Biota Environmental Sciences

Winu Project MNES Fauna Supporting Information

Prepared for

Rio Tinto Winu

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Biota Environmental Sciences

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Winu Project MNES Fauna Supporting Information

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1.0 Introduction

1.1 Project Background

Rio Tinto Winu Pty Ltd (RTW) are proposing to develop a new copper-gold mine (the Winu Project), located approximately 320 km east of Port Hedland in the Pilbara region of Western Australia within both the Nyangumarta and Martu Peoples' Native Title Determination Areas. Key terminology for the Winu Project is defined in Table 1.1.

Table 1.1: Key terminology for the Winu Project.

Term	Definition
The Project	Includes the development of a new below-water table copper-gold deposit and associated infrastructure and activities required to access, process and transport ore.
Development Envelope (DE)	Refers to the combined areas of the mine and infrastructure area, road access corridor and regional borefield, Rimfire. All activities will occur within this area (23,649 ha).
Mine and Infrastructure Area (MIA)	Refers to the area containing the mineralised deposit and related infrastructure (10,182 ha). This is the Winu mine site.
Road Access Corridor (RAC)	Refers to the Access Road, which encompasses the entire length of the existing Access Road from Great Northern Highway to the Winu Project Area (6,647 ha).
Rimfire Borefield (Rimfire)	Refers to the regional borefield located at Rimfire, which is approximately 31 km from the MIA (6,820 ha).
Disturbance Footprint	Refers to the indicative direct disturbance area for the Project (4,878 ha).

RTW's proposal was referred to the Department of Climate Change, Energy, the Environment and Water (DCCEEW) for assessment (EPBC 2025/10208). In order to inform the referral decision, DCCEEW have requested additional information in relation to *"Listed threatened species and ecological communities (s18 and 18a)"*. Biota Environmental Sciences (Biota) has been commissioned to address this request.

1.2 Purpose and Aims of this Report

The purpose of this report is to provide the additional information requested by DCCEEW in relation to the following four threatened species (as listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)):

1. Black-footed Rock-wallaby (*Petrogale lateralis lateralis*) - EPBC Act Endangered;
2. Northern Quoll (*Dasyurus hallucatus*) - EPBC Act Endangered;
3. Princess Parrot (*Polytelis alexandrae)* - EPBC Act Vulnerable; and
4. Grey Falcon (*Falco hypoleucos*) - EPBC Act Vulnerable.

This report aims to provide baseline data for the above listed species via discussion of survey effort and survey findings arising from biological survey work undertaken in relation to the Winu DE. Specifically, this report aims to meet the following items from DCCEEW's request for further information:

- *"Item 2.2b: For the Black-footed Rock-wallaby, Northern Quoll, Grey Falcon and Princess Parrot, the preliminary documentation should include a discussion on the adequacy of the*

surveys in determining the presence or absence of each species, local population size, distribution and habitat for each species, including how the surveys met the requirements under relevant departmental survey guidelines. Please provide the targeted surveys undertaken for these species.

- *Item 2.2c: For these fauna species, the following information is also required for the Department to further assess these impacts but are not limited to:*
  -Quantification of the extent of habitat and the number of individuals likely to be impacted, or historical patterns of use by those species, within the proposed action area and surrounds (including mapping identifying known and/or potential habitat).
  -Assessment of the quality and importance of known or potential habitat for the relevant listed species within the proposed action area and surrounds."

2.0 Survey Effort

A significant amount of biological survey work has been undertaken by Biota within the Winu DE and in the broader locality between 2017 and 2024 for the purposes of environmental impact assessment (EIA) for both the Winu Project and the Australian Renewable Energy Hub (AREH, previously the Asian Renewable Energy Hub) Project. In summary, the consolidated survey effort comprises:

- a three-phase detailed fauna survey for the AREH Project (which overlaps with the RAC) (Biota 2022a);
- a targeted fauna survey for AREH (Biota 2024a);
- three phases of migratory shorebird and waterbird studies for AREH (Biota 2018, 2022b);
- a two-phase seasonal detailed fauna survey of the MIA (Biota 2021);
- targeted surveys of a Bilby population south of the MIA (2019, 2022 and 2024 censuses)(Biota 2020, 2023a, 2024b); and
- six basic and targeted fauna surveys across the MIA, RAC and regional borefield options as the project developed (Biota 2022c, 2023b, 2023c).

A total of 741 sites were surveyed across the consolidated survey effort, with 398 of these located inside of the DE and 343 located outside (see Biota (2025) for further details). In addition to the survey sites, a total of 145 habitat assessments were undertaken, with 36 inside of the DE and 109 outside.

2.1 Legislation and Policy Conformance

All surveys were completed, as far as practicable, in accordance with the following relevant State and Commonwealth policy or guidance:

- Environmental Factor Guideline: Terrestrial Fauna (EPA 2016);
- Technical Guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment (EPA 2020);
- Survey guidelines for Australia's threatened mammals: Guidelines for detecting mammals listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999* (DSEWPaC 2011);
- Survey Guidelines for Australia's Threatened Birds: Guidelines for detecting birds listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999* (DEWHA 2010);
- Guidelines for Surveys to Detect the Presence of Bilbies, and Assess the Importance of Habitat in Western Australia (DBCA 2017);
- Matters of National Environmental Significance – Significant Impact Guidelines (Department of the Environment 2013); and
- EPBC Act referral guideline for the endangered Northern Quoll, *Dasyurus hallucatus*, EPBC Act Policy Statement (Commonwealth of Australia 2016).

2.2 Survey Methodologies

Detailed methodologies employed in the consolidated body of survey work are summarised in Biota (2025) and detailed in the supporting reports cited in Section 2.0. Table 2.1 provides an overview of the methods utilised to target the Black-footed Rock-wallaby, Northern Quoll, Princess Parrot and Grey Falcon.

Table 2.1: Overview of survey methods utilised for the four threatened species across AREH and Winu projects.

Species	Systematic Methods	Non-systematic Methods
Black-footed Rock-wallaby	• combination Elliott and cage trap transects.	• targeted searches – flyovers via helicopter to identify rockpiles, rockpile searches, and searches undertaken in rocky habitat for sign evidence of the two target species; • general searches carried out on foot; • nocturnal searches via road spotting (driving slowly and spotting animals from the car) as well as searches undertaken on foot using head-torches; and, • infrared motion camera deployment in rocky habitat.
Northern Quoll	• combination Elliott and cage trap transects; and • Elliott trap transects.	
Princess Parrot	• unbounded avifauna area searches (20 - 30 minutes in duration) conducted within defined habitats at systematic trapping sites (pitfall, funnel, Elliott traplines)	• opportunistic observations of birds whilst traversing the study areas; and • unbounded area searches conducted at opportunistic locations containing habitats or microhabitats likely to support previously unrecorded species.
Grey Falcon		

2.3 Fauna Habitat Mapping

Five rationalised fauna habitats (plus disturbed/cleared areas) were defined within the Winu DE through consolidation of the supporting studies reported on in Biota (2025). One additional habitat, Rocky outcropping, also occurs outside of the DE in the Winu locality. The rationalised habitats and their representation within the Winu DE and disturbance footprint are presented in Table 2.2.

Table 2.2: Fauna habitats of the Winu DE and disturbance footprint.

Habitat	DE	Disturbance Footprint
Shrub and spinifex on sandplain	17,039 ha (72%)	3,683 ha (75%)
Inland sand dune	3,105 ha (13%)	815 ha (17%)
Gravelly lateritic rises	3,116 ha (13%)	238 ha (5%)
Clayey sandplain with termitaria	125 ha (<1%)	39 ha (1%)
Ephemeral claypan	49 ha (<1%)	Nil
Disturbed/cleared areas	214 ha (<1%)	102 ha (2%)

2.3.1 Habitat Significance

The value of these fauna habitats for the four threatened species has been assessed with reference to the Department of the Environment's (2013) definition of *"habitat critical to the survival of a species or ecological community"* which refers to areas that are necessary for:

- activities such as foraging, breeding, roosting, or dispersal;
- the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators);
- maintaining genetic diversity and long-term evolutionary development; or
- the reintroduction of populations or recovery of the species or ecological community.

3.0 Black-footed Rock-wallaby

3.1 Background

The Black-footed Rock-wallaby (*Petrogale lateralis lateralis*) is listed as Endangered under the EPBC Act. The species was once more widely distributed but has declined in distribution and abundance across its former range (Willers et al. 2011). It has the largest geographical distribution of any rock-wallaby species, but now only occurs in widely disjunct populations, from Barrow Island in northwest WA to the Salisbury Islands off the Esperance coast to the south, and east to the Calvert Ranges in the Little Sandy Desert (Willers et al. 2011).

Factors contributing to the species' decline include predation by introduced carnivores (e.g. feral cats and foxes), competition from introduced herbivores (e.g. goats and rabbits), habitat degradation and insect plagues (Willers et al. 2011). Known predators include foxes, dingoes/dogs, feral cats, eagles, pythons and large goannas (Eldridge and Pearson 2008).

3.2 Habitat

Habitat critical to the survival of Black-footed Rock-wallaby is that where sufficient caves and crevices exist to provide shelter from extremes of temperatures and predators. Rockpiles, rocky outcroppings and other rocky habitat are critical shelter habitat for the Black-footed Rock-wallaby, as it provides shelter in the form of caves, cliffs and boulder screes during the day. Black-footed Rock-wallabies are primarily crepuscular and nocturnal, emerging from their rocky shelters to feed on grasses, forbs, browse and occasionally seeds and fruits such as figs (Pearson et al. 2016). Feeding occurs as close to shelter as possible (especially if predators are present), however if food is not available near an area of shelter, they will move up to several hundred metres away to obtain it ((Eldridge and Pearson 2008) cited in Threatened Species Scientific Committee (2016)).

