors as they have been working on site. In 2024, known nest mounds within the survey area (the co-ordinates of which are provided in Appendix 1) were re-visited and re-examined (for signs of activity) and scored for mound profile, age and breeding activity. Surveyors also looked for direct (e.g. sighting, calls) or secondary evidence (feathers, tracks, droppings) of Malleefowl presence. Mounds were visited either on foot or were inspected by drone. The drone inspections proved very effective and allowed quick access to mounds without the need to push through hundreds of metres of dense vegetation. The majority of mounds inspected by drone were clearly visible, and photographs taken at height could later be examined closely to assess mound condition.

NHT (2007) provides a system for evaluating Malleefowl mounds based upon mound profile (i.e. the shape of the mound in cross-section – viewed from the side). This system is focussed on describing the type of breeding activity taking place at a mound, with five profile descriptions for the different

stages of breeding activity, and one profile description for a mound that is not being used by a bird. Recognising that many mounds can be inactive, and may have been inactive for years, decades or possibly even centuries, BCE developed a mound age system that estimates the time since last used and describes the appearance of mounds of different age classes. This mound age system allows for mounds of very different ages but the same profile to be distinguished. In many parts of Western Australia, mounds are constructed in gravelly soils and thus retain their profile for decades and persist in the landscape for centuries within use, whereas in sandy soils, possibly where the NHT profile system as developed, mounds rapidly weather away to nothing. The mound age system can be used with the NHT (2007) profile system to provide further information on a mound.

During preparation for the MGGP survey, however, it was realised that with an opportunity to check a very large number of mounds during a short space of time, within the breeding season, the existing profile and aging systems might not be sufficient. In particular, neither system makes a clear distinction between a mound that contains eggs that are actively being incubated, and a mound that has been worked in that season but not used for breeding. This is an important distinction as the number and distribution of mounds containing eggs being incubated provides a measure of the number of pairs of Malleefowl present (since males usually only manage a single mound for breeding (Marchant and Higgins 1990). As a result, BCE developed a third system which ranks mounds according to the breeding activity taking place. This ranking system was the principal method used when observing mounds, but mound profile and estimates of mound age were also noted, and mounds were also described and photographed. All three mound methodologies are described in detail below.

Mound Profile

The profile of a Malleefowl mound changes with breeding activity and age (erosion and vegetation growth). A number of profile stages are classified according to age (NHT 2007):

- Profile 1: Typical crater with raised rims. This is the typical shape of an inactive nest. However, this is also the profile of a mound being worked early in the breeding season.
- Profile 2: Nest fully dug out. The characteristic of this profile is that the crater slopes down steeply and at the base the sides drop vertically to form a box- like structure with side usually 20 to 30 cm deep. Often, litter will have been raked into windrows and may have started to enter the nest.
- Profile 3: Nest with litter. This is the next stage after profile 2. Litter will have been raked into the nest by Malleefowl, and thick layers of litter are evident on the surface. There may or may not be sand mixed with the litter at this stage.
- Profile 4: Nest mounded up (no crater). This is the typical profile of an active but unopened Malleefowl nest. The active mound is closed and dome shaped.
- Profile 5: Nest a crater with peak in centre. This is a typical profile of an active nest which is in the process of being closed by Malleefowl.
- Profile 6: Nest low and flat without peak or crater. This mound has not been used for some time and weathering and erosion have ‘flattened’ the original mound.

Mound Age (BCE)

- Active: Fresh scratching, Malleefowl scats, loose soil, mound may be dug out in preparation for the breeding season or mounded for breeding. A mound age of 'active' can be used with the profile description to determine the type of activity taking place.
- Recently used (1-5 years): Mound contains signs of recent activity (e.g., eggshell fragments) and mound may still contain large amounts of leaf litter if not excavated. Soil surface compacted, mound structure intact with well-defined central depression. No vegetation colonising mound.
- Moderately old (5-20 years): No recent activity, mound compacted. Surface of mound showing some weathering and some minor plant colonisation possibly present. Mound profile raised; central depression defined.
- Old (20-100 years): Mound moderately to very weathered, often with a veneer of gravel on the slopes because of removal of fine materials from the surface. Extensive plant colonisation. Mound profile raised; no or minimal central depression.
- Very old (100+ years): Mound very weathered, with a low profile. Bushes and even small trees growing on mound. No central depression.

Mound breeding activity status and rank

The following classification system is intended to identify the level of breeding activity of mounds in the current breeding season. Using this system, it is only possible to determine if a mound was used in a particular breeding season, and only if the mound was examined after about August in that season, and before the onset of the rains of the following breeding season (about May/June). In years of low rainfall, there may be no or very few rank 1 mounds, but this is a reflection of breeding activity being low rather than a decline in population. The system is based upon a detailed examination and interpretation of mound characteristics as outlined below.

Rank 1.

Mound used for breeding in the current breeding season. Contains, or highly likely to contain or have contained, eggs. Determined by mound structure; profile 4 (fully mounded) and profile 5 (crater with peak in centre). During the breeding season (August to December or even into late summer), should have signs of being worked (i.e. fresh scratchings and diggings, fresh droppings). If inspected during the breeding season and there are no signs of being worked, then it is abandoned (rank 2). If examined very late in or shortly after the breeding season (before the next winter's rains) and with no signs of being recently worked, a profile 4 mound will usually be considered rank 1 unless there are obvious signs that it has not been worked for many months (such as the mound surface being crusted or eroded by rainfall). This is a difficult judgement and best to assume breeding occurred in such a mound (better still; not to assess mounds at this time of year). A profile 5 mound after about September is very unlikely to be used for breeding.



Plate 1. Rank 1. (A) Malleefowl mound (crater with peak in centre; profile 5) highly likely to be used for breeding this year as noted by recent signs of activity (fresh scratchings and scats. (B) Malleefowl mound (fully mounded; profile 4) which contained fresh activity signs to indicate this mound was formed this breeding season, is being worked on a daily basis and is highly likely to contain eggs.

Rank 2. Mound with signs of major activity in the current breeding season, but not used for breeding.

This includes mounds that have been excavated (profile 2), mounds that have had leaf-litter brought in (thus fresh litter (profile 3), litter trails, scratched ground around mound), and mounds that have been built up to profile 4 or 5 but are judged not to have been used for breeding. Rank 2 mounds are therefore mounds that have been worked in the current season, but this has not progressed to breeding. Rank 2 mounds (as judged early in the breeding season) could progress to rank 1, but a rank 2 observed after about July is very unlikely to progress.



Plate 2. Rank 2. Malleefowl mound with fresh scratchings, leaf litter brought in this year but has not progressed to being built up with soil.

Rank 3. Mound with no signs of activity in the current breeding season, but with evidence of breeding activity in the previous few years.

Such evidence can include eggshell fragments and plant material that form an integral part of the mound (i.e. not just leaf-fall but litter that has been incorporated into the mound structure). The persistence of eggshell fragments and leaf-litter is affected by subsequent activity at the mound (see notes below). Information on mound history can only be obtained early in the breeding season, or from mounds that are not being worked in the current breeding season. Rank 3 mounds will be profile 1 (rim and crater) or profile 3 (crater containing litter, but the litter is not fresh and was put in place several years before).



Plate 3. Rank 3. Malleefowl mound with no signs of activity in the current breeding season, however, with evidence of breeding activity in the previous few years. Lack of signs are diggings, scratchings and plants starting to grow on the sides of the mound.

Rank 4. Mound with no sign of current or recent activity.

The mound has no digging, litter or eggshell fragments. Most likely profile 1 (mound with crater) but with the rim and crater gradually merging. The surface of the slopes, rim and crater likely to be crusted and will support annuals or even young perennials. Excavations from other fauna, such as goannas and echidnas, may be present, but evidence of activity by Malleefowl unlikely. Random scratching by Malleefowl possible. Probably not used for breeding for decades, but assigning a 'years since last use' is difficult as this can depend on weather conditions and events.



Plate 4. Rank 4. Malleefowl mound with no sign of current or recent activity.

Rank 5. Mound with no signs of activity or use and heavily weathered.

Most likely profile 6 (little or no crater). The surface of the mound will be crusted, may even have lichen and other cryptogams present. Annuals likely and perennials, even small trees may be present. Excavations by other fauna and even scratching by Malleefowl possible.



Plate 5. Rank 5. Mound with no signs of activity or use and heavily weathered.

Additional information to be collected when assigning mound rank.

- **Eggshell presence.** This says nothing about current breeding activity as eggshells from the current season will not be exposed until the mound has been excavated in preparation for the next breeding season. Eggshells indicate past breeding attempts as fragments will be exposed on the rim of the mound when the crater is excavated. Eggshells probably only persist for one or two years so indicate recent breeding. Lack of eggshells may indicate the mound has not been used for breeding for several years. Eggshells are most conspicuous when a mound has been dug out (so early in the breeding season) and may be hard to find when a mound has reached profile 4. Presence of eggshell is therefore a useful indicator of mound history early in the breeding season but may not be useful if the mound is used again and has reached rank 1 or 2.
- **Leaf-litter in an excavated mound.** This indicates that a mound has been used in previous years and this litter probably persists for several years. The persistence of litter will depend on activity at the mound, as old litter will be lost if a mound is excavated and used again but may remain if a mound is not used after a breeding event. We have found an excavated mound in June in which the litter from the previous year was mouldy and contained beetle larvae; it appeared that the mound had been dug out by the birds to feed on the larvae and not necessarily for the mound to be used for breeding.
- **Age of mound.** The term 'age' is potentially ambiguous. When assigning a rank, the rank gives a relative age to the mound in terms of how long since it was last used. Mound age, however, can also refer to how long a mound has been present in the landscape and not how long since it was last used. This is important as in gravelly and rocky landscapes, mounds persist for centuries and if they are used regularly, the amount of gravel/rock builds up so that the mound becomes a massive structure due to the accumulation of this hard material with every breeding attempt. The mound may be >10m across even when the active breeding mound occupies only a much smaller area (an active mound is typically 3-4m across). In sandy landscapes, mounds may only persist for a few years if they are not used again. Mound age, in this sense, is important where breeding may be disrupted by development and males may be displaced, as such males may create new mounds that do not have any accumulation of gravel and rock.

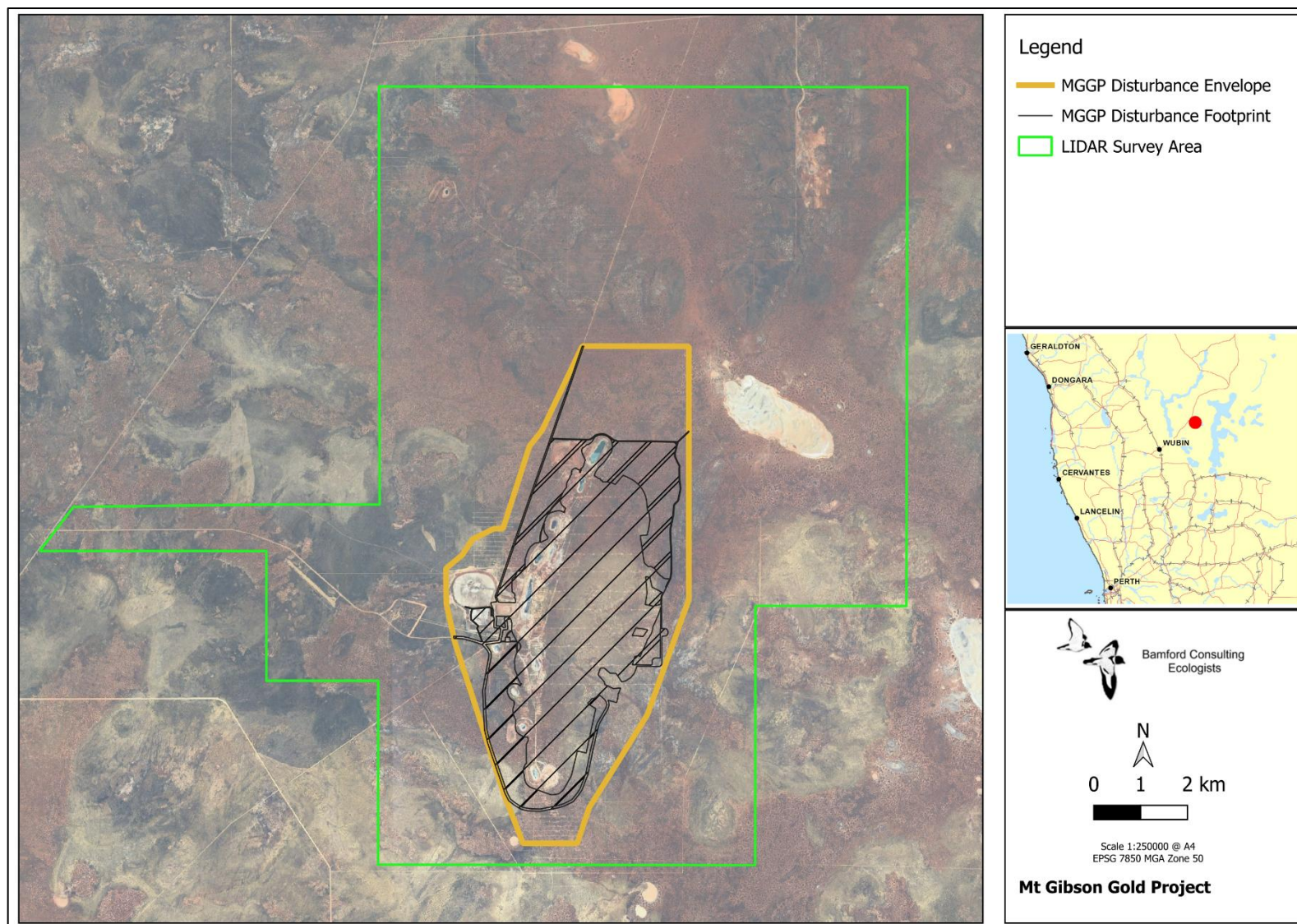


Figure 3. Lidar survey area.

3.3.5 *Southern Whiteface survey methods*

From previous experience with the southern Whiteface, it has been observed to have a very patchy distribution which can lead to great inconsistencies in recording rates depending on site selection and sampling approach. To allow for this, the approach taken by BCE was to traverse transects that avoided sampling specific and pre-determined habitat types, and covered as much area as possible without making assumptions on where the species might occur. Several different approaches to transects were taken. Personnel kept watch for the species at all times when driving around the project area, as even small birds can be detected by experienced ornithologists from a moving vehicle, and travel between sites was often slow (<20 kph). Observations on birds were also made when walking to and from Malleefowl mounds, while Whiteface-specific transects were walked to cover large areas quickly. These show as rough rectangular polygons on Figure 4. Fifty-one kilometres of Southern Whiteface transects were undertaken throughout the 2024 field investigations, of which an estimated 20km were walked. Figure 4 also illustrates Southern Whiteface walked transects in 2023; about eight kilometres of transects were walked in that year, most within the Disturbance Footprint.

