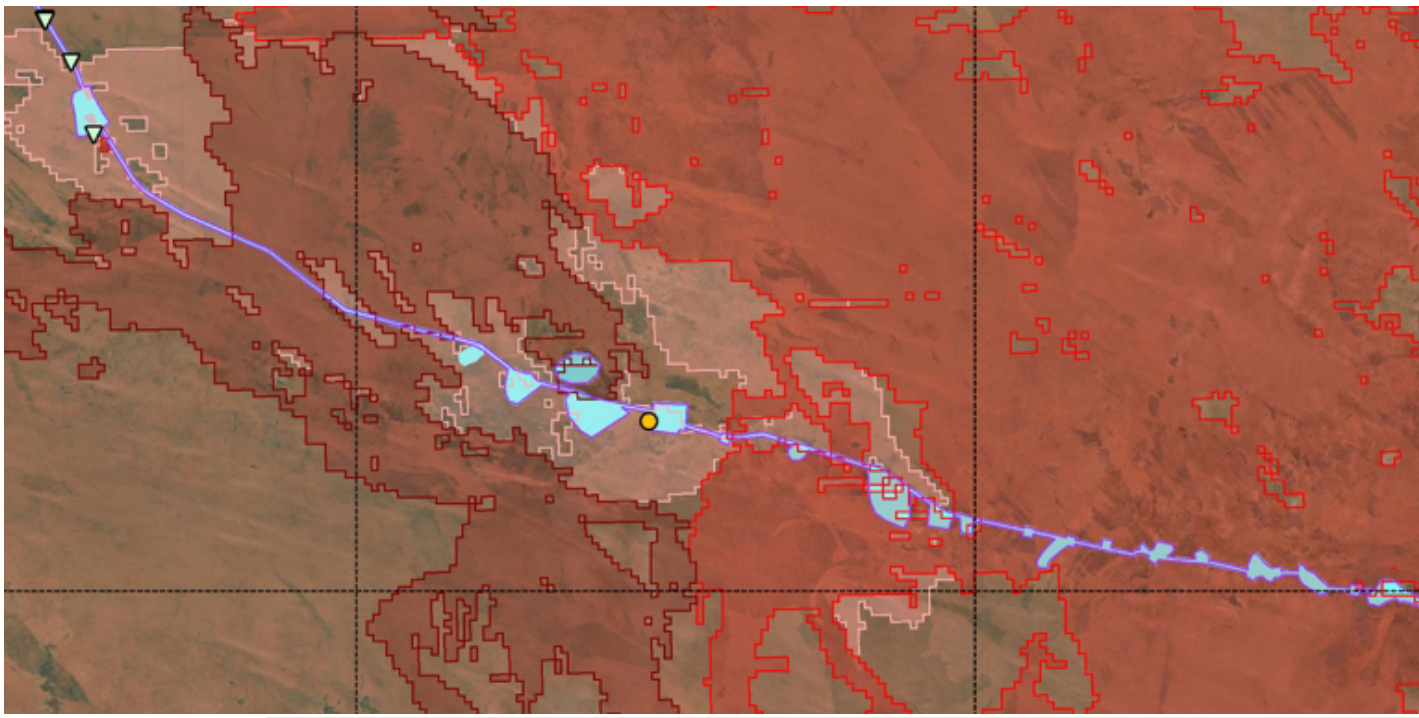
Biota Environmental Sciences

Winu Project Bilby Habitat Assessment



Prepared for

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1.0 Introduction

1.1 Background

Rio Tinto Winu Pty Limited (RTW) plans to develop a new copper-gold mine, referred to as the Winu Project, 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.

Multiple biological surveys focussing on terrestrial vertebrate fauna have been undertaken within and in the vicinity of the Winu Development Envelope (DE) for the Winu Project (reviewed in Biota (Biota 2025)). One focus of this work has been ongoing census surveys of a population of Bilby (*Macrotis lagotis* - listed as Vulnerable under the State *Biodiversity Conservation Act 2016* and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999)*, which was originally recorded in proximity to the Winu DE in 2019 (Biota 2020, 2021). The Winu Bilby census surveys have taken place in 2019, 2022, 2024 and 2025 and are reviewed in Biota (2026), along with a summary of consolidated survey effort for the Winu Project targeting Bilby prior to the discovery of the Winu population.

1.2 Project Definition

The DE covers approximately 23,649 ha and includes the combined areas of the Mine and Infrastructure Area (MIA), the Road Access Corridor (RAC), and the regional borefield (Rimfire) and its associated access tracks and pipelines.

Table 1.1: Key terminology relevant to the Winu Project.