3.3 Survey Adequacy

The Black-footed Rock-wallaby was initially detected in the Winu locality within an area of rockpiles east of the RAC (Biota 2022a). Additional search effort was then targeted at the neighbouring rockpiles in this area. Rockpiles were recorded opportunistically during helicopter flyovers and were then ground-truthed, with targeted searches and habitat assessments undertaken. Sign evidence of the Black-footed Rock-wallaby (scats or tracks) and potential food sources (e.g. *Ficus* spp.) were recorded (see Biota (2021)). Most effort targeting this species was directed at recording presence via sign, in order to maximise the amount of prospective rocky habitat that could be searched. In addition to this, one combination Elliott and cage trapping transect was also deployed, as well as 13 baited motion cameras which were set up in rocky areas to target the species. These methods are in accordance with those recommended for the species (DSEWPaC 2011). The total survey effort expended targeting the Black-footed Rock-wallaby is discussed and summarised below (see Table 3.1) and locations of sampling sites are presented in Figure 3.1.

3.3.1 Elliott and Cage Trapping

One combination Elliott and cage trap transect was deployed in Rocky outcropping habitat outside of the DE during Phase 1 of the detailed survey for the AREH project (Biota 2022d). This trap line was not run for subsequent phases due to temperature constraints. Five cages were run over seven nights, amounting to a total effort of 35 nights.

3.3.2 Motion Cameras

A total of 13 baited motion cameras were deployed targeting the Black-footed Rock-wallaby in Rocky outcropping habitat outside of the Winu DE. The total survey effort was 937 camera nights, which comprised eight cameras deployed for between 4-7 nights and five long-term camera deployments, each for 179 nights. None of the motion camera sites were located within the Winu DE due to an absence of suitable habitat for the species within the Winu DE.

3.3.3 General Searches

In addition, 196 diurnal (157 inside the Winu DE) and 10 nocturnal searches (nine within Winu DE) were also conducted, which had potential to record the species through direct observation or detection of secondary signs.

3.3.4 Targeted Searches

A total of 45 targeted searches were undertaken specifically targeting the Black-footed Rock-wallaby in Rocky outcropping habitat. At the time the searches were completed, the Winu DE encompassed a greater proportion of rocky habitat. However, due to changes in the definition of the project, only two of these search locations now sit within the current Winu DE as the DE was modified to avoid the Rocky outcropping habitat.

3.3.5 Nocturnal Searches

Ten nocturnal searches were undertaken (nine within the DE), which had potential to record the species through direct observation or detection of secondary signs.

Table 3.1: Summary of survey effort targeting Black-footed Rock-wallaby in Winu locality.

	Survey Effort	
Survey Methodology	**Inside DE**	**Outside DE**
Systematic Methods		
Elliott and cage trap line	Nil (due to lack of habitat)	1 site (35 cage nights)
Non-systematic Methods		
Motion Camera (short and long-term deployments)	Nil (due to lack of habitat)	13 sites (937 camera nights)
General Searches	157 searches	39 searches
Targeted Searches	2 searches	43 searches
Nocturnal Searches	9 searches	1 search

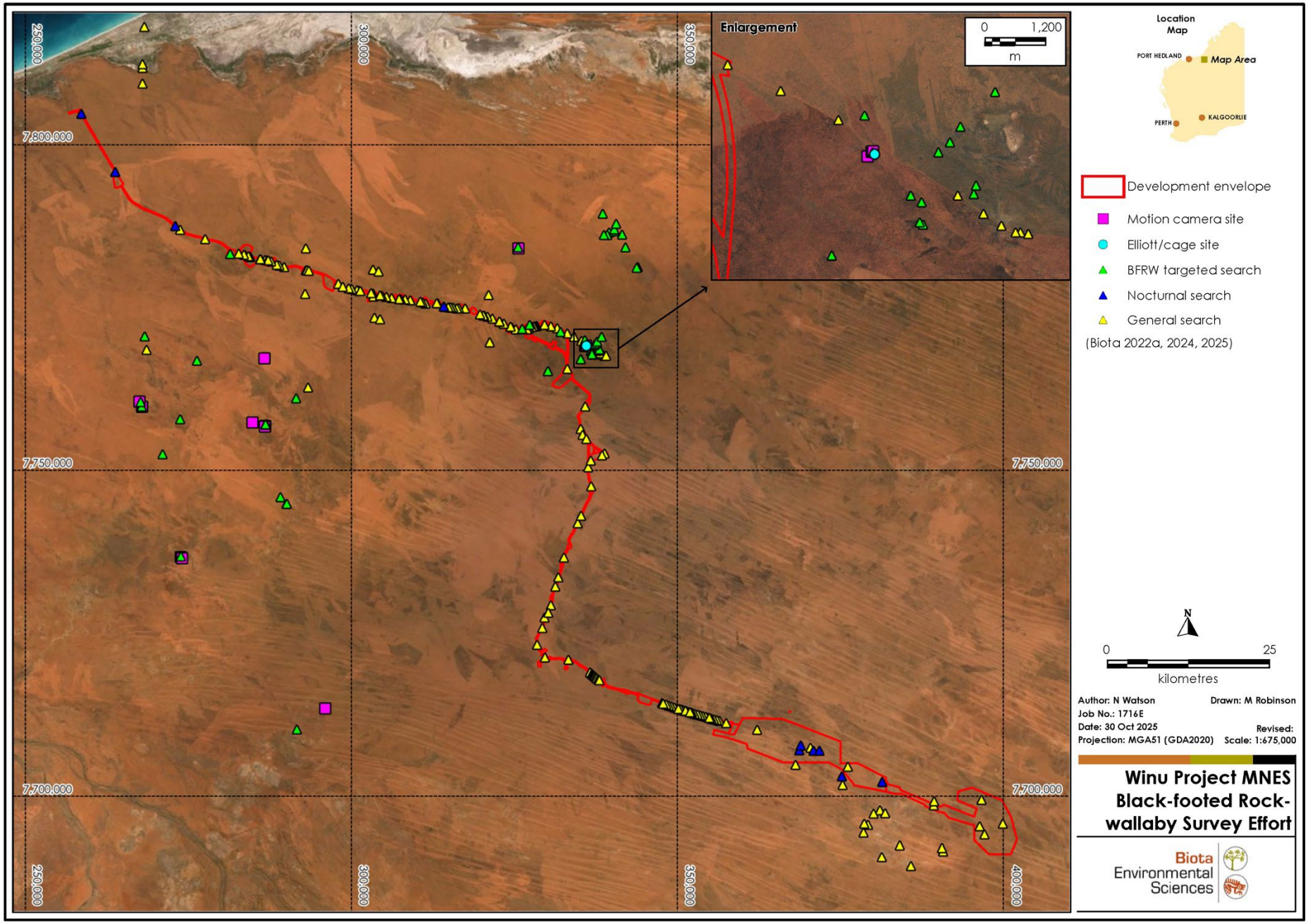

Figure 3.1: **Survey effort targeting the Black-footed Rock-wallaby in the Winu locality.**

3.4 Survey Findings

3.4.1 Records

The Black-footed Rock-wallaby was recorded during surveys for both the AREH and Winu projects. At the time, these records represented the most recent record of the species from the Great Sandy Desert, and a previously unknown colony. The location of this population is at the margin of the distribution of the nominate subspecies *lateralis* and the West Kimberley subspecies *kimberleyensis* which was formally described in 2020 (Eldridge and Potter 2020). Other populations in the Great Sandy Desert have been attributed to *lateralis* so we treat this population as such. The next nearest records of the species are over 300 km away from the Winu records (data sourced from ALA database Oct. 2025) (Figure 3.2).

Targeted searches yielded numerous scat and track records. In addition, two individuals were recorded in cage traps. Individuals were also recorded on motion cameras and sighted on the rock piles just after dawn (Plate 3.1- Plate 3.5). Records of the species were concentrated around two areas of rockpiles northeast of the RAC (Figure 3.2);

- Rockpile area A: approximately 1-3 km east-northeast of the eastern RAC section of the DE; abundant scats recorded and individuals regularly sighted and recorded on motion cameras from 2017 – 2023 (Biota 2021, 2022d, 2024a); and
- Rockpile area B: approximately 16 km northeast of the eastern RAC section of the DE; abundant scats were recorded here in 2018 (Biota 2022d).

The closest distance between records from these two areas is approximately 14 km. It is not known if individuals move between the two rockpile areas. Outside of these two areas of activity, a single track and scat were also recorded approximately 22 km and 34 km south of the western section of the RAC, respectively, during a 2023 survey for the AREH project (Biota 2024a) (Figure 3.2). The scat was found in Rocky outcropping habitat and was not fresh. Attempted molecular analysis failed to confirm species identification (Biota 2024a). The scat location is approximately 65-75 km west-southwest of the rockpile areas A and B (Figure 3.2).

3.4.1.1 Recorded Threats

A targeted 2023 survey for the AREH project deployed motion cameras within rockpile area A and recorded Black-footed Rock Wallaby and a feral cat at the same site within the same recording period (Plate 3.6 - Plate 3.7) (Biota 2024a). The presence of feral cats at the rock piles represents a significant threat to the Black-footed Rock-wallaby.