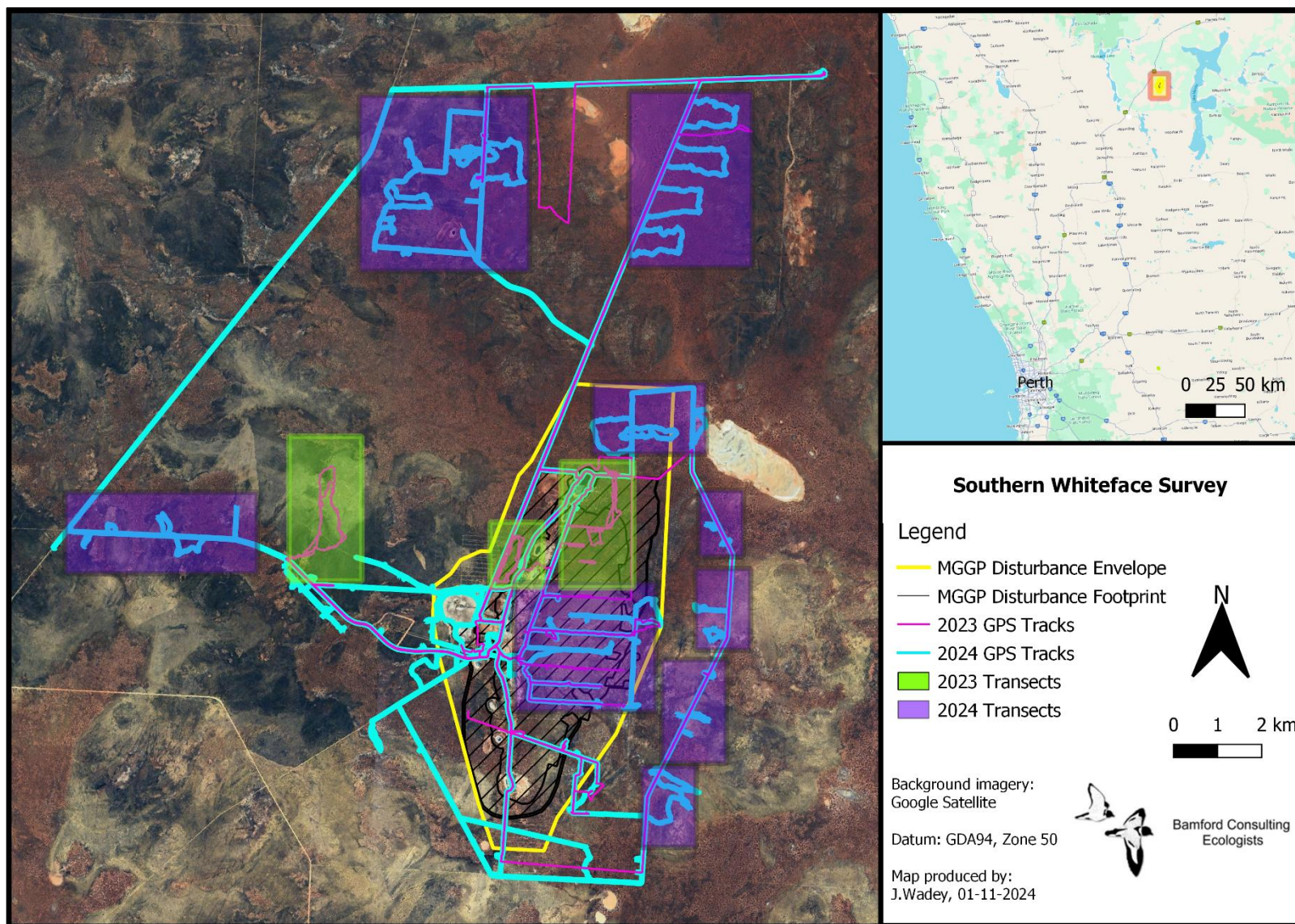


Figure 4. GPS tracks from field investigations, indicating Southern Whiteface transects within the shaded polygons.

3.3.6 *Motion-sensitive camera trapping*

Eleven motion-sensitive cameras were deployed across the survey area, (Figure 5, dates and location details in Appendix 2). The cameras were set progressively over the period 17-20 September and were all collected on 14-15 November, giving a total camera-night effort of 627 days. The footage is currently being analysed.

Cameras were placed mostly outside the survey area where cameras had been deployed in 2023 by Bancroft and Bamford (2024). Cameras were intended to target introduced mammal species (especially red fox and cat), but had the potential to detect other fauna, including Chuditch, and were deployed in 'high traffic' areas such as along or close to dirt tracks where such species are likely to move regularly.

Cameras were generally positioned on a southerly-facing angled branch or trunk (to avoid direct sun exposure into the camera lens), facing the ground and, where appropriate, directed towards notable landscape features such as fallen logs, rock piles or edges of thickets of dense vegetation. A non-reward lure was placed at each camera location to attract animals. These comprised a tethered PVC bait tube containing universal bait (a mixture of sardines, rolled oats, peanut paste and tuna oil). Bait tubes were positioned in the view of the camera and attached to a solid object.

Camera results were recorded as events to give a measure of the abundance of each species at each camera. An event is one or more images of an animal judged to be taken as part of one visit to the camera. For example, there might be 10 photographs of a single Malleefowl taken over a period of five minutes. A separate event (i.e. visit) is considered to occur if a period of more than approximately five minutes elapses before the next photograph is taken. The number of events thus gives a measure of activity at a camera site.

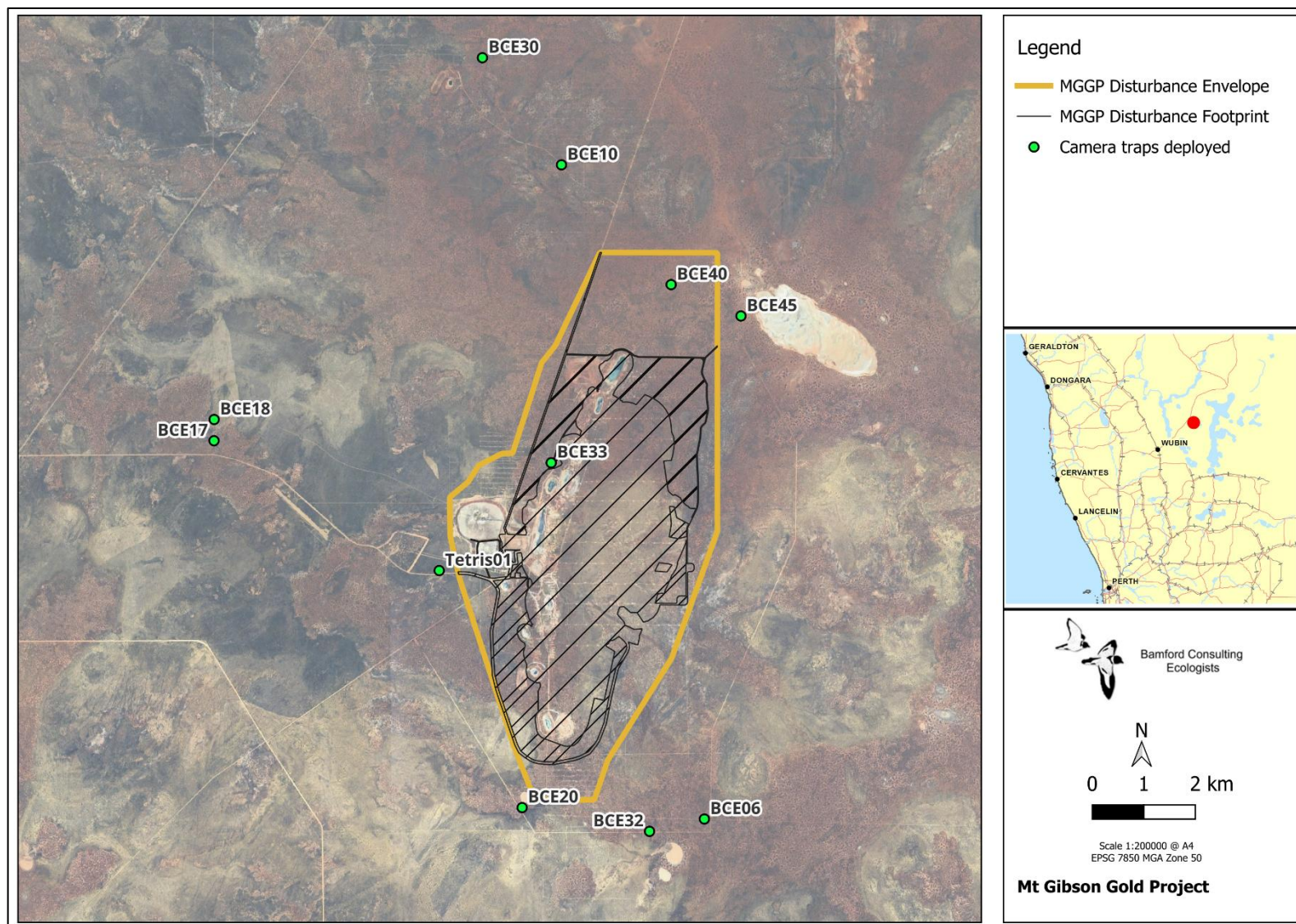


Figure 5. Motion-sensitive camera locations.

3.3.7 Survey limitations

The EPA's technical guidance for terrestrial fauna surveys (EPA 2020) outlines a number of limitations that may arise during field investigations for Environmental Impact Assessment (EIA). These survey limitations are discussed in the context of the BCE investigation of the survey area in Table 6.

Table 6. Survey limitations as outlined by EPA (2020).

EPA Survey Limitations	BCE Comment
Availability of data and information.	Sufficient information from databases and previous studies (see Biota 2022). Not a limitation.
Competency/experience of the survey team, including experience in the bioregion surveyed.	Field and reporting personnel have extensive experience in the region and with fauna investigations for impact assessment (see Table 5). Not a limitation.
Scope of the survey, e.g. were faunal groups excluded from the survey.	The investigations here focused on terrestrial vertebrate fauna and fauna values, including significant species. Scope was to target information on significant species and to provide an indicative assemblage. Not a limitation.
Timing, weather and season.	Daily maxima were moderate through the survey period and the region appears to have had above average rainfall for 2024. Timing is within known breeding season of Malleefowl. The results of the field investigations reflect this. Not a limitation.
Disturbance that may have affected results, e.g. Fire, flood.	None. Not a limitation.
The proportion of fauna identified, recorded or collected.	All targeted fauna observed (Malleefowl and Southern Whiteface) were identified. Not a limitation.
Adequacy of the survey intensity and proportion of survey achieved, e.g. The extent to which the area was surveyed.	The survey area was well-covered in the targeted investigations, with all suitable 'fauna habitats' (vegetation and substrate associations) sampled. Not a limitation.
Access problems.	There were no access problems encountered. Not a limitation.
Problems with data and analysis, including sampling biases.	There were no data problems. Not a limitation.

4 Results and Discussion

4.1 Outline

In the following sections on the Malleefowl and Southern Whiteface, results are presented and discussed to address the comments from DCCEEW (Table 1). Results and observations are presented under the headings: distribution and abundance; extent of suitable habitat; function of the area for the species; and importance of the population. These results and observations are then compared with the DCCEEW comments.

4.2 Malleefowl

4.2.1 Distribution and abundance

The original lidar and other surveys (Biota 2022, 2023) identified 306 possible Malleefowl mounds, with 212 potential mounds assessed in the September 2024 site visit. This include attempts to inspect 18 lidar mounds (by drone) but they could not be clearly seen due to overhanging vegetation. At least two of the mounds that were assessed were found opportunistically and had not been detected by Lidar. Most mounds (149) were visited on foot, while 45 mounds were successfully inspected by drone (and 18 not visible to drone). Observations on these mounds are given in Appendix 1 and a breakdown of mounds by rank is given in Table 7. The distribution of mounds that were inspected is given on Figure 6. All mounds identified by Lidar (32) or previously surveyed that lay within the Development Envelope were inspected.

Of the 194 mounds that were successfully visited (excluding the 18 that were not visible to drone), 25 (~13%) were found not to be Malleefowl mounds; these were mostly piles of earth pushed up alongside of tracks, and in some cases were mounds of earth around large trees. Therefore, detailed observations were made on 169 Malleefowl mounds. The majority (109) of these were rank 5 (very long-unused), but 16 mound were classed as rank 1, indicating they were active and likely to be used for breeding in 2024. This indicates at least 16 pairs of Malleefowl in the Development Envelope and surrounds, with two of these pairs in the disturbance footprint. The Lidar survey area was ~183 km², and therefore Malleefowl can be estimated to occur at a density of 0.09 pairs/km², but this density is highly variable Figure 6). Marchant and Higgins (1993) report breeding density (i.e. pairs or active mounds) in the range from 0.04 to 5.5/km², but commonly around 1/km².

The extent of Lidar mounds including those that have not been verified as Malleefowl mounds demonstrates that breeding by Malleefowl is widespread in the survey area but is not evenly distributed. Bancroft and Bamford (2024) noted that while Malleefowl may utilise all habitats within the survey area (for foraging, movement through the landscape, etc.), two VSAs appear to be strongly favoured for the construction of nest mounds: VSA 1 - *Acacia Shrubland* and VSA 2 - *Allocasuarina Shrubland* (Figure 7). VSA 2 seems to be particularly favoured with mounds at a high density through the western (airport) part of the survey area (Figure 6). In these VSAs, the vegetation is low (typically 2 to 4m), dense and produces a lot of leaf litter; and the soil is a loam to gravelly loam, tending towards sandy, with such soils being important for the function of the mound. Heavier soils, such as in VSA 3 (Callitris Woodland) and VSA 4 (Eucalypt Woodland) is not as suitable for mound function as the heavy soil can become waterlogged, while VSA 5 (Mallee Woodland) is generally too open. VSA 6 (Mixed Shrubland) may also be suitable for breeding but is very limited in extent.

Table 7. Results of inspection of Lidar mounds.

Numbers of mounds in each breeding rank are given; see section 3.3.4 for descriptions of these ranks. N.V.D = Not visible to drone. N.M = Not a mound (locations identified by Lidar that were not mounds).

Rank	Count
1	16
2	8
3	20
4	16
5	109
N.V.D	18
N.M	25
Total	212

4.2.2 *Extent of suitable habitat*

VSA's have been mapped only within the Development Envelope and surrounds (Figure 6), but the aggregation of mounds to the north-west of the Lidar survey area (Figure 6) was in an area where the VSA were only partly mapped, and had characteristics of both VSA 1 and VSA 2. There are ~873.4 ha of VSA 1 and VSA 2 habitat within the Development Envelope and over 3,340 ha mapped in the surrounding area (Figure 7). Based on aerial photography and recorded mound locations (Figure 6), suitable habitat is expected to occur extensively beyond the Development Envelope throughout the wider region.

4.2.3 *Function of the study area*

The survey area, including the Development Envelope, supports a resident population of the Malleefowl, with the birds foraging widely across the landscape, but with breeding occurring mainly in dense, low vegetation on sandy loam to gravelly loam soils (primarily VSA's 1 and 2, or in landscapes with similar characteristics). The Malleefowl is largely sedentary but young birds and sometimes adults will disperse (Marchant and Higgins 1993), and the almost continuous nature of vegetation across the study area, and across the greater region, means it is unlikely there are particular movement pathways or corridors.

4.2.4 *Importance of population*

An 'important population' is defined as a "population that is necessary for a species' long-term survival and recovery, and may include populations identified as such in recovery plans, and/or that are:

- Key source populations for either breeding or dispersal;
- Populations that are necessary for maintaining genetic diversity; and/or
- Populations that are near the limit of the species' range." (DotE, 2013).

The Malleefowl in the survey area are none of these, but the birds in the area are a small part of a larger regional population which is extensive in the region (Figure 8) and that could be considered

important, depending on the proportion of that larger population represented in the Disturbance Footprint. The two pairs breeding within the development footprint represent 12.5% of the breeding birds within the Lidar survey area, but the regional population extends more or less continuously across similar landscapes well to the north and east (but is truncated 30km to the west and about 10km to the south where extensive agricultural clearing has occurred). If the density found in the Lidar survey area is assumed, then >200 pairs would be present within a buffer of 9km from the development footprint. The two pairs that might be displaced by the proposed mine expansion therefore represent <1% of the regional population within 9km.

Additionally, the National Malleefowl Recovery Plan (Benshemesh 2007) determines no particular populations or general areas can be described as being of greater importance for the long-term survival of Malleefowl than any other at this stage.

4.2.5 Response to DCCEEW comments

Results and observations on the Malleefowl are reviewed against the DCCEEW comments in Table 8 below.

Table 8. Review of DCCEEW comments with respect to the Malleefowl

DCCEEW Comment	Response
Assessment of the quality and importance of known or potential habitat for the Malleefowl within the proposed action area and surrounding areas, including whether the habitat is critical habitat or supporting habitat, and whether it hosts an important population.	The development envelope and surrounding landscape support a resident population of the Malleefowl. With the exception of small cleared areas and existing mine pits, all habitat is critical in that it supports the Malleefowl, but some VSAs are important for breeding. The small number of birds in the area do not constitute an 'important population'.
Consider the regional context, describing the connectivity of habitat in the broader landscape for the Malleefowl.	The landscape, and therefore the Malleefowl population, is continuous. It will remain continuous around the proposed Development Envelope.
Highlight critical and supporting habitat types for the Malleefowl.	The highest quality breeding habitat and greatest density of mounds occurs in VSAs 1 and 2 (Figure 6); VSA 2 appears to have the highest mound density.
The total amount of each type of habitat (e.g., breeding, foraging, dispersal, important habitat, roosting, etc.) (in hectares) in the proposal area for the Malleefowl.	With the exception of small, cleared areas and existing mine pits, all native vegetation is foraging habitat, and the birds may also forage in rehabilitation areas (rehabilitation often contains high densities of acacias that provide seeds). VSAs 1 and 2 provide the best breeding habitat (highest density of mounds). Areas are given below (under 'area of occupancy'): 562ha of breeding habitat and 1174ha of foraging habitat in the DF.

Map of suitable habitat for breeding, foraging and dispersal for MNES	See Figure 6 and Figure 7. The entire landscape is foraging and dispersal habitat, with breeding mainly in VSAs 1 and 2.
Estimated size of Malleefowl area of occupancy.	The entire area of native vegetation within the Development Envelope is occupied by the Malleefowl, with highest density of breeding mounds in VSAs 1 and 2. These two VSAs have a combined area of: Disturbance footprint – 547.9 ha. Development envelope – 857.9 ha
Assess the impacts on east west dispersal of Malleefowl.	A slight reduction in east-west movement can be expected. The existing disturbance is aligned north-south and the proposed expansion will increase the north-south extent slightly but will greatly increase the east-west extent. The existing north-south disturbance is about 16km in length but with some gaps between mine pits that could allow movement of birds. The proposed expansion is likely to close these gaps, but there is continuous vegetation to the north and south that will continue to allow passage of birds in an east-west dispersion.
Assessment of how the ecological functions of the Malleefowl population (breeding, foraging and dispersal) will be affected over the life of the mine.	Two breeding pairs will be displaced, there will be loss of 547.9 ha of breeding habitat and up to 1,174 ha of foraging habitat. The EPA (2016b) suggests that the availability of fauna habitats within 15 km can be used to assess the significance of habitat loss as an impact. While there is no precise measure of breeding habitat, there is an area of 6,251ha of foraging habitat within 15km of the disturbance footprint. Therefore, the disturbance footprint represents 18.8% of foraging habitat within a 15km buffer. There might be a slight reduction in east-west movements, however noting there is an existing mine that has been closed for some time and dispersal does not seem to have been affected (active mounds in very close proximity), this is unlikely to be an issue.

4.2.6 *Impact assessment - Malleefowl*

Potential impacts upon the Malleefowl are considered with respect to information requested by DCCEEW (Table 2) and the threatening processes listed in Section 1.4. The significance of impact is drawn from Table 4.

Population decline due to habitat clearing and degradation.

Negligible. Nine mounds lie within the Disturbance Footprint of the mine area (Figure 6), with two of these active in 2024. One other mound was recently active (rank 2), with the remaining mounds either rank 3 or rank 5. This suggests two pairs with home ranges included in the disturbance footprint. One of the active mounds is close to the boundary of the disturbance footprint, and therefore that male probably has alternative mounds that will not be cleared. Observations at other projects (M. Bamford pers. obs.) indicate that Malleefowl will be displaced by clearing and will construct new mounds if suitable nearby habitat is available. There is such suitable habitat outside the Disturbance Footprint and Development Envelope to the east, south and north.

Impact of habitat fragmentation.

Negligible. Malleefowl are large, mobile birds and, while terrestrial, are strong flyers. The expanded mine area will probably form a barrier to direct movement but birds will be able to move around to the north and south. The existing mine already presents a barrier and the species has persisted around it.

Mortality during operation (construction and life of mine)

Minor to Moderate. Malleefowl are vulnerable to roadkill (Garnett and Baker 2021) and as it is a long-lived species with low recruitment, even deaths of a few birds can impact a local population. Furthermore, deaths can be expected during construction and throughout the life of mine. Mitigation measures are possible and discussed below.

Fire

Minor. The potential impact of fire is very difficult to gauge as it depends so much on the fire regime. Fire will reduce litter supply and possibly prevent breeding for several years, but regeneration after fire may improve the value of foraging habitat. A succession of extensive fires would reduce breeding success but would be unlikely in this landscape where fuel loads are variable and low across some areas. The project does introduce sources of ignition.

Noise, vibration, dust and lighting (disturbance)

Negligible. Based on observations of Malleefowl at other mine sites, the birds are very tolerant of noise, vibration and light. They have been observed to continue working on a mound, and subsequently returning to a mound <50m from a major haul road (M. Bamford pers. obs.). One male continued to work a mound within <50m of clearing being carried out and continued to maintain that mound until the end of the season. If the Development Envelope is assumed to be the area over which Malleefowl may be subject to some disturbance (Figure 6), there are seven mounds that may be affected by disturbance.

Invasive species including feral predators

Moderate. The significance of impact of introduced predators on the Malleefowl is uncertain, but in at least some situations the Red Fox and Cat do have adverse impacts on populations (Garnett and Baker 2021). The mine expansion should not of itself increase the abundance of introduced predators, but this can happen due to the inadvertent or deliberate provision of food (see mitigation below). Currently, no feral predator management or control programme is in place between the State barrier fence in AWC Reserve and Charles Darwin Reserve.

Changes to surface and groundwater conditions

Negligible. Groundwater changes are not expected as a result of the mine expansion while the landscape has low relief and thus little surface flow that could be altered.

4.2.7 Mitigation - Malleefowl

Mitigation can be linked to threatening processes and many are standard practice in the mining industry. Suggested mitigation actions to reduce the threat to Malleefowl are outlined below.

Habitat loss and degradation. Standard practice; minimise clearing and adhere strictly to clearing boundaries. No unnecessary tracks. Modify boundaries where possible to avoid mounds. Standard vehicle hygiene and weed control. Weed hygiene to extend to footwear and clothing if a risk of weed seeds is identified.

Mortality. Survey mounds prior to clearing to identify any that may be active (i.e. contain eggs; Rank 1) or at a critical stage in preparation for breeding (Rank 2 mounds in the period May to September). Note that Lidar surveys are a useful tool to define mound targets and density, however, require ground truthing and more intensive surveys conducted on foot in areas where disturbance is likely, especially prior to clearing. Given the Lidar ground truthing and subsequent field surveys, it is expected that the majority of mounds have been detected across the survey area. Mound activity can be determined with a single inspection or a series of inspections over several months. The presence of birds is not a good indicator of mound activity, as they will regularly visit inactive mounds, but motion-sensitive cameras can be placed at mounds where breeding activity is suspected to confirm if the mound is actually being worked. A mound that is being worked will be visited several times a day, so a long period of camera monitoring is not required. Delay clearing of Rank 1 and possibly Rank 2 mounds, depending on time of year, until end of breeding season; the non-breeding season is about January to May. Strict speed limits through area where there is Malleefowl habitat (effectively any native vegetation). Record road-side sightings; install signposts and possibly introduce lower speed limits where regular sightings made. If active mounds are found close to roads, additional signage may be required. Removing such mounds (during the non-breeding season) could be a last resort to avoid birds putting themselves at risk.

Disturbance. No action required other than standard practice such as dust suppression, and minimisation of light spill, noise and vibration.

Invasive species. Ensure introduced species are not encouraged, such as ensuring cats are not inadvertently or deliberately fed. Implement a feral predator control programme, discuss

collaboration with AWC and perhaps Bush Heritage (Charles Darwin Reserve) to increase efficacy. Foxes in particular have been implicated in the decline of Malleefowl in some areas (Garnett and Baker 2021).

4.2.8 Monitoring - Malleefowl

The purpose of monitoring Malleefowl is to detect any change due to actions and management of the mine expansion, with the main concerns being with mortality and possibly impacts of introduced predators. Monitoring should focus on mounds and determine which mounds are being visited and how they are being used, but interpreting monitoring data requires a good understanding of Malleefowl breeding biology. Key points to consider:

- A male will visit many mounds within its home range probably throughout the year, with Rank 2 and particularly Rank 1 mounds giving the best indication of presence and breeding activity.
- Breeding will not occur every year, but there will most likely be activity at mounds every year (thus Rank 2 mounds indicate a male present even if no Rank 1 mound is found).
- Long-unused mounds (Rank 4 and even Rank 5) will sometimes be used again after decades of inactivity.
- Malleefowl will construct new mounds. This can happen particularly after displacement due to clearing (M. Bamford pers. obs).

Based upon the above points, if the intent of monitoring is to provide a robust measure of abundance each year, then a very large number of mounds will need to be visited annually. Survey after about July is necessary as by that time the males will have visited and probably have worked several of their mounds and will have chosen one mound to concentrate on. With 16 Rank 1 mounds found in 2024, annual monitoring could focus on these and nearby (particularly Rank2) mounds, but a large number of Rank 3, 4 and 5 mounds will need to be visited, as it is among these mounds that new activity may occur. The possibility of completely new mounds also needs to be considered, such as may occur after displacement and could also occur after successful recruitment, particularly after feral predator management programmes are implemented. Therefore, repeat Lidar surveys, or foot-based human-chain surveys, could be repeated every five years. Such surveys should concentrate in VSAs favoured for breeding by Malleefowl (VSAs 1 and 2). Monitoring should be aligned with the National Malleefowl Monitoring Program, but it is recommended to use the mound ranking system presented in the current report.

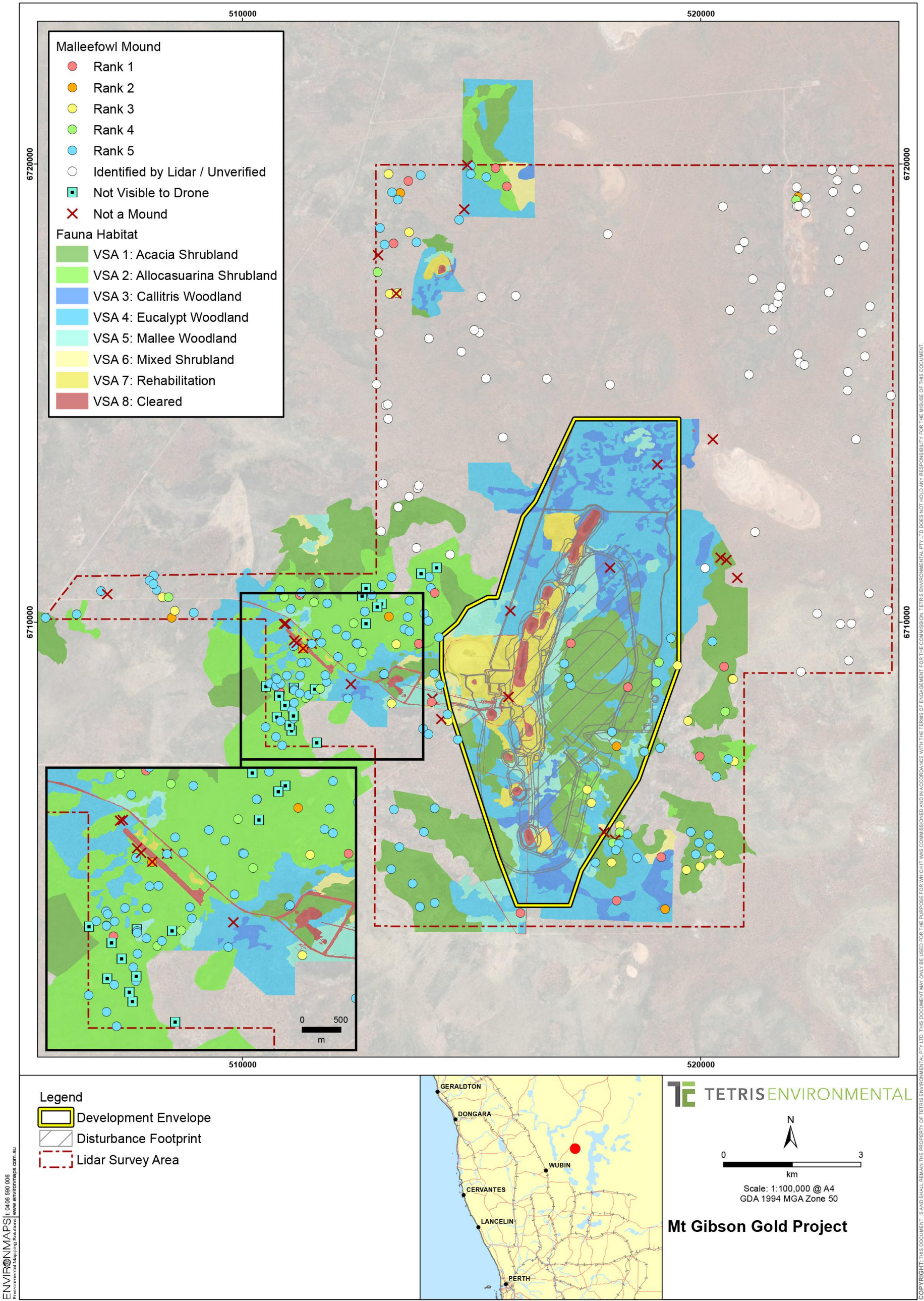


Figure 6. Distribution of Malleefowl mounds using the Breeding Mound Activity classification.