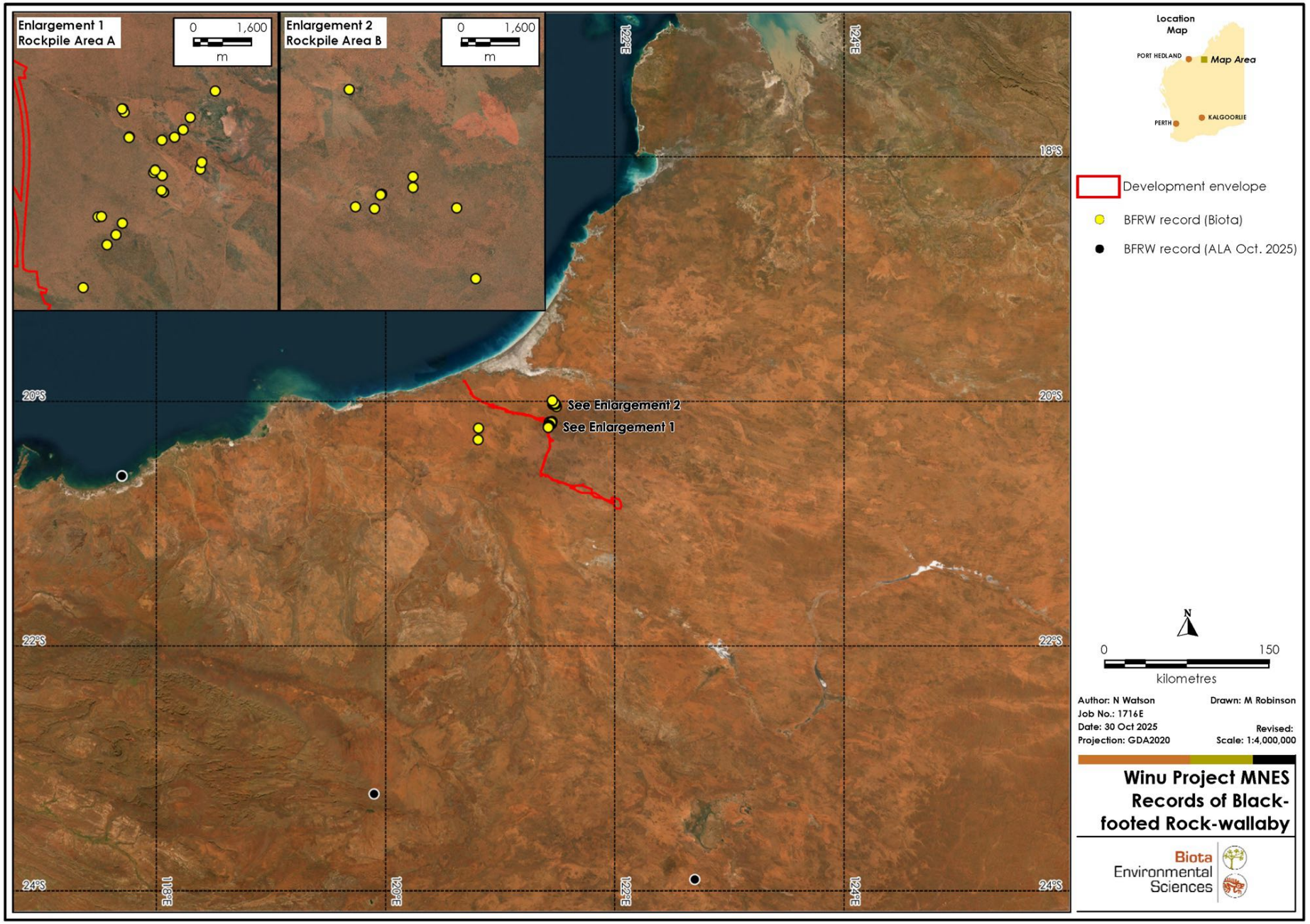

Figure 3.2: **Records of the Black-footed Rock-wallaby from Winu and the wider locality.**

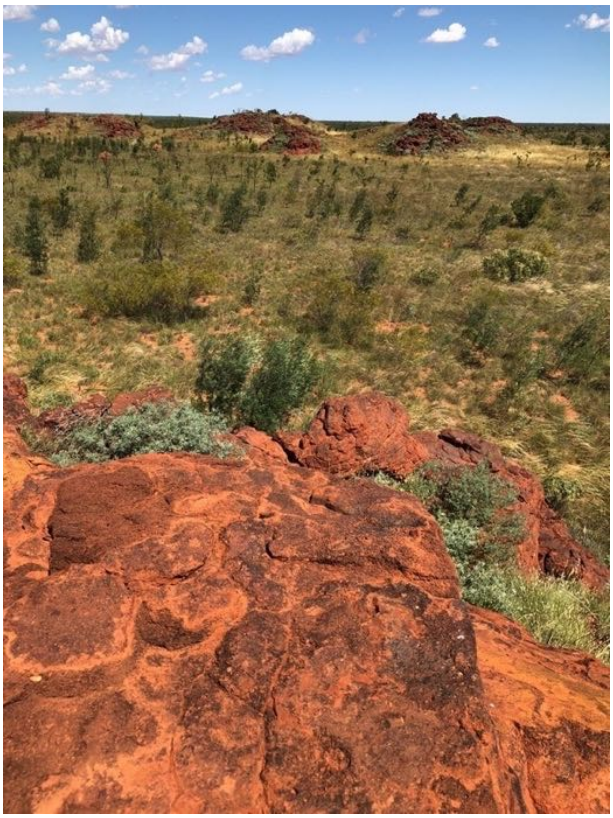

Plate 3.1: **Black-footed Rock-wallaby habitat (Biota 2021).**

Plate 3.2: **Black-footed Rock-wallaby shelter and scat piles (Biota 2021).**

Plate 3.3: **Black-footed Rock-wallaby tracks (Biota 2021).**

Plate 3.4: **Black-footed Rock-wallaby recorded on a motion camera (Biota 2021).**

Plate 3.5: **Individual observation of a Black-footed Rock-wallaby (Biota 2021).**

Plate 3.6: **Black-footed Rock Wallaby recorded on motion camera (Biota 2024a).**

Plate 3.7: **Feral cat recorded on motion camera (Biota 2024a).**

3.4.2 Habitat at Winu

Rockpiles and rocky outcroppings in the Winu locality represent locally restricted shelter habitat for the Black-footed Rock-wallaby. We also recognise that an area of vegetation around the rockpiles and rocky outcroppings would represent important foraging habitat. A review of research on the Black-footed Rock-wallaby, as well as other species of rock-wallaby, found that for rock-wallabies in general, "*home range sizes appear to vary significantly, from just a few hectares up to 160 hectares, however the majority of studies have suggested that rock-wallabies forage within 400 m of their diurnal refuge (Lim, 1988; Jarman & Bayne, 1997; Telfer & Griffiths, 2006; Sharp, 2009). Variability may be due to weight, sexual, and food availability differences (Telfer & Griffiths, 2006; Sharp 2009*)" (Pentland 2014). A lower estimate of foraging range of 100 m was suggested by Pearson (2013), again referring to rock-wallabies in general, "*their close association with rocky habitats makes it relatively easy to delineate the habitat that is potentially suitable for rock wallabies to use for shelter. Their limited foraging zone (usually within 100 m of outcrops) means that their effective shelter and foraging areas can be estimated*."

Specific to the Black-footed Rock-wallaby, Pearson et al. (2016) observe that "*the species is typically sedentary. Males can wander widely in search of mates and females can also move*

large distances. They are known to move up to 300 m from rockpiles to forage but this only seems to occur in exceptional circumstances e.g. when numbers are high. The presence of feral predators has been shown to set up a predator-fear behavior which restricts the animals to only forage close to their shelter sites, within 30 m (Pentland 2015). Black-footed Rock-wallaby are known to disperse several kilometers, but such long-range dispersal is infrequent based on the genetic structuring of populations. The minimum area required to support a viable population is not known and is dependent on many factors. Certainly, the Black-footed Rock-wallaby is able to live in relatively small rockpiles with small numbers of individuals for many years. They appear to be able to tolerate high levels of inbreeding" (Pearson et al. 2016).

Though we identify the Rocky outcropping habitat as 'habitat critical to the survival of the species', the foraging habitat outside of the rockpiles is also of importance. Individuals would also occasionally travel outside of these areas for the ecological functions discussed above (e.g. long-range dispersal), but this is expected to be an infrequent (but not unexpected) occurrence.

3.4.3 Population at Winu

While the number of animals present in the colony/ies cannot be determined from the survey records, research from other rock-wallaby species indicates that group size appears to be linked to both the number and size of caves, such that the higher the number of shelter sites, the larger the colony ((Pentland 2014) and references therein). As numerous scats were collected and individuals were regularly sighted on Rocky outcropping habitat, this suggests a resident population for both rockpile areas A and B. Indeed, for rockpile area A, the closest to the Winu DE, the species has been recorded there over a six-year period from 2017-2023, validating that this rockpile area supports the persistence of the resident population of Black-footed Rock-wallabies in the Winu locality.

After the discovery of the Black-footed Rock-wallaby population/s, the Winu project modified the original route for the RAC to avoid the confirmed habitat for the species.