Rank 1 = used for breeding in the current breeding season, **Rank 2** = activity in the current breeding season, but not used for breeding, **Rank 3** = no signs of activity in the current breeding season, but with evidence of breeding activity in the previous few years, **Rank 4** = Mound with no sign of current or recent activity, **Rank 5** = Mound with no signs of activity or use and heavily weathered.

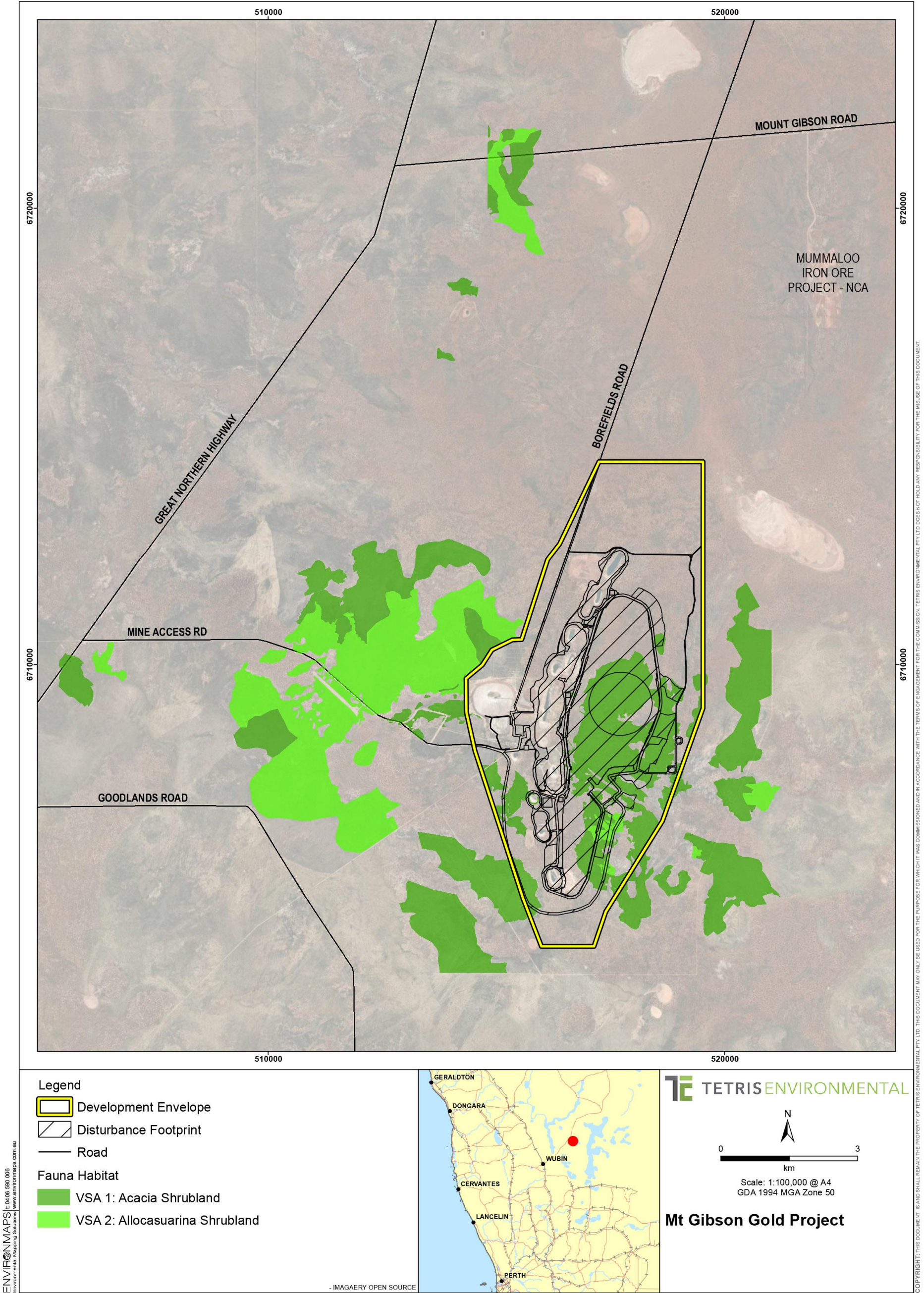


Figure 7: Mapped extent of preferred Malleefowl breeding habitat

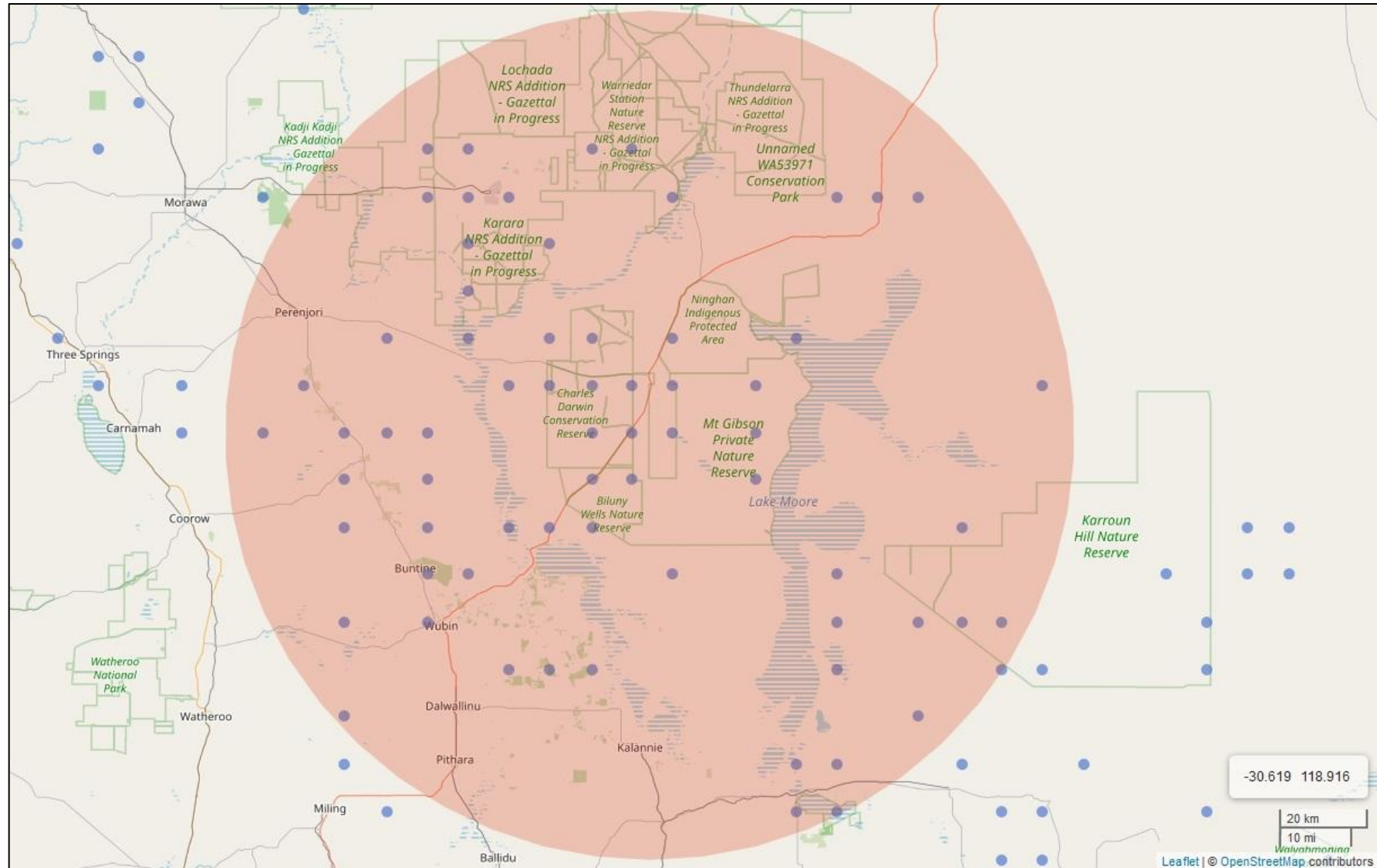


Figure 8. Distribution of Malleefowl records from the Atlas of Living Australia. The circle indicates a radius of 100km from the Development Envelope.

4.3 Southern Whiteface

4.3.1 *Distribution and abundance*

Surveys for the Southern Whiteface, including opportunistic observations, yielded six observations (each observation a party of two to six birds), one just within the southeast area of the Development Envelope and five outside (see Figure 9, Table 10, Plate 6 and Plate 7). In addition, one observation was made in the 2023 survey (10km northeast of the Development Envelope). These records indicate a very patchy distribution, given about 60km of transects were walked or driven slowly, with nearly half these being walked transects (Figure 4). Five of the six records made in 2024, however, were found when four transects were walked in the north of the survey area. This was in an area of open acacia shrubland with extensive bare ground and annuals, and this general area was chosen because it seemed consistent with previous observations on preferred habitat of the species. The vegetation does not really correspond with any of the VSAs in the Development Envelope, but has elements of VSA 1 (Acacia Shrubland), VSA 4 (Eucalypt Woodland) and VSA 6 (Mixed Shrubland). As noted in Section 4.3.2 below, vegetation structure rather than floristics appears to be important for the species.

Each transect was walked by one person and was approximate 3km in length. Assuming a detection distance of 25m (the Southern Whiteface is a small bird usually seen when flying across the field of view at a low height, and occasionally when heard as it has a distinctive ‘trill’), it can be assumed that the survey area of each transect was 3km by 50m; therefore 15ha. Five records of 17 birds gives a density of 1.3 birds/ha but noting that the groups of birds were widely-spaced. Garnett and Baker (2021) report densities of around 1.7/ha, so the birds in the Development Envelope and surrounds, at least where suitable habitat is present, occur at a similar density.

The Southern Whiteface is unevenly distributed in the region, with its distribution corresponding approximately to VSA 1 where this has a structure of dense bushes and open areas. Vegetation with such structural characteristics is very patchily distributed and can occur in small patches, so is very difficult to map, but the records obtained in 2023 and 2024 suggest it is quite widespread in the north of the survey area towards Mt Gibson Road (Figure 9). It is also reported to be common within the AWC Reserve (per comm. AWC ecologist).

4.3.2 *Extent of suitable habitat*

Southern Whiteface habitat is broadly described as semi-arid woodlands particularly of Mulga (e.g. Garnett and Baker 2021), with the presence of understorey shrubs such as bluebush often mentioned in habitat descriptions accompanying sight records (eBird, Storr Johnstone database). This sort of understorey often occurs in low-lying areas, along drainage systems and around the periphery of salt lakes. Johnstone and Storr (2005) describe habitat (of the western sub-species) as ‘Open or sparsely wooded plains with scattered low shrubs, especially blue-bush (*Maireana sedifolia*); Myall (*Acacia papyrocarpa*), mallee, Mulga with bushy understorey.’

In the listing of the species as Vulnerable in March 2023, DCCEEW (2023) stated that the Southern Whiteface inhabits “... a wide range of open woodlands and shrublands where there is an understorey of grasses or shrubs, or both. These areas are usually in habitats dominated by acacias or eucalypts on

ranges, foothills and lowlands, and plains.” In addition, DCCEEW (2023) defines ‘habitat critical to the survival of the Southern Whiteface’ as:

- relatively undisturbed open woodlands and shrublands with an understorey of grasses or shrubs, or both;
- habitat with low tree densities and an herbaceous understorey litter cover which provides essential foraging habitat;
- living and dead trees with hollows and crevices which are essential for roosting and nesting.

These descriptions are fairly general in nature, probably due to the wide geographic range of this species. Most of these ‘habitat’ descriptions are vegetation descriptions and make little if any reference to structure. In June/July 2024, BCE had the opportunity to conduct targeted surveys for the Southern Whiteface at a location south of Yalgoo and about 100km north-west of the Development Envelope. The vegetation was broadly Acacia tall shrubland with scattered Mallee and other eucalypts, generally on loam soils. Southern Whiteface were found to be moderately common and had a clear association with vegetation structure, occurring where dense acacia thickets were juxtaposed with open, low shrubland (often sparse bluebush) and bare ground. Suitable habitat was therefore very patchy and the habitat suitable for Southern Whiteface would normally be included in a broad habitat description. It also has some ecotonal characteristics.

All Southern Whiteface records made in the survey area were in habitat consistent with these previous observations. They were in vegetation that did not align well with any of the VSAs described for the Development Envelope, but at locations where the density of shrubs was low so that the structure consisted of dense shrubs and large open areas (roughly an open version of VAa 1), often with VSA 4 (Eucalypt Woodland) nearby (Plate 7). Vegetation with these structural characteristics appears to be extensive (based upon aerial imagery) to the north of the survey area but is very limited within the Development Envelope and Disturbance Footprint (Figure 2). VSA 4 is extensive in the Development Envelope, particularly in the north, but no Southern Whiteface were found in this northern part of the Development Envelope.

4.3.3 *Function of the study area*

The Southern Whiteface is typically sedentary and occurs in small family parties, but occasionally forms flocks (very rarely in excess of 50 birds) and will also occasionally disperse (Birdlife Australia 2023). The entire survey area therefore supports a resident, breeding but highly scattered population, probably with most birds towards the north (near Mt Gibson Road) where there appears to be more extensive suitable habitat. Dispersing birds are likely to occur anywhere but may favour the preferred habitat (open VSA 1).

4.3.4 *Importance of population*

An ‘important population’ is defined as a “population that is necessary for a species’ long-term survival and recovery, and may include populations identified as such in recovery plans, and/or that are:

- Key source populations for either breeding or dispersal;
- Populations that are necessary for maintaining genetic diversity; and/or
- Populations that are near the limit of the species’ range.” (DotE, 2013).