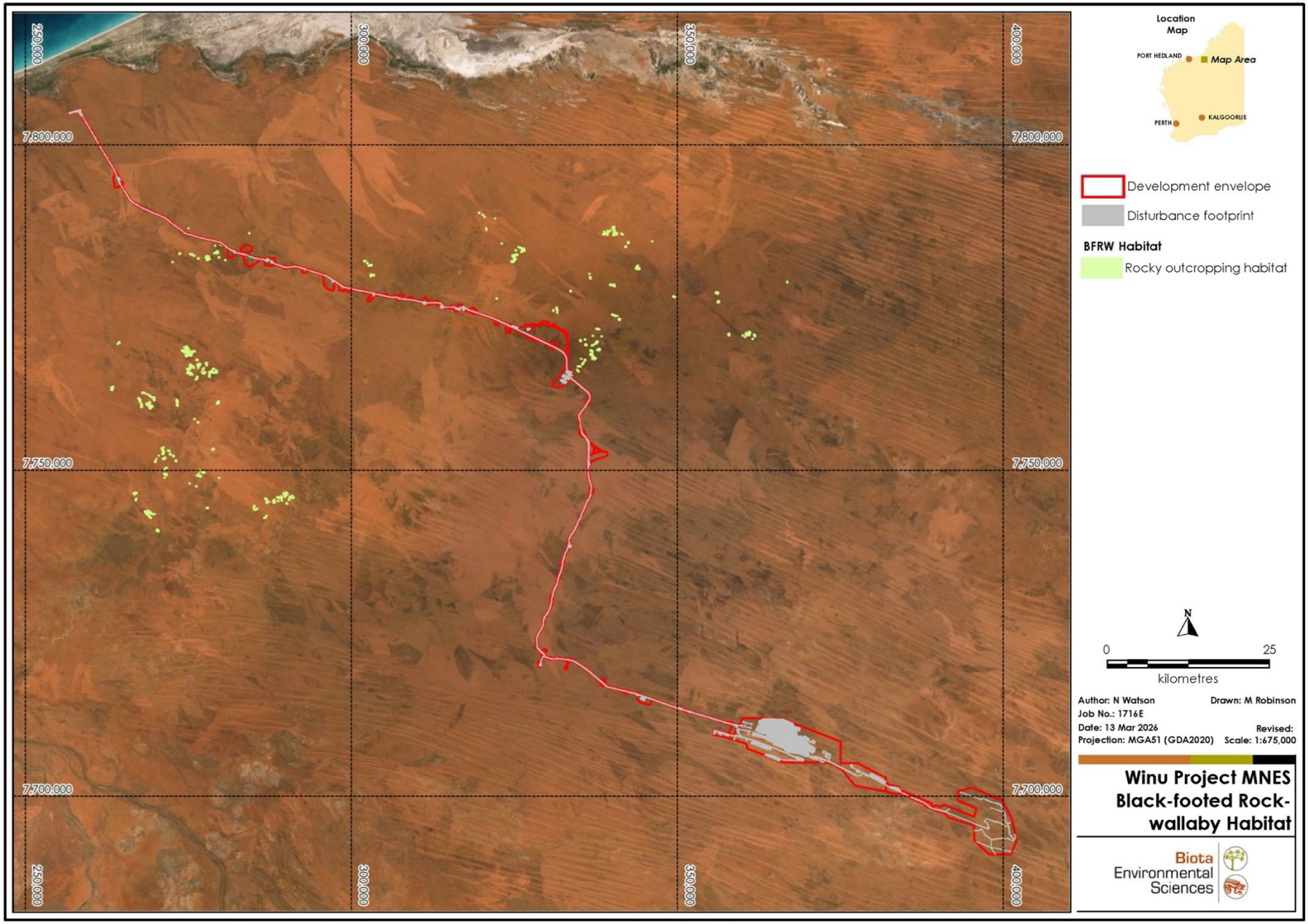

Figure 3.3: **Black-footed Rock-wallaby habitat in the Winu locality.**

4.0 Northern Quoll

4.1 Background

The Northern Quoll (*Dasyurus hallucatus)* is listed as Endangered under the EPBC Act. The Northern Quoll is a medium-sized dasyurid marsupial, with adult weight ranging from 300 g to 1,200 g. It is a partially arboreal and aggressive carnivore, preying on a varied diet of small invertebrates and vertebrates, including lizards, birds, snakes, small mammals and frogs (Oakwood 2008). It is also known to feed on fleshy fruit and carrion. The Northern Quoll is mostly nocturnal, although crepuscular (dusk and dawn) activity also occurs.

The Northern Quoll is a short-lived mammal, with both sexes maturing at 11 months. Females reproduce only once each year and all males die shortly after reproducing (Dickman and Braithwaite 1992, Oakwood 2000). The discrete male cohorts that arise within populations can make quolls susceptible to local population extinctions. If no juvenile male quolls survive to adulthood, there will be no males available for mating the following year and the local population will rapidly go extinct (Braithwaite and Griffiths 1994, Oakwood 2000). Therefore, any factor that results in significant increases in mortality rates of female and juvenile quolls could result in the loss of local populations. Northern Quolls are considered sedentary with a home range of about 35 ha (Commonwealth of Australia 2016).

On the mainland of Western Australia, the species is generally described as occurring within the Pilbara and northwest Kimberley, with the Great Sandy Desert thought to represent a barrier to gene flow between the two main populations, except during favourable conditions when movement between the two could occur (How et al. 2009). In 2015, the Northern Quoll was recorded in the Broadhurst and Throssell Ranges in the Little Sandy Desert representing a significant easterly range extension of approximately 200 km (Turpin and Bamford 2015). Then in 2019, the Northern Quoll was recorded on motion camera in Walyarta Conservation Park, in the Great Sandy Desert, 15 km north of Winu at its closest point (exact location of the Walyarta record not known).

4.2 Habitat

Core populations of the Northern Quoll persist in dissected rocky habitats (ranges, escarpments, gorges, boulder fields) as well as along major drainage lines and treed creek lines which support tree hollows and hollow logs (Turpin and Bamford 2015). Rocky areas provide prime habitat for the Northern Quoll by providing shelter and denning habitat in rock crevices and caves, as well as protection from predators and fire (Turpin and Bamford 2015).

The species makes a den in spaces amongst rocks or in log and tree hollows. Many records from the Pilbara bioregion have come from mesa and breakaway features abutting large creeks (Biota 2010) and from boulder tors of the Abydos-Woodstock Plain (How et al. 1991).

4.3 Survey Adequacy

Due to the overlap in habitat preferences between the Northern Quoll and Black-footed Rock Wallaby, the survey effort expended across both the Winu and AREH projects is the same for both species, with the exception of an additional Elliott trap transect being deployed for the Northern Quoll. Survey methods involved targeted and general searches (diurnal and nocturnal), baited motion camera deployment and Elliott and cage trapping. These methods are in accordance with those recommended for the species by DSEWPAC (2011). The overall

survey effort for the species is discussed and summarised below (see Table 4.1). The locations of sampling sites are presented in Figure 4.1.

4.3.1 Elliott and Cage Trapping

Two Elliott trap lines were deployed, one was a combination of 10 large and 25 medium sized Elliott traps and was run over two phases (total effort = 245 nights); the other was a combination of 40 medium, 20 large Elliott traps and 5 cage traps run only during one phase due to temperature considerations (total effort = 420 nights for Elliott traps, 35 nights for cage traps). Both sites were located in Rocky outcropping habitat outside of the Winu DE.

4.3.2 Motion Cameras

A total of 13 motion cameras were deployed targeting the Northern Quoll in Rocky outcropping habitat. The total survey effort totalled 937 nights which comprised eight cameras deployed for between 4-7 nights and five long-term camera deployments, each for 179 nights. None of the motion camera sites were located within the Winu DE due to an absence of suitable habitat for the species.

4.3.3 General Searches

In addition, 196 diurnal (157 inside the Winu DE) and 10 nocturnal searches (nine within Winu DE) were also conducted, which had potential to record the species via direct observation or via secondary signs.

4.3.4 Targeted Searches

A total of 45 targeted searches were undertaken specifically targeting the Northern Quoll in Rocky outcropping habitat. Only two of these searches which were within the Winu DE, reflecting the lack of preferred core habitat for this species occurring within the Winu DE.

4.3.5 Nocturnal Searches

Ten nocturnal searches were undertaken (nine within the DE), which had potential to record the species through direct observation or detection of secondary signs.

Table 4.1: Summary of survey effort targeting Northern Quoll in Winu locality.

	Survey Effort	
Survey Methodology	**Inside DE**	**Outside DE**
Systematic Methods		
Elliott/Elliott and cage trap sites	Nil (due to lack of habitat)	2 site (665 nights)
Non-systematic Methods		
Motion Camera (short and long-term deployments)	Nil (due to lack of habitat)	13 sites (937 nights)
General Searches	157 searches	39 searches
Targeted Searches	2 searches	43 searches
Nocturnal Searches	9 searches	1 search