The Southern Whiteface in the MGGP are none of these, but the birds in the area are a small part of a larger regional population, with extensive regional records (Figure 10). Based upon the distribution of VSAs, survey results (Figure 4 and Figure 10) and the habitat preference of the species, its distribution within the Development Envelope is limited. The one party found in the Development Envelope was outside the Disturbance Footprint (Figure 10), in an area of complex and mixed vegetation with large clearings.

4.3.5 DCCEEW comments

Results and observations on the Southern Whiteface are reviewed against the DCCEEW comments in Table 9 below.

Table 9. Review of DCCEEW comments with respect to the Southern Whiteface

DCCEEW Comment	Response
Assessment of the quality and importance of known or potential habitat for the Southern Whiteface within the proposed action area and surrounding areas, including whether the habitat is critical habitat or supporting habitat, and whether it hosts an important population.	A resident population occurs in the general area but with few birds and little habitat suitable for resident or breeding birds within the Development Envelope. The habitat in this area may be suitable for breeding. Given the small number of birds present and the extensive population more regionally, the birds in the Development Envelope do not represent an important population.
Consider the regional context, describing the connectivity of habitat in the broader landscape for the Southern Whiteface.	Habitat across the landscape is patchily distributed. Birds are likely to be resident only in Acacia Open Shrubland (often close to VSA 4 Eucalypt Woodland) that does not align with any VSA described for the Development Envelope. This suitable habitat appears to be moderately extensive north of the Development Envelope, towards Mount Gibson Road. The birds may disperse through any vegetation but may favour this sort of shrubland.
Highlight critical and supporting habitat types for the Southern Whiteface.	Acacia Open Shrubland (often close to VSA 4 Eucalypt Woodland; see Plate 7) would appear to be critical habitat for resident and breeding birds.
The total amount of each type of habitat (e.g., breeding, foraging, dispersal, important habitat, roosting, etc.) (in hectares) in the proposal area for the Southern Whiteface.	This is uncertain. Only very small patches and areas of critical habitat appear to be present within the Development Envelope. It is more extensive to the north (outside the Development Envelope).
Map of suitable habitat for breeding, foraging and dispersal for the Southern Whiteface	All native vegetation is potentially dispersal habitat, which means it will also be used for foraging, but core habitat to support resident and breeding birds is best described as Acacia Open Shrubland (often close to VSA 4 Eucalypt Woodland). This

	core habitat appears to be very patchy and even where the birds were recorded, it was not continuous.
Estimated size of Southern Whiteface area of occupancy.	Southern Whiteface could occur anywhere at least occasionally, but core habitat is more limited. Within the Development Envelope, core habitat may be limited to a few hectares in the south-east where birds were recorded. Core habitat is more extensive to the north, towards Mount Gibson Road. The extent of database records for the species indicates that occupied habitat is very extensive in the region.
Assess the impacts on east west dispersal of Southern Whiteface.	Negligible impact as the birds occur only in small numbers around the Disturbance Envelope and there is limited suitable habitat for them in this area.
Assessment of how the ecological functions of the Southern Whiteface population (breeding, foraging and dispersal) will be affected over the life of the mine.	As the species appears to be patchily distributed in the Development Envelope, and probably absent from large parts of this envelope, little impact on ecological function is expected. There will be a slight reduction in potential dispersal where clearing occurs.
Southern Whiteface occurs in the surrounding area in Callitris woodland and acacia/melaleuca shrubland sites. Justify the level of suitability of the different Vegetation Substrate Associations on site and assess the potential for occurrence in each	It is not clear where this information of Southern Whiteface in Callitris Woodland and Acacia/Melaleuca Shrubland comes from. They were not found in such vegetation types in the present study. The VSAs within the Development Envelope were of low suitability for the species.

4.3.6 Impact assessment – Southern Whiteface

Potential impacts upon the Southern Whiteface are considered with respect to information requested by DCCEEW (Table 2) and the threatening processes listed in Section 1.4. The significance of impact is drawn from Table 4.

Population decline due to habitat clearing and degradation.

Negligible. There are no records within the Disturbance Footprint and little if any core habitat. Vegetation in the Disturbance Footprint may have a dispersal function but the species appears to be very patchily distributed in that area. Note that the species is vulnerable to broad-scale habitat loss, as indicated by the lack of records in the nearby Wheatbelt (Figure 10).

Impact of habitat fragmentation.

Negligible. The Disturbance Footprint is expected to be of limited value for dispersal as there is little core habitat for the species in the Development Envelope.

Mortality during operation (construction and life of mine)

Negligible to Minor. Southern Whiteface do occur along Mount Gibson Road and the mine access road from the north, so there is a chance of roadkill. This is expected to be infrequent and most birds do not occur close to roads. Mortality during clearing is unlikely due to the scarcity of the species in the Development Envelope.

Fire

Minor. The potential impact of fire is very difficult to gauge as it depends so much on the fire regime. Fire is not identified as a threat to the Southern Whiteface by Garnett and Baker (2020). The species occurs in open vegetation where fire is likely to be patchy, and observations to the west (Rothsay area) found the species to be common in an area of thick acacia and open ground that was the result of restoration in an old gravel pit (M. Bamford pers obs.). This sort of vegetation structure is likely to occur during post-fire regeneration so the species may be advantaged by some seral stages. Despite this, a succession of extensive fires could reduce breeding success for several years.

Noise, vibration, dust and lighting (disturbance)

Negligible. There appears to be no information on the tolerance of Southern Whiteface to disturbance, but the record in 2023 was of a party foraging within 25m of the Top Iron accommodation camp so these birds would have been regularly exposed to noise, light, and movement of vehicles and people.

Invasive species including feral predators

Possibly **Minor.** The Southern Whiteface is present (in suitable habitat) at densities comparable with other studies, which suggest the local population is stable and tolerating current densities of introduced predators such as cats. An increase in the abundance of introduced species is not expected as a result of the mine expansion. Read *et al.* (2015), however, have reported a decline in small, sedentary birds around mine sites apparently due to an increase in the abundance of predatory birds (attracted to the mine site as a result of an increase in food supply). The Southern Whiteface is a small, mostly sedentary bird that could therefore be vulnerable.

Changes to surface and groundwater conditions

Negligible. Groundwater changes are not expected as a result of the mine expansion while the landscape has low relief and thus little surface flow that could be altered.

4.3.7 Mitigation – Southern Whiteface

Mitigation can be linked to threatening processes and many are standard practice in the mining industry. Suggested mitigation actions to reduce the threat to the Southern Whiteface are outlined below.

Habitat loss and degradation. Standard practice; minimise clearing and adhere strictly to clearing boundaries. No unnecessary tracks. Standard vehicle hygiene and weed control.

Mortality. The only mortality risk is from roadkill as the risk during clearing is considered to be very low (due to birds probably absent and lack of core habitat). The impact of roadkill is expected to be

negligible as it is likely to be infrequent, but will be reduced by low speed limits (implemented to protect Malleefowl).

Disturbance. No action required other than standard practice such as dust suppression, and minimisation of light spill, noise and vibration.

Invasive species. Ensure introduced species are not encouraged, such as ensuring cats are not inadvertently or deliberately fed. Discuss (with AWC) a regional introduced predator control program. Avoid attracting large, predatory birds through effective waste management. Large numbers of insects attracted to and killed by lights can encourage predatory birds and should also be avoided (in the first instance to reduce insect mortality, but secondarily to reduce other effects).

4.3.8 Monitoring – Southern Whiteface

There is no indication that monitoring of the Southern Whiteface is warranted as impacts are considered to be negligible.



Plate 6. Southern Whiteface recorded north of the disturbance envelope. Photo credit: Peter Smith.

Table 10. Locations of Southern Whiteface observations.

ID	Easting	Northing	Date Deployed	Comments
SWF1	517877	6705617	17/09/2024	Two birds with Thornbills. In ecotone of breakaway, Euc Woodland and Acacia shrubland.
SWF2	520126	6720944	20/09/2024	Six birds in acacia open shrubland.
SWF3	519519	6720424	20/09/2024	Two individuals in acacia open shrubland.
SWF4	519507	6717862	20/09/2024	Two birds, in Acacia thicket with patches of bare ground. were in a group of birds including Redthroats and Chestnut-rumped Thornbills.
SWF5	518452	6717441	20/09/2024	Five birds in patches of low dense shrubs with areas of bare ground; in a group of birds including Redthroats and Chestnut-rumped Thornbills.
SWF6	520469	6719381	20/09/2024	Two birds in area of open, tall acacia shrubland close to VSA 4 (Plate 7).

VSA 1: Acacia Shrubland. VSA 4: Eucalypt woodland.

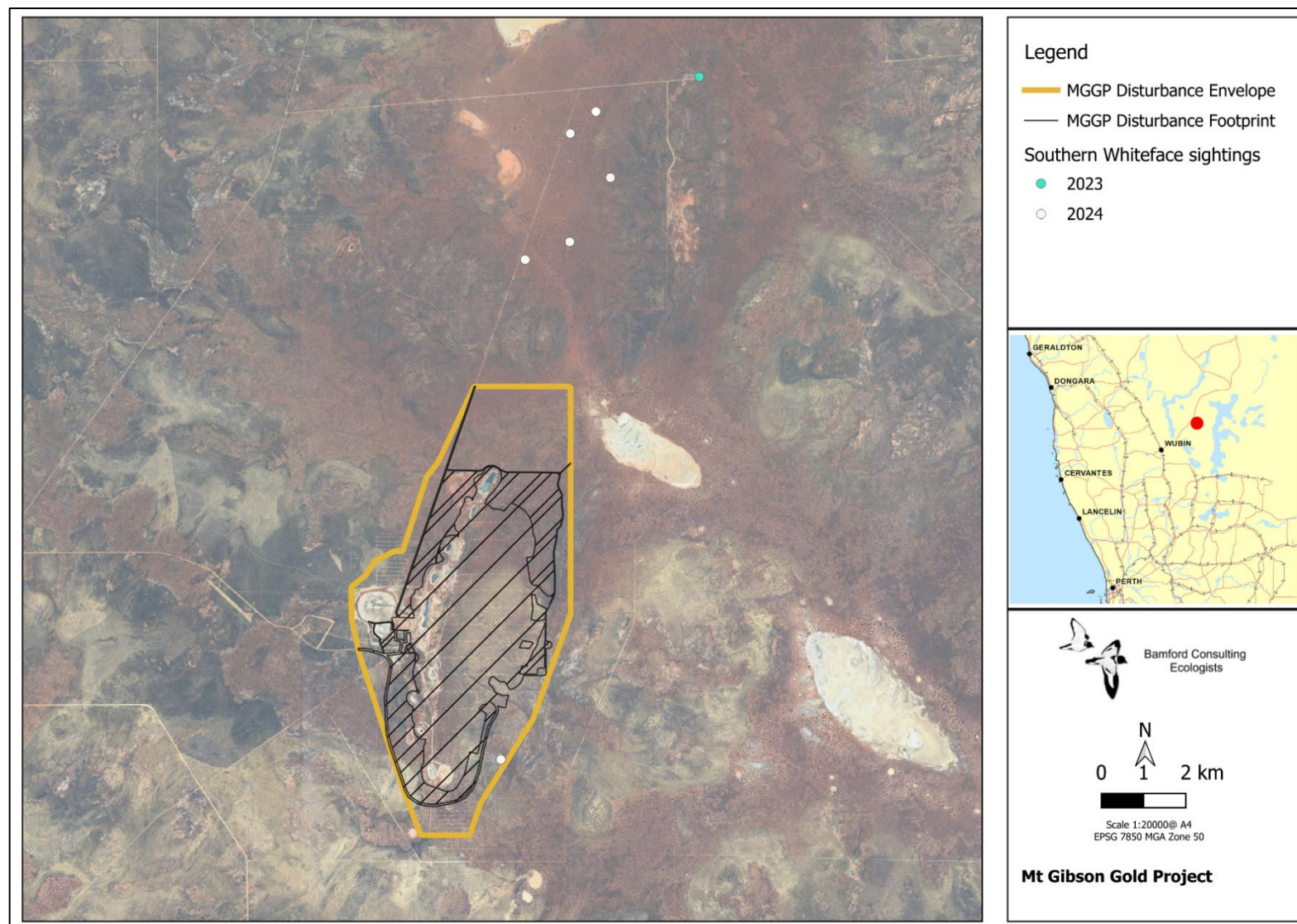


Figure 9. Distribution of Southern Whiteface sightings in the MGGGP studies. One record within the disturbance envelope (southeastern corner). Five records outside the disturbance envelope with the closest record 6 km from disturbance envelope.



Plate 7. Vegetation at location SWf6, where two Southern Whitefaces were observed. Typical habitat for the species, with a lot of open ground, some dense acacia shrubs and at the ecotone between Eucalypt Woodland and Acacia Shrubland.

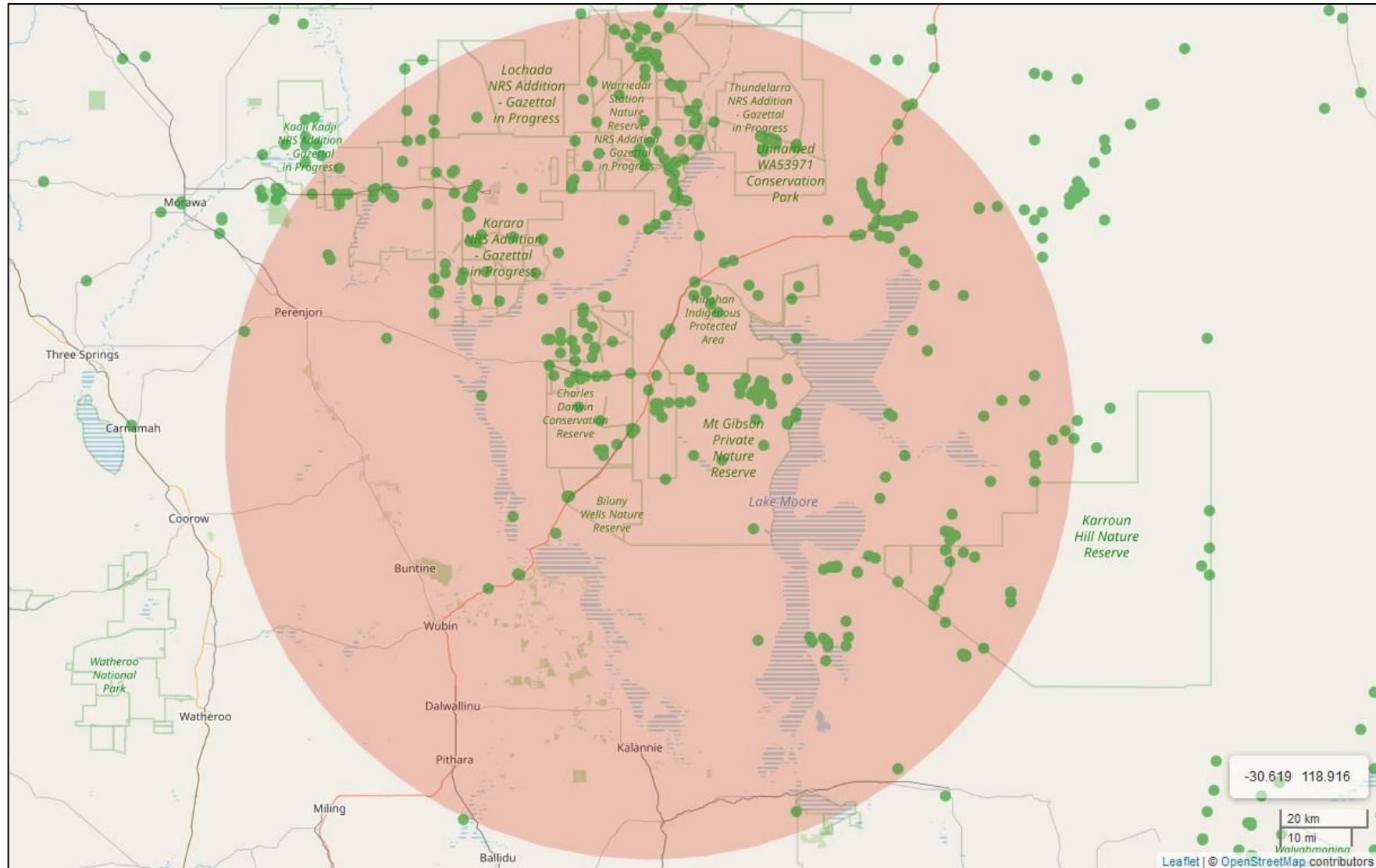


Figure 10. Distribution of Southern Whiteface sightings from the Atlas of Living Australia (2024). The circle indicates a 100km radius from the Development Envelope.