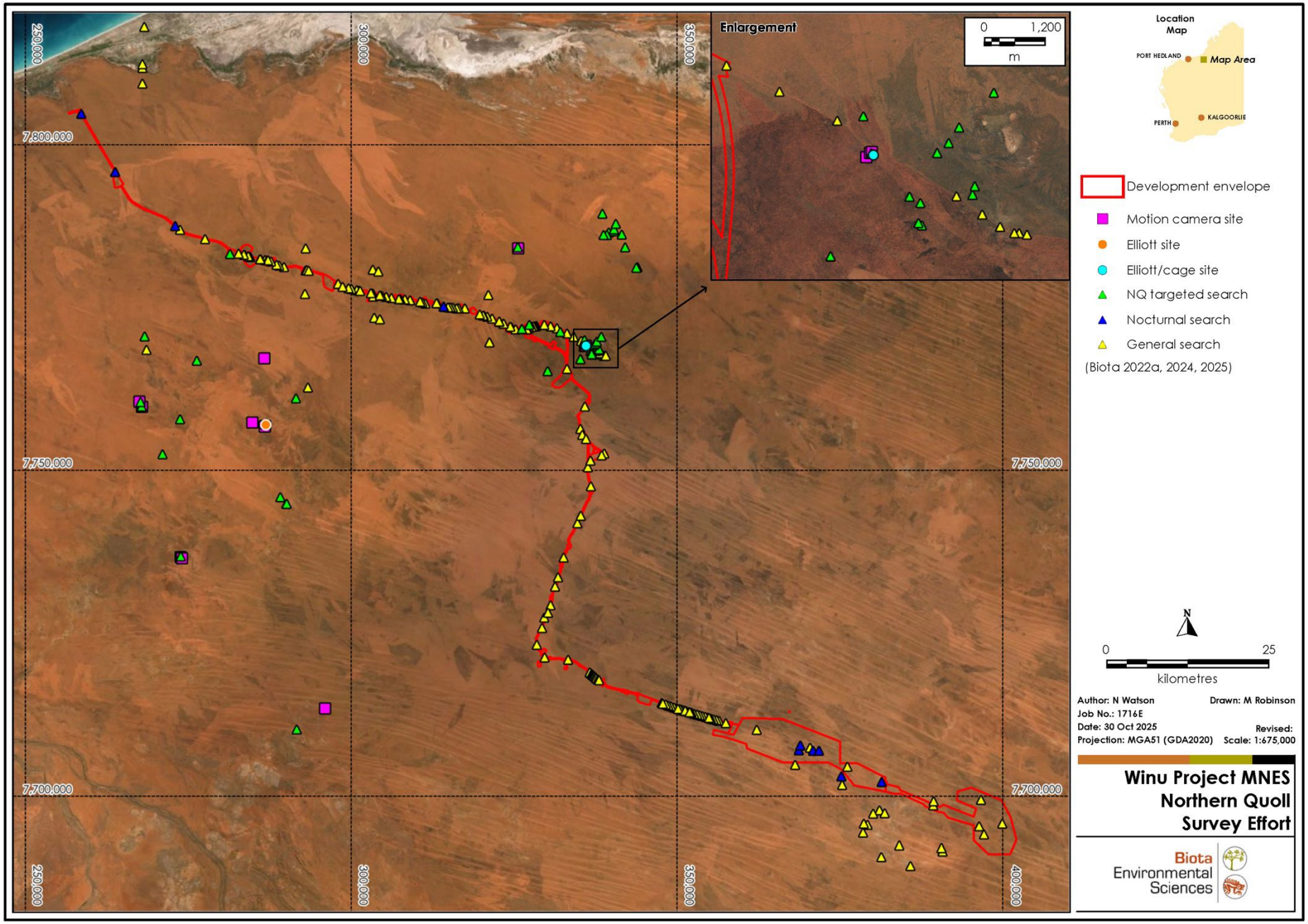

Figure 4.1: **Survey effort targeting the Northern Quoll in the Winu locality.**

4.4 Survey Findings

4.4.1 Records

Despite considerable survey effort, the Northern Quoll was only recorded in the Winu locality from two single scats during surveys for the AREH project (Biota 2022d). One scat was adjacent to the central RAC portion of the DE (approximately 270 m outside the DE), and the other was approximately 25 km south of the RAC (Biota 2022d) (see Figure 4.2; regional records from ALA database also shown[1]). No evidence of denning in the form of larger scat piles was recorded, no individuals were trapped and none were recorded on automated cameras. Areas utilised intensively by Northern Quolls are readily identified by the presence of latrines near their dens, which can remain in the landscape for many years even when the dens cease to be used. Given the extensive searches of rocky habitat undertaken to target both the Black-footed Rock-wallaby and Northern Quoll outside the DE, and the paucity of denning evidence of the Northern Quoll, it would suggest that the species occurs in the Winu locality at most on a transient basis and at a very low density.

4.4.2 Habitat at Winu

In the Winu locality, potential denning or shelter habitat for the Northern Quoll is represented by the Rocky outcropping habitat. While it is possible that all habitat types mapped within the DE may be used by the species to disperse or forage, we consider that the habitat types Shrub and spinifex on sandplain and Gravelly lateritic rises would be more likely be used by the Northern Quoll as these are the habitat types which occur adjacent to the Rocky outcropping habitat.

A study on the movement ecology of the Northern Quoll found that, "*while quolls do use structurally simple habitats like spinifex (*Triodia *spp.) grassland) in natural landscapes - often when moving between patches of favoured rocky habitat- they tend to be avoided where possible given the increased risk of encountering predators such as feral cats and dingoes"* (Cowan et al. 2024). Cowan et al. (2024) also found that, "*observed movement ranges had a higher proportion cover of rocky habitat compared to the available landscape, and all other habitats were used in proportion to their availability*". Other movement studies have shown that, "*Northern Quolls preferred rocky out-crops that also had greater vegetation cover <0.5 m in height and a higher number of den crevices - quolls were scarce in the surrounding grassland, but when they used it, they remained close to the rocky habitat and preferred areas of high vegetation cover*" (Gibson et al. 2023).

The EPBC Act referral guidelines for the Northern Quoll state that, "*habitat usually includes some form of rocky area or structurally diverse woodland or forest used for shelter purposes with surrounding vegetated habitats used for foraging and dispersal. Shelter habitat is important for breeding and refuge from fire and/or predation. Little is understood about the characteristics of foraging or dispersal habitat for the northern quoll. However, on current knowledge, foraging or dispersal habitat is recognised to be any land comprising predominantly native vegetation in the immediate area (i.e. within 1 km) of shelter habitat, quoll records or land comprising predominately native vegetation that is connected to shelter habitat within the range of the species"* (Commonwealth of Australia 2016).

4.4.3 Population at Winu

To understand the significance of the records from the Winu locality in the context of there being a local population, it is first important to understand movements and home ranges of the

[1] Northern Quoll records from Little Sandy Desert and Great Sandy Desert (discussed in Section 5.1) were absent from the ALA data.

Northern Quoll and likely distances Northern Quolls may cover when foraging or dispersing. A literature review was therefore undertaken of recent movement studies of the Northern Quoll.

Reported home range estimates are extremely variable for the species (Moore et al. 2021) and it has been acknowledged that estimates gained using VHF telemetry likely underestimated Northern Quoll home ranges. We focused on estimates from the Pilbara region, because the Northern Quoll record within the Winu locality represents one of the most northerly occurring of the Pilbara records.

One analysis of six home range studies of Northern Quolls in the Pilbara provided home range estimates using two methods: minimum convex polygons (MCP) and kernel density estimation (KDE) (Cowan et al. 2020). These estimates are presented in Table 4.2.

Table 4.2: Pilbara Northern Quoll home range estimates reported in Cowan et al. (2020).

	MCP	KDE
Females	19.8 ± 6.11 ha	24.2 ± 6.7 ha
Males	152.06 ± 61.62 ha	492.31 ± 150.78 ha

The variation in home range estimates for females was 13.69 – 25.91 ha using MCP, and 17.5 – 30.9 ha using KDE (Cowan et al. 2020). For males, the data ranged from 90.44 – 213.68 ha using MCP, and 341.53 – 643.0.9 ha using KDE (Cowan et al. 2020). Using both methods, female home ranges were demonstrated to be smaller than males (Cowan et al. 2020). Male Northern Quolls are known to travel long distances when breeding, seeking females and food (Moore et al. 2021, Cowan et al. 2024). In fact, movement range estimates reported by Cowan et al. (2024) demonstrated that Northern Quolls had movement ranges which were more than 12 times larger in the breeding season compared to non-breeding season (Cowan et al. 2024) (breeding season average = 6,152 ±66.79; non-breeding season average 504.83 ±199.84). With such variation in the home range estimates and wide range of variables potentially influencing the data on home ranges, it is difficult to put a single value on the home range of the Northern Quoll. However, it is justifiable to presume that any Northern Quolls moving large distances from critical habitat are likely to be males during breeding season.

The Northern Quoll scat records at Winu were recorded within Shrub and spinifex on sandplain and Gravelly lateritic rises habitat and not associated with denning habitat, or even within 3 km of Rocky outcropping habitat. We consider these records to be those of an individual (most likely a male) dispersing through the wider Winu locality, and not of a resident population.

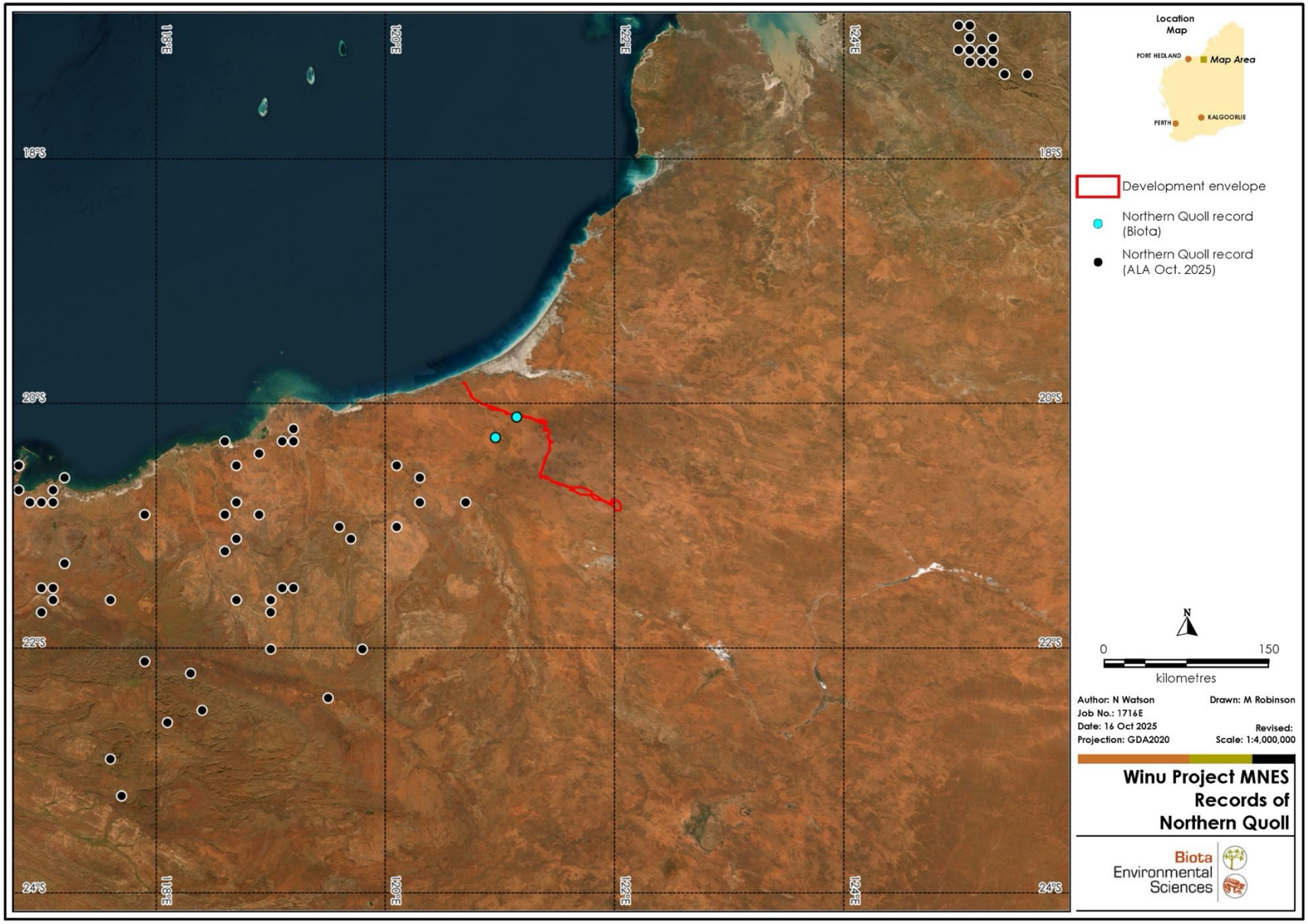

Figure 4.2: Records of the Northern Quoll in the Winu locality[2].