4.4 Chuditch

4.4.1 *Distribution and abundance*

Until recently, the Chuditch was locally extinct in the area, but it has been the subject of a reintroduction programme by the AWC on the ex-Mt Gibson Station since 20XX. Recent location records of translocated animals are shown on Figure 11. The animals have dispersed widely, with most records to the north-east of the Development Envelope, where releases were made, but with some records nearby and one well to the west. There are no records within the Development Envelope, probably because camera survey carried out in 2023 occurred only over a short period and very early in the release programme. The results of cameras set in September 2024 have not yet been analysed. It is highly likely that Chuditch have moved through the Development Envelope, and it is possible that one or two animals are resident in the area.

Chuditch have a large home range, with females in the deeper south-west occupying 55-120 ha and males ranging over 400 ha or more (Van Dyck and Strahan 2008). Further east in semi-arid woodland (Forrestania), Rayner *et al.* (2012) found that Chuditch occurred at an average density of 0.039 individuals/km², with home ranges as small as 189 ha (a female) and as large as 2,125 ha (a male).

4.4.2 *Extent of suitable habitat*

The Chuditch was formerly very widespread and occurred in a range of environments from tall forests to desert shrublands. During the day, Chuditch shelter in dens; predominantly hollow logs and earth burrows (Van Dyck and Strahan 2008). The availability of such dens is probably an important habitat feature, meaning that VSA 4 (Eucalypt Woodland) may provide abundant shelter in the form of hollow logs (both on the ground and in standing trees), although the Chuditch will probably forage throughout all VSAs. Suitable area to provide dens and foraging habitat are very widespread across the landscape, and such suitable habitat is continuous.

4.4.3 *Function of the study area*

The Chuditch is sedentary but individuals can range over large areas. Individual home ranges are large and potentially bigger than the size of the Development Envelope, and in a recent trapping study near Boranup in the south-west Jarrah Forest, a male Chuditch moved over 5km in one morning (P. Smith pers. comm.). Therefore, the Development Envelope could support resident individuals that may range inside and outside the boundary and could also support dispersal. VSA 4 (Eucalypt Woodland) is likely to be most important for denning sites, but burrows of other animals will occur throughout, and there are some small rocky breakaways scattered throughout.

4.4.4 *Importance of population*

An 'important population' is defined as a "population that is necessary for a species' long-term survival and recovery, and may include populations identified as such in recovery plans, and/or that are:

- Key source populations for either breeding or dispersal;
- Populations that are necessary for maintaining genetic diversity; and/or
- Populations that are near the limit of the species' range." (DotE, 2013).

The Chuditch in the broader region occurs as a discrete (reintroduced) population. It therefore meets all these criteria as an important population, effectively being a founder population for the return of the species to the region.

4.4.5 DCCEEW comments

Results and observations on the Chuditch are reviewed against the DCCEEW comments in Table 11.

Table 11. Review of DCCEEW comments with respect to the Chuditch

DCCEEW Comment	Response
Assessment of the quality and importance of known or potential habitat for the Chuditch within the proposed action area and surrounding areas, including whether the habitat is critical habitat or supporting habitat, and whether it hosts an important population.	All native vegetation in the broader region is Chuditch habitat, with Eucalypt Woodland (VSA 4) probably providing a higher density of denning habitat than elsewhere. The Development Envelope is part of this landscape. Chuditch in the broader area are a founder population for a reintroduction programme and this is therefore an important population.
Consider the regional context, describing the connectivity of habitat in the broader landscape for the Chuditch.	Habitat across the landscape is continuous and Chuditch are likely to occupy the entire area as the reintroduction population expands, and the animals are likely to be resident in and disperse across the entire landscape.
Highlight critical and supporting habitat types for the Chuditch.	Chuditch occur at a low density and it is the extent of available habitat that is critical, rather than any particular VSA type. VSA 4 (Eucalypt Woodland) may provide a higher density of denning sites than other VSAs. A critical feature of the habitat is ensuring a low abundance of the Red Fox.
The total amount of each type of habitat (e.g., breeding, foraging, dispersal, important habitat, roosting, etc.) (in hectares) in the proposal area for the Chuditch.	The entire landscape is important for the Chuditch. Within the development envelope, VSA 4 (Eucalypt Woodland that provides the highest density of denning habitat) occupies 1,281.8ha, with other VSAs occupying 2442ha, of which 702ha is cleared or rehabilitated.
Map of suitable habitat for breeding, foraging and dispersal for the Chuditch.	The entire landscape is important for the Chuditch. They will forage and disperse throughout. VSA 4 (Eucalypt Woodland) may provide a higher density of dens that are important at all times of the year, but particularly for females with young. However, they will also den in burrows (rabbit, goanna, old Boodie warrens) and in areas of rocky breakaways.
Estimated size of Chuditch area of occupancy.	Chuditch occur mainly to the north-east of the Development Envelope as that is where animals were released, but have the potential to spread across the entire regional landscape.

Assess the impacts on east west dispersal of Chuditch.	Negligible impact as Chuditch are wide-ranging and can be expected to travel around the mine area.
Assessment of how the ecological functions of the Chuditch population (breeding, foraging and dispersal) will be affected over the life of the mine.	Little if any effect as suitable habitat is very extensive, Chuditch are highly mobile and the impact area is small across the broad landscape.

4.4.6 Impact assessment – Chuditch

Potential impacts upon the Chuditch are considered with respect to information requested by DCCEEW (Table 2) and the threatening processes listed in Section 1.4. The significance of impact is drawn from Table 4.

Population decline due to habitat clearing and degradation.

Negligible. The Disturbance Footprint is small across a broad and continuous landscape.

Impact of habitat fragmentation.

Negligible. The Disturbance Footprint is small in comparison with the mobility of the Chuditch so animals should readily be able to move around and even through the Development Envelope.

Mortality during operation (construction and life of mine)

Negligible to Minor. There is some risk of roadkill. While the founder population is small, even a few deaths could have a significant impact. Mortality during clearing is unlikely but possible, particularly when large fallen and standing tree hollows are impacted, since these are potential denning sites.

Fire

Minor. Frequent fires could reduce the availability of shelter by destroying hollow logs. Clearing can create shelter in the form of piles of brush and small to large logs, and fire should not be used to 'clean up' such material.

Noise, vibration, dust and lighting (disturbance)

Negligible. The effect of disturbance on Chuditch is uncertain, but there are records of them entering suburban gardens (e.g. to prey on domestic chickens; W. Bancroft pers. comm.), so this does suggest they are tolerant of disturbance.

Invasive species including feral predators

Possibly **Major.** The red fox has been implicated in the decline of Chuditch across much of its range, so the reintroduced population is likely to be vulnerable to this predator, and to any increase in its abundance. Such changes in the abundance of introduced species can occur in association with disturbance during mining and an increase in food supply.

Changes to surface and groundwater conditions

Negligible. Groundwater changes are not expected as a result of the mine expansion while the landscape has low relief and thus little surface flow that could be altered.

4.4.7 Mitigation – Chuditch

Mitigation can be linked to threatening processes and many are standard practice in the mining industry. Suggested mitigation actions to reduce the threat to the Chuditch are outlined below.

Habitat loss and degradation. Standard practice; minimise clearing and adhere strictly to clearing boundaries. No unnecessary tracks. Standard vehicle hygiene and weed control. Weed hygiene to extend to footwear and clothing if a risk of weed seeds is identified.

Mortality. There is some risk of mortality during clearing and from roadkill. Risk during clearing is largely from impacts on denning habitat such as standing and fallen hollow trees. As Chuditch occur at very low densities (e.g. average density of 0.039 individuals/km² found by Rayner *et al.* (2012), although it is not known how representative this is), the number of animals at risk is likely to be very low, but the loss of a female with young would be a concern. Dens are not easy to identify in a landscape with an abundance of apparently suitable tree hollows, but if areas of suitable denning habitat are proposed for clearing, camera surveys could be used to determine if Chuditch are present in the area. If found to be present, and particularly during the breeding season (roughly August to November/December), individual tree hollows should be checked and clearing of these supervised by a zoologist to reduce the risk to Chuditch. The risk of roadkill depends on the amount of night traffic. If Chuditch sightings are recorded, it may be possible to identify Chuditch ‘hotspots’ and then install Chuditch crossing signs to reduce the risk.

Disturbance. No action required other than standard practice such as dust suppression, and minimisation of light spill, noise and vibration.

Invasive species. The red fox is a significant risk to the Chuditch and could be inadvertently encouraged such as through the provision of food (poor food waste management; dead insects around lights). These should be managed. Actual control of the red fox to benefit the Chuditch needs to take place at a landscape scale and should be discussed with the AWC and Bush Heritage.

4.4.8 Monitoring – Chuditch

Monitoring of the Chuditch at a landscape scale is already being undertaken by the AWC. Crimson Metals could contribute to this monitoring with camera stations within the Development Envelope. Any monitoring proposals should be discussed with the AWC to ensure effective cooperation.

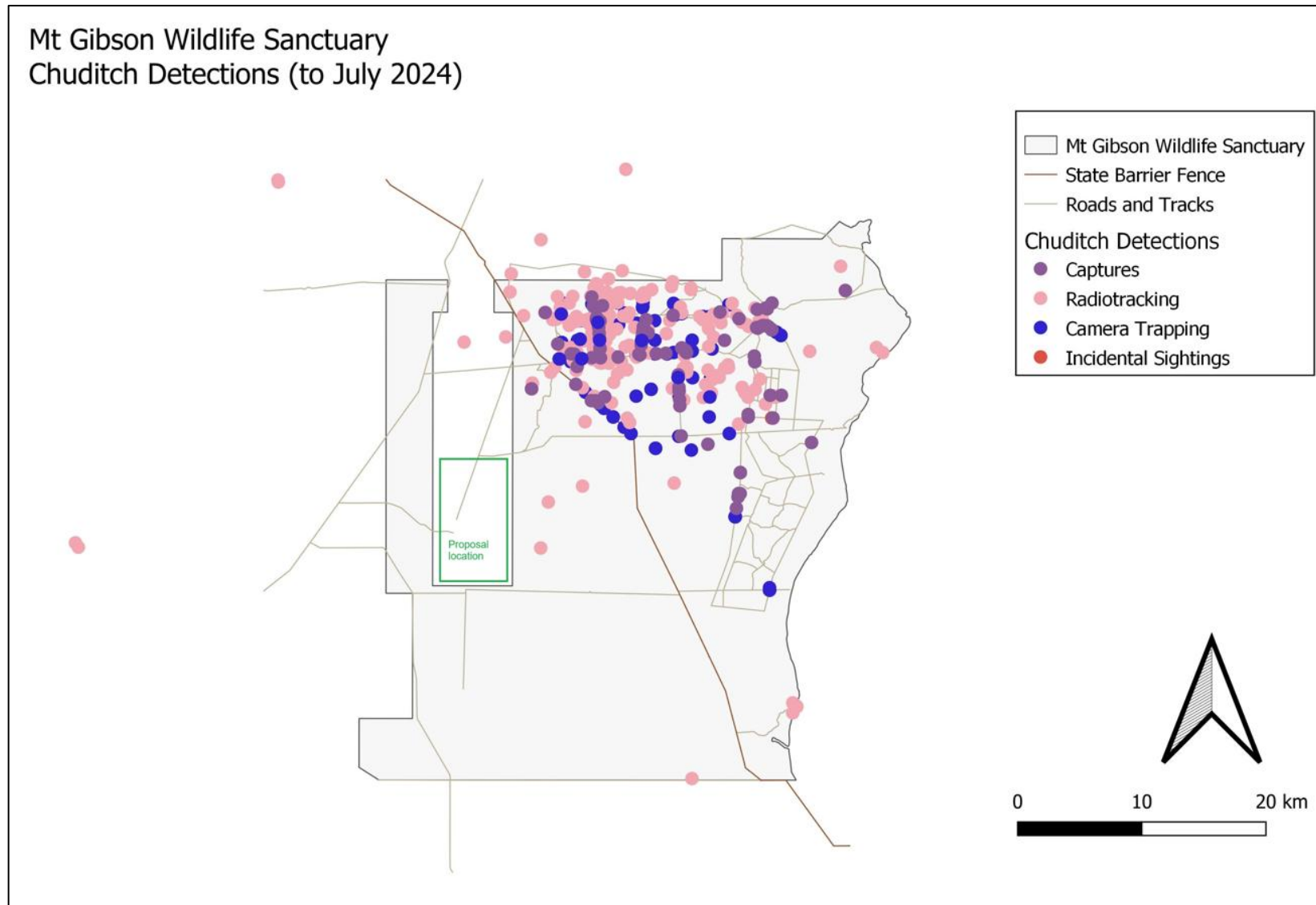


Figure 11. Location records of Chuditch from monitoring of translocated animals carried out by the AWC (data courtesy AWC).

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Appendix 1. Potential Malleefowl nest mound locations within the survey area.

Datum = GDA2020, zone 50.

See Section 3.3.4 for elaboration of Rank, Mound Age and Profile. These were determined by BCE in 2024.

“N.M” = not a mound. Location was identified by lidar.

“N.V.D” = not visible to drone. Location identified by lidar that was assessed by drone and status could not be determined due to vegetation obstructing drone view.