[2] Regional Northern Quoll records from Little Sandy Desert and Great Sandy Desert (Walyarta Conservation Park) absent from ALA data.

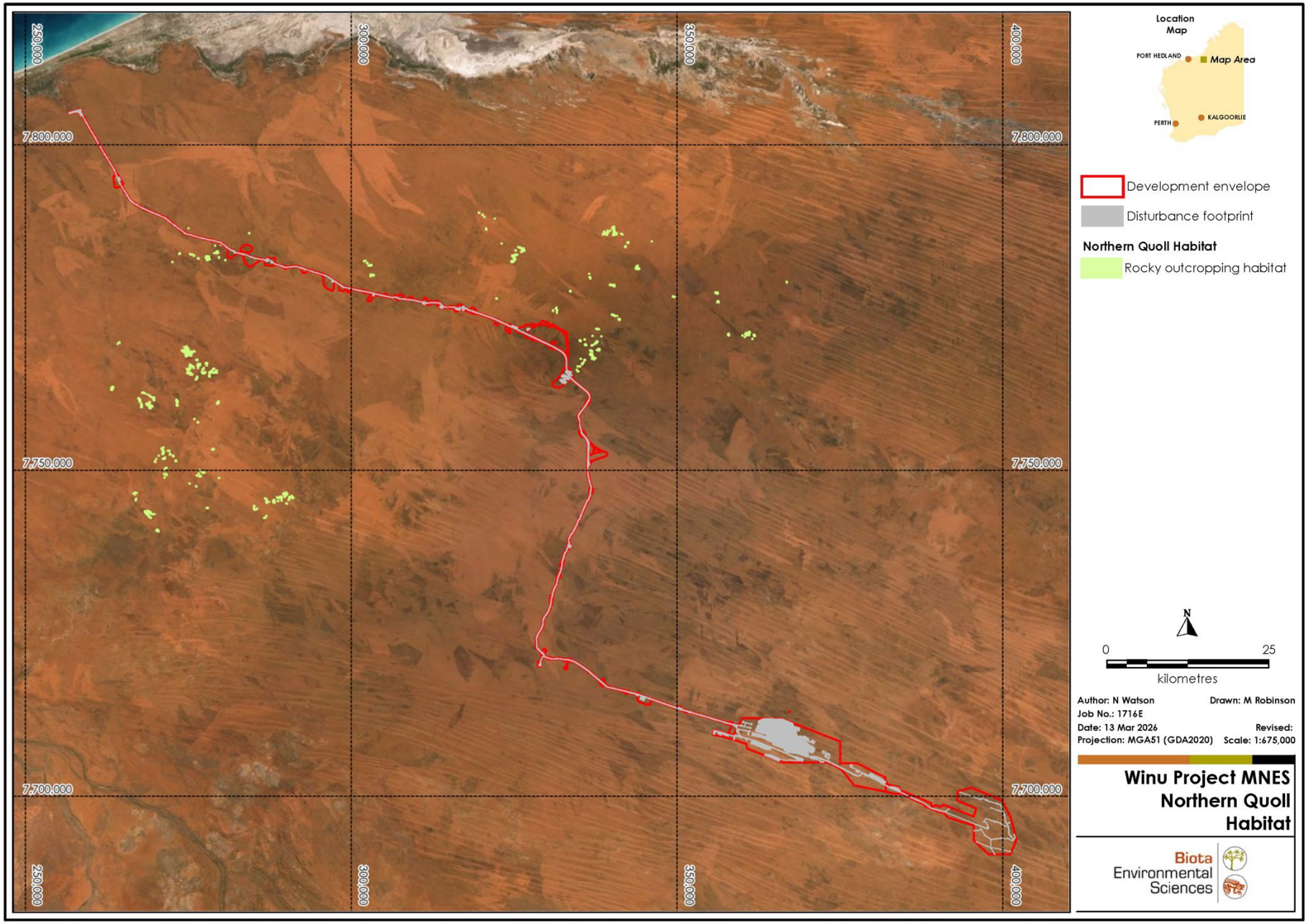

Figure 4.3: **Northern Quoll habitat within the Winu locality.**

5.0 Princess Parrot

5.1 Background

The Princess Parrot (*Polytelis alexandrae*) is listed as Vulnerable under the EPBC Act. The species is enigmatic and little is known of its biology or ecology (Higgins 1999). Its geographical range is considered to be restricted to the arid zone of Western Australia, the Northern Territory, and South Australia, however its distribution is not well understood, with suggestions that it is centred on the eastern Great Sandy Desert, while others suggest that it may be the eastern Gibson Desert and western Great Victoria Desert (Pavey et al. 2014, and references therein) (see Figure 5.1). Previously, the pattern of occurrence of the species was described as nomadic or migratory but there is now general consensus that the Princess Parrot has irruptive population dynamics, often not being present for long periods and then large numbers of birds being seen in an area for a short period of time (Pavey et al. 2014). Within the Great Sandy Desert, Lake Tobin (the largest salt lake within the Percival Lakes chain) is known to be an important area for the Princess Parrot. Lake Tobin is approximately 380 km east of Winu.

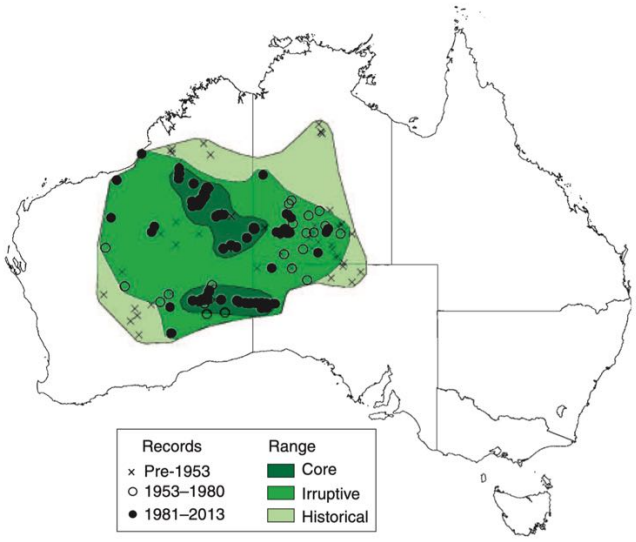

Figure 5.1: **The geographical range of the Princess Parrot (reproduced from Pavey et al. (2014)).**

5.2 Habitat

Habitat preferences for the Princess Parrot include sand dunes and sand flats, although the bird also occurs in open savanna woodlands and shrublands that usually consist of scattered stands of *Eucalyptus, Casuarina* or *Allocasuarina* (Department of the Environment 2016). It also frequents *Eucalyptus* or *Allocasuarina* trees in riverine or littoral areas (Department of the Environment 2016). The Princess Parrot feeds on flowers, seeds and other material of a wide range of plants and it frequently forages on both the ground and in foliage (Pavey et al. 2014). In the Northern Territory, nesting has been reported in Marble Gums and River Red Gums (Pavey et al. 2014).

5.3 Survey Adequacy

The Princess Parrot is a distinctive bird that can be distinguished visually and by its call (Department of the Environment 2016). It is noisy and conspicuous early and late in the day but harder to detect in the heat of the day (DEWHA 2010). We therefore consider its detectability to be high, with its activity periods coinciding with the time of day avifauna surveys were conducted within the Winu DE and the surrounding locality.

The *Survey Guidelines for Australia's Threatened Birds* (DEWHA 2010) recommend the following survey methods and effort in relation to the Princess Parrot:

- area searches or transect surveys of suitable habitat in the early morning with detection by sighting or call (20 hours/ 10 days). Also targeted searches and subsequent watches of waterholes for presence in late dry season (20 hours/ 10 days).

With a combined total of 62 avifauna survey sites, comprising 60 hours of survey effort expended across the Winu locality (31.8 hours across 32 sites within the Winu DE), the DEWHA (2010) survey effort recommendations for Princess Parrot have been met and exceeded. No waterholes were present within the Winu DE during this survey period. Though the Winu avifauna surveys were recording the general avifauna assemblage, the conspicuousness of the bird means that if it was present, it could have been recorded during any of the vertebrate fauna surveys undertaken by Biota in the Winu locality over 2017 – 2024 (as well as opportunistically during subterranean fauna surveys).

5.4 Survey Findings

5.4.1 Records

Although the Princess Parrot was not recorded during any of the surveys at Winu and there have been no records from the locality, the species still may occur in the Winu DE, as there is suitable habitat in the form of sand dunes and sand flats present. The irruptive nature of populations of this species means that it could be present within the Winu DE on occasion, where it would likely forage on spinifex during seeding events, however it would be difficult to confirm this unless survey timing coincided with this species' periodic presence.

5.4.2 Habitat at Winu

Habitat critical for the survival of the Princess Parrot is not present within the Winu DE but foraging habitat is present, and based on the species' habitat preferences, two habitat types within the DE represent potential foraging habitats: Inland sand dune, and Shrub and spinifex on sandplain.