UID	Rank	Mound Age	Profile	Easting	Northing	Method
MFM1	N.M	N.M	N.M	515797	6708369	Foot
MFM2	N.M	N.M	N.M	515839	6710251	Foot
MFM06	5	Old	6	517022	6709097	Foot
MFM07	5	Old	6	517179	6710717	Foot
MFM08	5	Old	6	517178	6708632	Foot
MFM11	3	Recent	1	517618	6706060	Foot
MFM13	N.M	N.M	N.M	517892	6705412	Foot
MFM13	3	Active	5	517521	6706347	Foot
MFM14	N.M	N.M	N.M	518020	6711191	Foot
MFM15	5	Old	6	518067	6707611	Foot
MFM17	2	Active	3	518165	6707291	Foot
MFM19	5	Old	1	518770	6707179	Foot
MFM20	4	Recent	1	519094	6709120	Foot
MFM22	3	Recent	1	519500	6709057	Foot
MFM24	4	Recent	3	511563	6710434	Drone
MFM25	5	Very Old	6	511619	6709744	Foot
MFM26	5	Very Old	6	511670	6710859	Drone
MFM27	5	Very Old	6	511854	6710410	Drone
MFM28	4	Old	6	511387	6708348	Drone
MFM29	5	Old	6	512091	6709246	Foot
MFM30	3	Recent	3	518059	6704753	Foot
MFM31	N.M	N.M	N.M	514138	6708335	Foot

UID	Rank	Mound Age	Profile	Easting	Northing	Method
MFM32	3	Recent	2	514491	6707846	Foot
MFM33	3	Active	3	518240	6705563	Foot
MFM34	4	Moderate	1	520544	6708050	Foot
MFM35	5	Very Old	6	511117	6709481	Foot
MFM36	N.M	N.M	N.M	511176	6709547	Foot
MFM37	2	Recent	3	511317	6709425	Foot
MFM38	N.M	N.M	N.M	511508	6709534	Foot
MFM39	5	Old	6	511404	6709120	Drone
MFM40	5	Moderate	1	511291	6709117	Drone
MFM41	5	Old	1	511256	6708833	Drone
MFM42	N.V.D	N.V.D	N.V.D	511126	6708563	Drone
MFM43	5	Old	6	511132	6708542	Drone
MFM44	5	Old	6	511129	6708518	Drone
MFM45	5	Moderate	1	511248	6708449	Drone
MFM46	5	Moderate	6	511447	6708411	Drone
MFM47	N.V.D	N.V.D	N.V.D	511577	6708540	Drone
MFM48	4	Moderate	1	511700	6708549	Drone
MFM49	5	Old	6	511833	6708701	Foot
MFM50	5	Old	6	511811	6708845	Foot
MFM51	N.M	N.M	N.M	512361	6708650	Foot
MFM52	5	Very Old	6	514293	6709671	Foot
MFM53	5	Old	6	514194	6705936	Foot
MFM54	1	Active	5	516071	6703657	Foot
MFM55	5	Very Old	6	517705	6704757	Foot
MFM56	4	Recent	1	518236	6705417	Foot
MFM57	5	Recent	3	518408	6705375	Foot
MFM58	N.M	N.M	N.M	518129	6705253	Foot
MFM59	4	Recent	1	518081	6705184	Foot

UID	Rank	Mound Age	Profile	Easting	Northing	Method
MFM60	5	Moderate	1	518209	6705157	Foot
MFM61	5	Old	1	518155	6705026	Foot
MFM65	N.V.D	N.V.D	N.V.D	514243	6711194	Drone
MFM66	5	Old	6	514076	6710989	Drone
MFM67	5	Old	6	514116	6710749	Drone
MFM68	1	Active	4	514197	6710637	Drone
MFM69	5	Old	6	513080	6708858	Foot
MFM70	5	Old	6	513094	6708870	Foot
MFM71	3	Recent	3	513258	6708229	Foot
MFM72	5	Very Old	1	514192	6708881	Foot
MFM73	5	Very Old	1	514312	6708637	Foot
MFM74	N.M	N.M	N.M	514332	6707890	Foot
MFM75	5	Old	6	513943	6707673	Foot
MFM76	5	Old	6	514060	6707560	Foot
MFM77	5	Old	6	514709	6707443	Foot
MFM78	4	Recent	1	519032	6708682	Foot
MFM79	N.M	N.M	N.M	511124	6709603	Foot
MFM80	N.M	N.M	N.M	511321	6709430	Foot
MFM95	5	Old	6	513429	6705090	Drone
MFM96	5	Old	6	513963	6705420	Drone
MFM97	5	Very Old	6	519790	6705425	Foot
MFM97	5	Old	1	519787	6705425	Foot
MFM98	5	Old	1	520172	6705367	Foot
MFM99	3	Active	3	519697	6704591	Foot
MFM100	3	Active	5	519987	6704671	Foot
MFM101	3	Recent	3	520410	6704932	Foot
MFM102	5	Old	1	520217	6705084	Foot
MFM103	2	Active	3	522131	6719287	Foot

UID	Rank	Mound Age	Profile	Easting	Northing	Method
MFM104	4	Moderate	1	522087	6719219	Foot
MFM105	5	Old	1	520349	6706623	Foot
MFM106	1	Active	4	519984	6707074	Foot
MFM107	5	Old	6	519120	6707250	Foot
MFM108	5	Old	6	513717	6704295	Drone
MFM110	2	Recent	2	519228	6703738	Foot
MFM112	2	Active	3	513440	6719373	Foot
MFM113	5	Old	1	513266	6719387	Foot
MFM116	1	Active	4	513303	6718274	Foot
MFM117	5	Very Old	6	513108	6718245	Foot
MFM118	4	Moderate	1	512954	6717645	Foot
MFM120	3	Recent	3	513217	6717173	Foot
MFM121	3	Active	4	513378	6717184	Foot
MFM122	N.M	N.M	N.M	513349	6717180	Foot
MFM123	N.M	N.M	N.M	512948	6718013	Foot
MFM124	1	Active	5	513625	6719637	Foot
MFM125	5	Very Old	1	514984	6719965	Foot
MFM126	5	Moderate	1	515325	6719719	Foot
MFM145	5	Old	6	512382	6709013	Drone
MFM146	4	Moderate	3	512621	6709350	Drone
MFM147	N.V.D	N.V.D	N.V.D	510510	6708595	Drone
MFM148	5	Moderate	1	510608	6708667	Drone
MFM149	5	Old	6	510730	6708789	Drone
MFM150	5	Old	6	514475	6707987	Foot
MFM151	N.V.D	N.V.D	N.V.D	510746	6707929	Drone
MFM152	5	Old	6	510737	6707500	Drone
MFM153	5	Old	6	510506	6707711	Drone
MFM154	N.V.D	N.V.D	N.V.D	511072	6707633	Drone

UID	Rank	Mound Age	Profile	Easting	Northing	Method
MFM154	N.V.D	N.V.D	N.V.D	511072	6707633	Drone
MFM155	N.V.D	N.V.D	N.V.D	511029	6707753	Drone
MFM156	5	Old	6	511114	6707895	Drone
MFM157	1	Active	4	510825	6708474	Drone
MFM158	N.V.D	N.V.D	N.V.D	510929	6708184	Drone
MFM159	5	Very Old	6	511082	6708070	Drone
MFM160	2	Active	2	520694	6708767	Foot
MFM162	1	Active	4	520516	6709030	Foot
MFM163	3	Recent	1	520713	6708760	Foot
MFM166	5	Moderate	6	520258	6709585	Foot
MFM182	5	Very Old	6	506384	6710175	Foot
MFM183	5	Moderate	1	508068	6711019	Foot
MFM184	5	Moderate	6	508125	6710711	Foot
MFM185	3	Recent	2	508252	6710545	Foot
MFM186	4	Old	1	508385	6710548	Foot
MFM187	2	Active	5	508458	6710096	Foot
MFM188	5	Old	1	508940	6710205	Foot
MFM189	3	Old	1	508521	6710250	Foot
MFM190	N.M	N.M	N.M	510940	6709969	Foot
MFM191	N.M	N.M	N.M	510903	6709961	Foot
MFM192	4	Recent	3	510914	6710556	Drone
MFM193	5	Old	6	510819	6710700	Drone
MFM194	1	Active	5	511246	6710601	Drone
MFM195	5	Very Old	6	511055	6710295	Drone
MFM196	5	Old	1	511724	6709552	Foot
MFM197	4	Old	6	512428	6709979	Drone
MFM198	N.V.D	N.V.D	N.V.D	512699	6709969	Drone
MFM199	5	Recent	3	512828	6710586	Drone

UID	Rank	Mound Age	Profile	Easting	Northing	Method
MFM201	5	Old	6	513650	6710468	Drone
MFM202	5	Old	6	513607	6710114	Drone
MFM203	5	Old	1	506917	6710681	Foot
MFM205	N.M	N.M	N.M	520795	6710967	Foot
MFM206	N.M	N.M	N.M	520556	6711360	Foot
MFM207	N.M	N.M	N.M	520432	6711414	Foot
MFM209	3	Recent	3	513191	6719782	Foot
MFM210	5	Old	1	513003	6718607	Foot
MFM214	5	Old	6	513394	6719228	Foot
MFM215	5	Very Old	6	513892	6719759	Foot
MFM216	5	Very Old	6	514731	6718790	Foot
MFM217	N.M	N.M	N.M	514836	6719017	Foot
MFM218	5	Very Old	1	514983	6719787	Foot
MFM219	N.M	N.M	N.M	514897	6719977	Foot
MFM221	1	Active	4	515528	6719916	Foot
MFM222	1	Active	4	515776	6719519	Foot
MFM226	N.M	N.M	N.M	520263	6713995	Foot
MFM251	3	Recent	1	520735	6706967	Foot
MFM252	5	Old	6	520608	6707012	Foot
MFM253	5	Old	6	519897	6704931	Foot
MFM254	5	Old	6	519965	6705183	Foot
MFM255	3	Recent	1	519728	6707846	Foot
MFM256	5	Old	1	510799	6708385	Foot
MFM257	4	Moderate	1	510735	6708609	Foot
MFM258	5	Moderate	6	519355	6709648	Foot
MFM259	5	Old	6	514197	6703877	Drone
MFM260	5	Moderate	3	513877	6703789	Drone
MFM261	5	Old	6	514057	6710029	Drone

UID	Rank	Mound Age	Profile	Easting	Northing	Method
MFM262	5	Old	6	513968	6710195	Drone
MFM263	N.V.D	N.V.D	N.V.D	513901	6711061	Drone
MFM265	5	Old	6	513252	6704611	Drone
MFM266	5	Old	1	513311	6705916	Foot
MFM267	5	Old	6	513260	6710986	Drone
MFM268	5	Very Old	6	513044	6710822	Drone
MFM269	N.V.D	N.V.D	N.V.D	513035	6710407	Drone
MFM270	N.V.D	N.V.D	N.V.D	512945	6710331	Drone
MFM271	N.V.D	N.V.D	N.V.D	512611	6710571	Drone
MFM272	N.V.D	N.V.D	N.V.D	512700	6710742	Drone
MFM273	5	Old	6	512262	6709705	Drone
MFM274	5	Old	6	512302	6708334	Foot
MFM275	5	Old	6	512055	6709841	Drone
MFM276	N.V.D	N.V.D	N.V.D	511620	6707370	Drone
MFM277	N.V.D	N.V.D	N.V.D	511118	6707959	Drone
MFM278	5	Very Old	6	511134	6708247	Drone
MFM279	5	Old	6	511287	6710645	Drone
MFM280	5	Old	6	510974	6708836	Drone
MFM281	5	Old	6	510866	6707315	Drone
MFM282	5	Old	6	510836	6707848	Drone
MFM283	N.V.D	N.V.D	N.V.D	510799	6708385	Drone
MFM284	5	Moderate	1	510734	6708609	Drone
MFM285	5	Very Old	6	510838	6708661	Drone
MFM286	5	Moderate	6	510751	6708756	Drone
MFM287	5	Old	6	507973	6710910	Foot
MFM288	5	Old	6	508057	6710831	Foot
MFM289	N.M	N.M	N.M	507041	6710612	Foot
MFM290	5	Old	6	505701	6710096	Foot

UID	Rank	Mound Age	Profile	Easting	Northing	Method
MFM294	N.M	N.M	N.M	519049	6713445	Foot
MFM295	3	Recent	2	513641	6718518	Foot
MFM297	5	Moderate	2	513803	6718298	Foot
MFM301	1	Active	5	518165	6703928	Foot
MFM302	N.M	N.M	N.M	515797	6708369	Foot
MFM308	1	Active	4	517166	6709541	Foot
MFM309	1	Active	4	518415	6708582	Foot
MFM310	5	Old	6	518606	6704858	Foot
MFM311	1	Active	4	519144	6704870	Foot
MFM312	2	Active	1	513200	6710123	Foot
MFM313	3	Recent	2	513355	6709521	Foot
MFM314	5	Old	1	511514	6709529	Foot
MFM315	5	Very Old	1	512485	6709541	Foot
MFM316	5	Very Old	1	512501	6709534	Foot
MFM317	5	Moderate	6	512670	6710236	Foot
MFM317	5	Very Old	1	512669	6710236	Foot
MFM318	5	Very Old	6	513538	6709851	Foot
MFM319	5	Very Old	6	513650	6709802	Foot
MFM320	1	Active	4	513848	6709535	Foot
MFM321	1	Active	5	514132	6708263	Foot
MFM322	4	Moderate	6	517126	6708782	Foot
MFM323	5	Old	1	517121	6708787	Foot

Appendix 2. Sampling location details for motion-sensitive cameras.

Datum = GDA2020, zone 50.