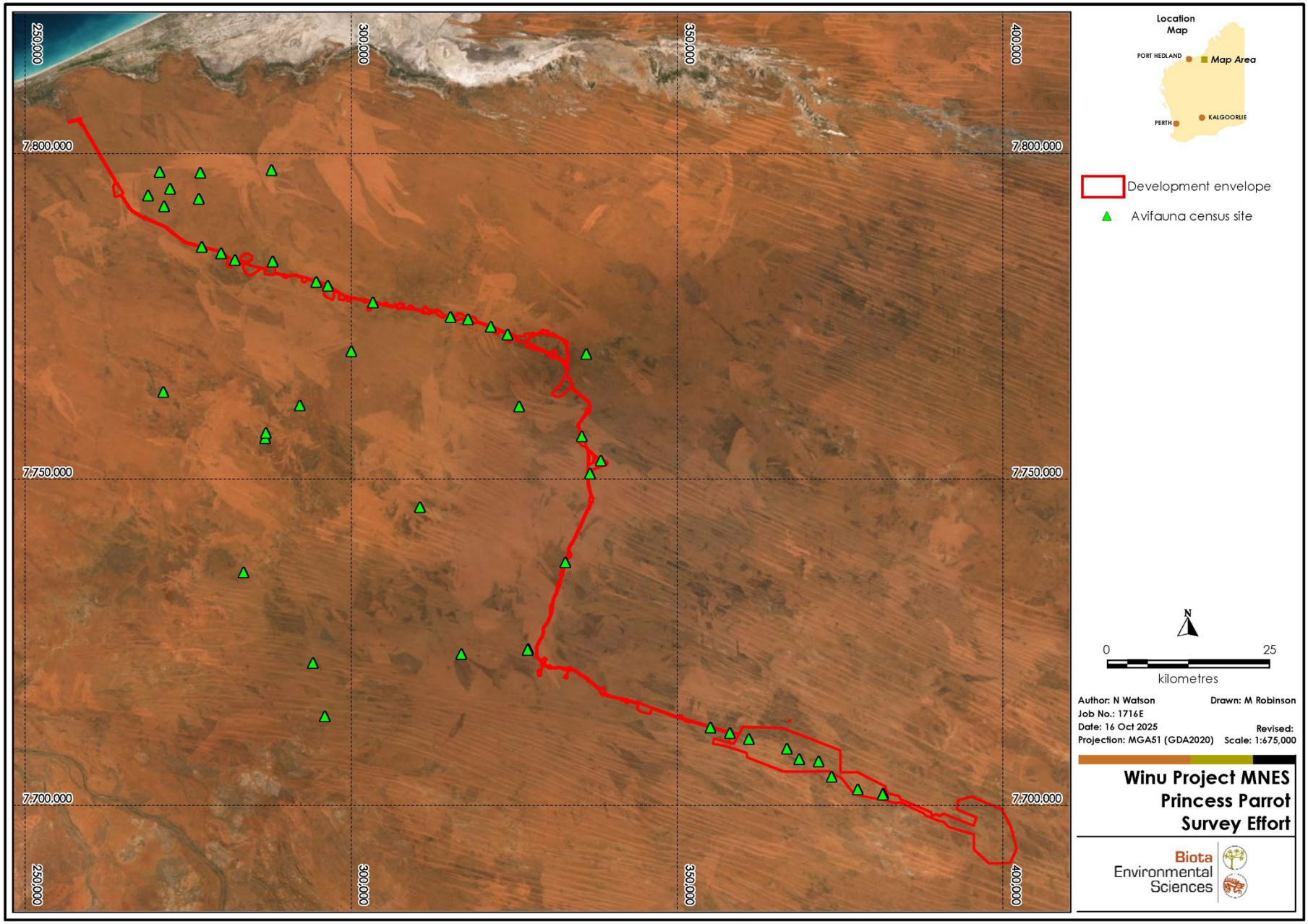

Figure 5.2: **Survey effort targeting the Princess Parrot in the Winu locality.**

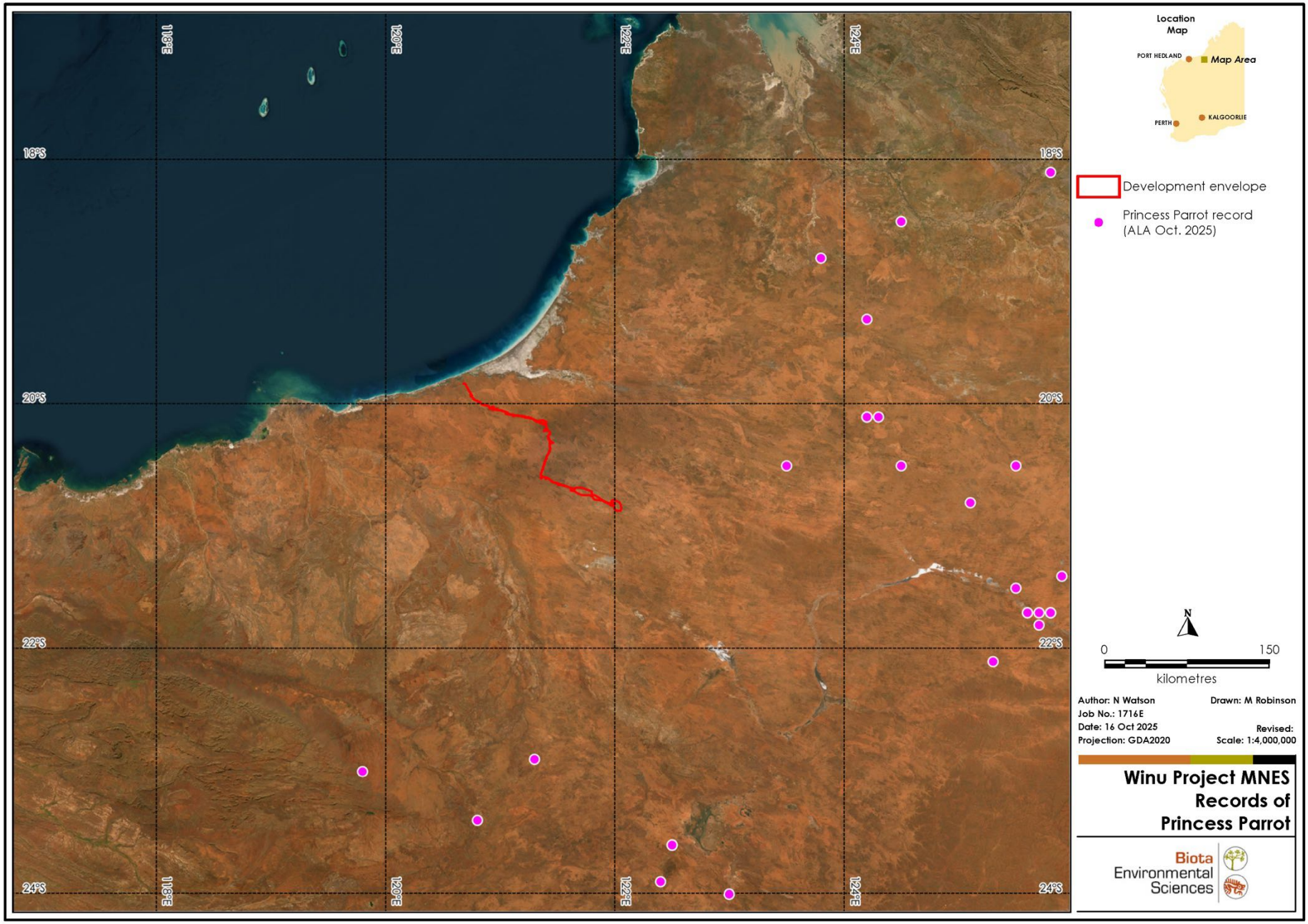

Figure 5.3: **Records of the Princess Parrot in the Winu locality.**

6.0 Grey Falcon

6.1 Background

The Grey Falcon (*Falco hypoleucos*) is listed as Vulnerable under the EPBC Act. It is an elusive species, endemic to Australia and widespread but rare throughout the arid and semi-arid regions. Its distribution is centered primarily on inland drainage systems with an average rainfall <500 mm per annum, except when wet years are followed by drought, when the species becomes more widespread (Garnett et al. 2011). The species occurs at low densities across inland Australia.

6.2 Habitat

The Grey Falcon inhabits lightly timbered coastal and inland plains, particularly *Acacia* shrublands crossed by tree-lined watercourses (Johnstone and Storr 1998, Garnett et al. 2011). Wetlands where surface water attracts prey may also attract Grey Falcons, but they will hunt over a variety of habitats, even far out over treeless plains (Olsen and Olsen 1986). The Grey Falcon primarily hunts birds, especially parrots and pigeons, taken using high-speed chases and stoops; reptiles and mammals are also taken. Natural breeding sites are usually in trees, such as eucalypts, typically in the abandoned nests of crows and butcherbirds (Marchant and Higgins 1993, Johnstone and Storr 1998). Telecommunications towers are also used regularly.

6.3 Survey Adequacy

The *Survey Guidelines for Australia's Threatened Birds* (DEWHA 2010) recommend the following survey techniques for conspicuous diurnal raptors: "observation from vantage points to detect soaring species over suitable habitat. Detection by sightings." Though the Grey Falcon is not included in the DEWHA (2010) guidelines (the Grey Falcon was only listed as Vulnerable under the EPBC Act in 2020), for falcons in general, the suggested method is: "transect surveys by boat along suitable coastal or riverine habitat for detection of birds and nests", which is not applicable to the Winu DE due to absence of riverine habitat.

With a combined total of 62 avifauna survey sites, comprising 60 hours of survey effort expended across the Winu locality (includes 31.8 hours across 32 sites within the Winu DE), the survey effort is considered sufficient for detection of the Grey Falcon. The location of the avifauna census undertaken in the Winu locality are presented in Figure 6.1.

6.4 Survey Findings

6.4.1 Records

A single Grey Falcon was observed in the MIA during sampling for subterranean fauna at Winu in November 2019 (Biota 2022e). The species was sighted over the main drilling area west of the Winu camp, initially sighted in active flight at relatively low altitude (~10 m above ground) before gaining height and soaring high over the area for an extended period before disappearing to the west. Overall bird numbers observed during that subterranean fauna survey were higher than on the two phases of terrestrial fauna survey, and large numbers of smaller birds, including Zebra Finches, Pied Honeyeaters, Masked Woodswallows and Budgerigars, were observed drinking from surface water retained in sumps around the drilling area. It is likely that the Grey Falcon was hunting within the MIA where it was attracted by the

higher bird densities. The location of the Grey Falcon recorded at Winu, along with regional records of the species (sourced from ALA) is shown in Figure 6.2.

6.4.2 Habitat at Winu

The Grey Falcon has been recorded within the Winu DE and is considered likely to occur as a foraging visitor (given the diverse range of habitats utilised by the species), however no suitable nesting habitat (in the form of major drainages) is present. There is also no foraging habitat within the DE that is locally or regionally restricted. All habitat types present within the DE represent foraging habitat for the species, particularly in areas where surface water may pool.

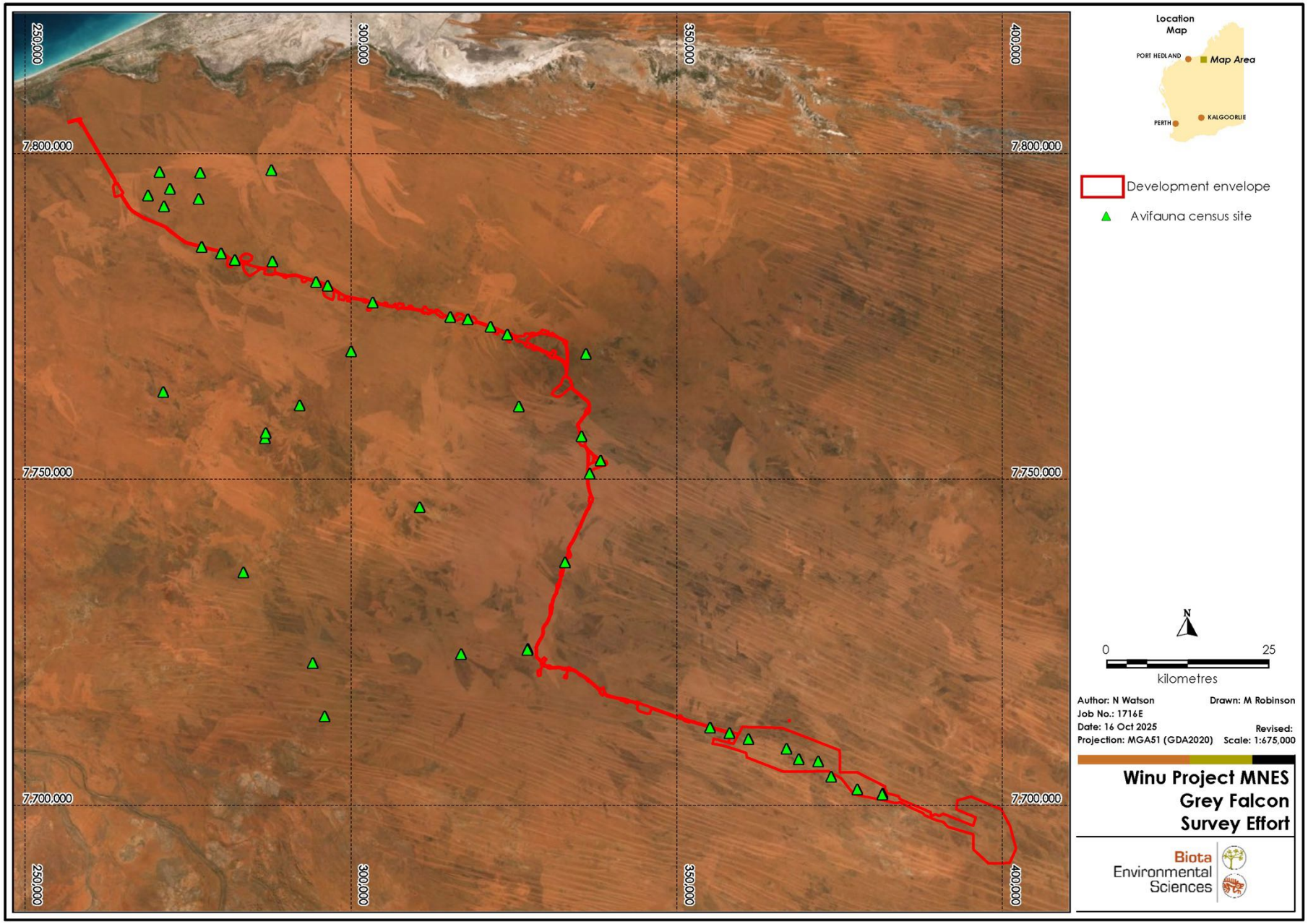

Figure 6.1: **Grey Falcon survey effort in the Winu locality.**

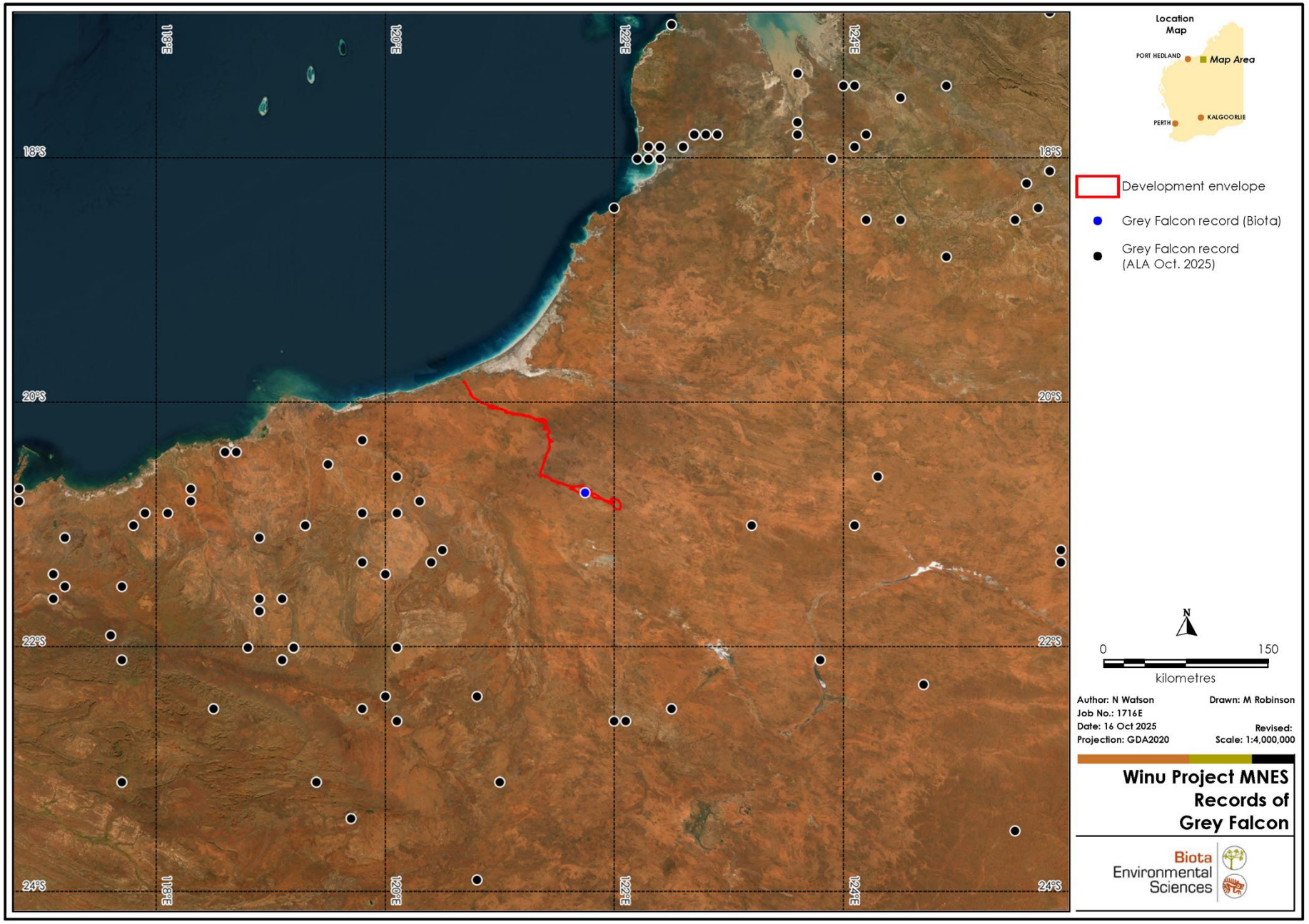

Figure 6.2: **Records of the Grey Falcon from Winu and wider locality.**

7.0 Summary and Conclusions

7.1 Habitat Significance

For each of the four threatened species, the occurrence of 'habitat critical to the survival of the species' has been discussed and if present, identified using the fauna habitats mapped for the Winu DE as defined in Section 2.3. For the Black-footed Rock-wallaby, the Rocky outcropping habitat occurs outside of the DE and disturbance footprint, though the area of supporting vegetation around the Rocky outcropping habitat represents important foraging habitat, which may overlap the DE where the rockpiles/ rocky outcrops occur closer to the DE boundary.

Similarly, for the Northern Quoll, the Rocky outcropping habitat occurs outside of the DE and disturbance footprint. Again, foraging habitat may overlap with the DE where rockpiles occur closer to the DE boundary. Although the species was recorded from sign evidence near to the DE, this record most likely represented an individual dispersing through the wider Winu locality.

No evidence of the Princess Parrot was recorded in the Winu locality and no habitat critical to the survival of the species was identified. Foraging habitat exists within the DE and disturbance footprint.

The record of the Grey Falcon at Winu also represents use of the area as foraging habitat. All habitat types present within the DE can be regarded as foraging habitat.

7.2 Population Significance

Under Commonwealth significant impact guidelines (Department of the Environment 2013), threatened species populations are considered important if they:

1. represent key source populations either for breeding or dispersal;
2. are necessary for maintaining genetic diversity; and/or
3. are near the limit of the species' range.

Based on the findings presented here, only one of the four threatened species – the Black-footed Rock-wallaby, meets the above criteria as an 'important' population. The survey work undertaken at Winu and in the locality resulted in the discovery of a new population of the Black-footed Rock-wallaby, outside of areas thought likely to support the species. This population is also located a significant distance away from other known populations. This finding has emphasised the importance of conducting survey work, as well as the importance of approaching likelihood of occurrence assessments without an over-reliance on regional records, especially in areas which have been less well surveyed. The population identified in the Winu locality is considered to be a regionally significant one, as the Biota survey work demonstrated that it has persisted at the same location for at least seven consecutive years.

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