Location	Easting	Northing	Date Deployed	Date Retrieved	Sampling Type
BCE20	515741	6703674	17/09/2024	15/11/2024	Motion-sensitive Camera
BCE06	519275	6703453	17/09/2024	15/11/2024	Motion-sensitive Camera
BCE32	518211	6703213	17/09/2024	15/11/2024	Motion-sensitive Camera
BCE40	518630	6713819	18/09/2024	15/11/2024	Motion-sensitive Camera
BCE33	516305	6710363	18/09/2024	15/11/2024	Motion-sensitive Camera
BCE45	519984	6713211	18/09/2024	15/11/2024	Motion-sensitive Camera
BCE18	509769	6711203	18/09/2024	15/11/2024	Motion-sensitive Camera
BCE17	509766	6710791	18/09/2024	15/11/2024	Motion-sensitive Camera
Tetris01	514133	6708272	20/09/2024	15/11/2024	Motion-sensitive Camera
BCE10	516504	6716143	20/09/2024	15/11/2024	Motion-sensitive Camera
BCE30	514971	6718221	20/09/2024	15/11/2024	Motion-sensitive Camera

Appendix 3. Annotated species list from 30th October to 7th November 2023, and 16th to 21st September 2024

Casuariidae (Emus and Cassowaries)			
<i>Dromaius novaehollandiae</i>	Emu	2023	Tracks seen regularly along access roads. Scats throughout.
		2024	Tracks and scats found regularly. Some footprints of young and a 'circle' of small scats, adjacent to one large scat, probably where a family slept. Occasional family groups seen.
Megapodiidae (Megapodes)			
<i>Leipoa ocellata</i>	Malleefowl	2023	Tracks seen almost throughout. Mounds inspected and many had been used in 2022. One individual seen on entry road on 6/11/23.
		2024	Tracks throughout. High level of activity at mounds, with many mounds visited and partly worked, and several mounded and active. Several reported by staff and some roadkill has occurred. Jamie flushed a pair near an active mound west of Highway Pit.
Anatidae (Ducks and swans)			
	Australian Shelduck	2024	Footprint of adult with ducklings along track in north-east (18/09).
Columbidae (Pigeons and Doves)			
<i>Phaps chalcoptera</i>	Common Bronzewing	2023	Two seen at camp (31/10) and one or two seen along entrance road into site on most days.
		2024	Several pairs along entrance road most mornings and evenings. Occasionally elsewhere.
Cuculidae (Cuckoos)			
	Pallid Cuckoo	2024	Several heard most days, including around camp.
<i>Chalcites basalis</i>	Horsfield's Bronze-Cuckoo	2023	Heard at least once.
		2024	Heard daily in several locations.
	Black-eared Cuckoo	2024	Heard daily throughout; slightly less often than HBC.
Otididae (Bustards)			
<i>Ardeotis australis</i>	Australian Bustard	2023	One along highway

		2024	One along highway about half way between Mt Gibson and Wubin(21/09)
Accipitridae (Eagles, Kites, Goshawks)			
<i>Hamirostra melanosternon</i>	Black-breasted Buzzard	2023	Unconfirmed
<i>Hieraetus morphnoides</i>	Little Eagle	2023	One near Site 1 (30/10).
		2024	Pair near existing mine pits (second from north). Interacted with a Peregrine Falcon (21/09)
<i>Accipiter fasciatus</i>	Brown Goshawk	2023	Individual birds seen on most days (especially near Site 4, Site 3 and Site 2).
		2024	One soaring very high (300m +) in south (17/09). Probably a female. A male seen in same area on 18/09.
<i>Haliastur sphenurus</i>	Whistling Kite	2023	One along highway
	Spotted Harrier	2024	One over eucalypt woodland in north-east.
Strigidae (Hawk-Owls)			
<i>Ninox novaeseelandiae</i>	Southern Boobook	2023	Heard near camp most nights.
		2024	One flushed in woodland south-east of highway pit (19/09).
Meropidae (Bee-eaters)			
<i>Merops ornatus</i>	Rainbow Bee-eater	2023	Few seen and heard throughout.
Alcedinidae (Kingfishers)			
<i>Todiramphus pyrrhopygius</i>	Red-backed Kingfisher	2023	Seen once
		2024	Heard in woodland near northern pit (19/09) and during Whiteface Walk between sanctuary road and mine (20/09).
	Sacred Kingfisher	2024	One seen 17/09.
Falconidae (Falcons)			
<i>Falco cenchroides</i>	Nankeen Kestrel	2023	unconfirmed
<i>Falco longipennis</i>	Australian Hobby	2023	unconfirmed

<i>Falco berigora</i>	Brown Falcon	2023	One east of site 1 (30/10). One seen or heard most days within survey area.
		2024	Seen and heard most days; just one or two birds
<i>Falco peregrinus</i>	Peregrine Falcon	2023	Pair reported (J. Hesford) to breed in slope of highway it to NW. Pair seen near site 5 (and near a large pit) on 1/11 and 4/11.
		2024	One seen near second from north pit 21/09.
Cacatuidae (Cockatoos and Corellas)			
<i>Calyptorhynchus banksii</i>	Red-tailed Black-Cockatoo	2023	Highway
		2024	Group of about seven near camp in evenings; smaller groups occasionally throughout but mostly in Eucalypt Woodland.
<i>Eolophus roseicapilla</i>	Galah	2023	Highway
		2024	Two seen near camp (16/09) and several between Sanctuary Road and mine during Whiteface Walk; including one entering a hollow (20/09).
	Major Mitchell's Cockatoo	2024	Pair seen in Eucalypt Woodland in north and par in Woodland near camp (18/09).
<i>Cacatua sanguinea</i>	Little Corella	2023	Uncertain record
		2024	Flock of six birds in Whiteface Walk between Sanctuary Road and mine (2009).
Psittaculidae (Parrots, Lorikeets and Rosellas)			
	Cockatiel	2024	Apparently single birds and a few pairs seen and heard occasionally
<i>Psephotellus varius</i>	Mulga Parrot	2023	Pair along access road in north (30/10). Group of five at camp (2/11) and several around old offices, including a juvenile.
		2024	Few pairs seen
<i>Barnardius zonarius</i>	Australian Ringneck	2023	Seen occasionally throughout. Not common. Usually pairs.
		2024	Seen occasionally throughout; usually in pairs
	Regent Parrot	2024	Few pairs and small flocks seen and heard regularly.

	Budgerigar	2024	Occasional flocks of <20 birds on 17/09 only
Climacteridae (Treecreepers)			
<i>Climacteris rufus</i>	Rufous Treecreeper	2023	Few seen and heard in Eucalypt tall woodland regularly.
		2024	Few seen and heard in Eucalypt tall woodland regularly.
Maluridae (Fairy-wrens, Emu-wrens and Grasswrens)			
<i>Malurus pulcherrimus</i>	Blue-breasted Fairy-wren	2023	Party in acacia shrubland in north of airstrip (1/11). Coloured male seen clearly; coverts same blue as crown, and no pale lavender on upper flank. Breast not seen well but suggestion of Prussian blue. Adult female had large rufous eye-ring same colour as beak.
<i>Malurus splendens</i>	Splendid Fairy-wren	2023	Recorded in bird surveys.
		2024	Parties encountered throughout
	White-winged Fairy-wren	2024	Several parties in chenopod shrublands near salt lakes to NE
Meliphagidae (Honeyeaters and Chats)			
<i>Lichmera indistincta</i>	Brown Honeyeater	2023	Few heard around old offices (2/11).
		2024	Few heard near old mine offices; presumably linked to planted eucalypts
<i>Melithreptus brevirostris</i>	Brown-headed Honeyeater	2023	Group seen near site 7 in mallee (1/11, 5/11).
<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater	2023	Heard and seen in woodland to mallee areas.
		2024	Seen and heard regularly throughout but mostly in mallee areas
<i>Gavicalis virescens</i>	Singing Honeyeater	2023	Individual birds common throughout.
		2024	Seen occasionally; one carrying food, presumably to a nest, near old mine offices.
<i>Ptilotula ornata</i>	Yellow-plumed Honeyeater	2023	Few seen and heard in eucalypt woodland.
		2024	Few seen and heard in eucalypt woodland
<i>Purnella albifrons</i>	White-fronted Honeyeater	2023	Heard and seen in woodland to mallee areas.

		2024	Appeared numerous throughout but especially in shrublands and mallee
	Pied Honeyeater	2024	One or two birds present almost everywhere; quite vocal.
<i>Manorina flavigula</i>	Yellow-throated Miner	2023	Heard and seen in tall eucalypt area.
	Crimson Chat	2024	Small flock seen on edge of road near waste dump
Pardalotidae (Pardalotes)			
<i>Pardalotus striatus</i>	Striated Pardalote	2023	Heard in eucalypt tall woodland.
		2024	Heard in eucalypt areas.
Acanthizidae (Thornbills and Gerygones)			
<i>Smicronis brevirostris</i>	Weebill	2023	Few in eucalypt areas.
<i>Pyrrholaemus brunneus</i>	Redthroat	2023	Seen and heard occasionally
		2024	Few heard. Group of three juveniles very inquisitive near Highway Pit; suggests recent breeding.
<i>Calamanthus campestris</i>	Rufous Fieldwren	2023	Heard occasionally in low shrubland
	Shy Heathwren	2024	One heard and seen in low shrubland in east, along powerline (18/09)
<i>Aphelocephala leucopsis</i>	Southern Whiteface	2023	Party around camp in scattered shrubs and open herbfield with eucalypt woodland nearby.
		2024	Two seen in SE in area of open ground near rocks, scattered but dense shrubs and eucalypts. A lot of searching in apparently suitable environments failed to locate any more in the development envelope or nearby. Whiteface Walk between Sanctuary Road and mine yielded at least six parties...for about 8km walking. Tended to be in areas of dense acacias with extensive bare areas between; often carpeted with annuals. But large areas without Whiteface looked like this. The development envelope has little of this vegetation type.
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill	2023	Seen and heard occasionally

<i>Acanthiza apicalis</i>	Inland Thornbill	2023	Seen occasionally in most woodland and mallee areas. Also in acacia shrubland.
		2024	Seen occasionally throughout wherever there were shrubs
<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill	2023	Seen regularly in most woodland and mallee areas.
		2024	Seen regularly throughout
Pomatostomidae (Australian Babblers)			
<i>Pomatostomus superciliosus</i>	White-browed Babbler	2023	Party at Site 3 (30/10) and in airstrip area (1/11).
		2024	Parties seen and heard occasionally.
Campephagidae (Cuckoo-shrikes and Trillers)			
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	2023	One or two seen most days.
		2024	Seen just once or twice over the whole period
	White-winged Triller	2024	Abundant; calling everywhere
Cinclosomatidae (Quail-thrush)			
<i>Cinclosoma castanotum</i>	Chestnut (Copper-backed) Quail-thrush	2023	Heard or seen regularly, more or less throughout.
		2024	Heard occasionally; rarely seen.
Pachycephalidae (Whistlers, Shrike-thrushes and allies)			
<i>Pachycephala rufiventris</i>	Rufous Whistler	2023	Heard or seen occasionally, throughout.
		2024	Seen and heard regularly throughout
<i>Pachycephala pectoralis occidentalis</i>	Western Whistler	2023	Heard near site 6 in mallee and thickets (1/11).
		2024	One heard in dense tall shrubland of acacia and melaleuca north-west of Highway Pit (20/09).
<i>Colluricincla harmonica</i>	Grey Shrike-thrush	2023	Seen and heard occasionally in areas of tall thickets and mallee.
		2024	Seen and heard regularly in areas of tall thickets and mallee
	Gilbert's Whistler	2024	Heard at one location in east along power line, from thicket (18/09).

Oreoicidae (Australo-Papuan Bellbirds)			
<i>Oreica gutturalis</i>	Crested Bellbird	2023	Heard site 2 (30/10).
		2024	Heard regularly and throughout
Artamidae (Woodswallows, Currawongs, Butcherbirds and Magpie)			
<i>Strepera versicolor</i>	Grey Currawong	2023	Heard near site 4 (30/10). One seen along airstrip road near site 6 (1/11).
		2024	Heard once; in east of 18/09.
<i>Gymnorhina tibicen</i>	Australian Magpie	2023	Party around camp.
		2024	Heard in eucalypt woodland in north (18/09).
<i>Cracticus nigrogularis</i>	Pied Butcherbird	2023	Camp.
		2024	Heard along entrance road at Blind Hill (19/09)
<i>Cracticus torquatus</i>	Grey Butcherbird	2023	Heard near site 6 (1/11).
		2024	Heard occasionally throughout
<i>Artamus cinereus</i>	Black-faced Woodswallow	2023	Few around eucalypt woodland.
		2024	Three seen in SE (19/09).
<i>Artamus minor</i>	Little Woodswallow	2023	Few around mine pits and around old offices.
		2024	Few around northern mine pits and a pair carrying food into a tree hollow nearby.
	Dusky Woodswallow	2024	Several in eucalypt woodland near northern mine pits (18/09).
Rhipiduridae (Fantails)			
<i>Rhipidura leucophrys</i>	Willie Wagtail	2023	Pair at old offices. Occasional individuals throughout.
		2024	One seen during Whiteface Walk between Sanctuary Road and mine (20/09).
Corvidae (Crows and Ravens)			
<i>Corvus orru</i>	Torresian Crow	2023	Camp.
		2024	Heard occasionally in project area and near camp

<i>Corvus coronoides</i>	Australian Raven	2023	Seen and heard occasionally.
Petroicidae (Australian Robins)			
<i>Petroica boodang</i>	Scarlet Robin	2023	Unconfirmed
<i>Petroica goodenovii</i>	Red-capped Robin	2023	Unconfirmed.
		2024	Female seen apparently nest-building. Seen and heard a few times only.
<i>Microeca fascinans</i>	Jacky Winter	2023	Unconfirmed
<i>Drymodes brunneopygia</i>	Southern Scrub-robin	2023	Heard in Allocasuarina closed tall shrubland and in Acacia shrubland. Recorded on camera.
		2024	Heard regularly in dense, low vegetation and a few seen.
<i>Eopsaltria griseogularis</i>	Western Yellow Robin	2023	Unconfirmed
Estrildidae (Weaver Finches)			
<i>Taeniopygia guttata</i>	Zebra Finch	2023	Flock of 15 at old offices (2/11).
Hirundinidae (Swallows and Martins)			
<i>Cheramoeca leucosterna</i>	White-backed Swallow	2023	Unconfirmed
<i>Petrochelidon nigricans</i>	Tree Martin	2023	Few around camp and old offices. Very common in eucalypt woodland at Site 5.
		2024	Very common in eucalypt woodland
<i>Hirundo neoxena</i>	Welcome Swallow	2023	Few around old offices.
Tachyglossidae (Echidnas)			
<i>Tachyglossus aculeatus acanthion</i>	Short-beaked Echidna	2023	Diggings throughout.
		2024	Few diggings.
Macropodidae (Kangaroos)			
	Red Kangaroo	2024	One large male seen; lots of large macropod tracks but only one sighting

<i>Macropus fuliginosus melanops</i>	Western Grey Kangaroo	2023	One seen along entrance road evening 1/11.
Muridae (Rats and mice)			
<i>Mus musculus</i>	House Mouse	2023	Trapping.
<i>Notomys mitchellii</i>	Mitchell's Hopping-mouse	2023	Camera-trapping.
<i>Taphozous</i>		2024	Several roosting in small groups in hollow metal crossbeams of power poles in east. Disturbed readily in daylight (18/09).
Leporidae (Rabbits and hares)			
<i>Oryctolagus cuniculus</i>	Rabbit	2023	Seen and on camera
		2024	Tracks, scat and diggings widespread. Jamie saw two!
Canidae (Dogs)			
	Dingo	2024	Old tracks under powerlines in east.
<i>Vulpes vulpes</i>	Red Fox	2023	Scats and tracks.
Felidae (Cats)			
<i>Felis catus</i>	Cat	2023	Scats and tracks. Camera-trapping.
		2024	Tracks throughout

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