Term	Definition	Area (ha)
The Project	Includes the development of a new below-water table (BWT) copper-gold deposit and associated infrastructure and activities required to access, process and transport ore.	N/A
Development Envelope (DE)	Refers to the combined areas of the mine and infrastructure area, two regional borefield (Rimfire) and all associated access tracks and pipeline corridors. All activities will occur within this area.	23,649
Mine Infrastructure Area (MIA)	Refers to the area containing the mineralised deposit and related infrastructure. This is the Winu mine site.	10,182
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
Rimfire Borefield (Rimfire)	Refers to the regional borefield located at Rimfire (located approximately 31 km from the MIA), and the associated pipeline corridor connecting the borefield to the MIA.	6,820

1.3 Purpose of this Report

The purpose of this report is to provide additional information in relation to Bilby habitat prospectivity within the DE. Previous reports have adopted both a local and regional habitat assessment approach, in line with generalised fauna habitats for the Winu locality, and broadscale land system or soil-landscape mapping for the Winu region (discussed in detail in Biota (2025, 2026)). A fine-scale approach has also been utilised for the areas surveyed during the Bilby censuses, utilising specific criteria to assess Bilby habitat prospectivity at the time of surveys (see Biota (2026)). In response to requests from regulators to provide an assessment of Bilby habitat prospectivity for the whole DE, the current report aims to provide this using a methodology designed to overcome limitations imposed by external factors such as variations in survey timing, fire and weather events.

2.0 Bilby Habitat at Winu

2.1 Overview

At a landscape scale, there are many factors that affect suitability of habitat for the Bilby, and thus its occurrence, including landform, substrate, vegetation, fire frequency, rainfall, land clearance and presence of introduced herbivores and carnivores (Cramer et al. 2017).

Within WA, three landforms have been identified as primary Bilby habitat, described broadly as (1) residual landforms, (2) fluvial landforms and (3) plains and dune fields (Cramer et al. 2017). Additionally, soil, sand, sandy clay or sandy gravel substrates have been identified as critical to the presence of the Bilby, as they enable burrow construction (DBCA 2017a). Within the DE (including the RAC, MIA and Rimfire), suitable landforms present are consistent with (3), plains and dune fields (includes the mapped fauna habitats described in Biota (2025, 2026) "shrub and spinifex on sandplain" and "inland sand dune"), and (1) residual landforms (includes the mapped fauna habitat "gravelly lateritic rises"), and the substrate is suitably sandy throughout.

Given the complexity of factors that define Bilby habitat, a finer scale, survey-specific approach was developed by Biota to map Bilby habitat. The approach recognised that Bilby presence is strongly linked to the availability of food resources, which are intrinsically dependent on fire history (Southgate 2005). Bilbies have been recorded in habitats with a range of fire-ages, including recently burnt (1-2 years), unburnt (3-6 years) and long unburnt (>6 years) areas (Southgate 2005, Southgate and Carthew 2007, DBCA 2017b). This has been attributed to fire influencing food availability; fire (and subsequent rainfall) promotes regeneration of some short-lived species such as the grass *Yakirra australiensis*, the seeds of which form dominant components of the Bilby diet when available (Southgate 2005, Liddle 2016). Fire also promotes the growth of other short-lived species such as *Senna notabilis*, the roots of which host larvae, another key component in the Bilby diet (Liddle 2016, DBCA 2018). Conversely, fire kills long-lived larvae host species, such as *Acacia hilliana* (Liddle 2016). These long-lived species only develop hosting capacity for larvae after the plant reaches a certain age (Liddle 2016), suggesting that unburnt stands of these species are important for Bilby foraging.

Bilby habitat has been mapped previously for the RAC and MIA (Biota 2021, 2023, 2024, 2026). Biota developed a set of criteria to determine the prospectivity of Bilby habitat, based on field notes, vegetation mapping of the area and fire scar mapping produced by North Australia and Rangelands Fire Information (NAFI) mapping (Charles Darwin University 2022). The maps produced over successive project iterations were representative of habitat suitability at the time of writing, as Bilby habitat is influenced by dynamic ecosystem change over time. As such, the habitat maps in these previous reports (Biota 2021, 2023, 2024, 2026) should be considered a guide to areas that may have been important for Bilby at that time, noting that factors such as fire, rainfall, and introduced predators may subsequently alter suitability.

Producing a Bilby habitat prospectivity map that combines previously mapped habitat areas is therefore challenging, as habitat mapping reflected the biotic and abiotic conditions present at the time of assessment. Consequently, successive reports have identified changes in habitat status over time in response to changing environmental conditions.

2.2 Approach and Methodology

In light of the above, a modified approach has been taken here that adapts Biota's criteria for assessing prospective Bilby habitat (see Table 2.1). Here, the same assessment criteria were applied, with the exception of fire recency, which was excluded from the habitat prospectivity classification. This approach enables the development of a baseline prospectivity map identifying High, Moderate and Low prospectivity habitat areas based primarily on the distribution of food source plants, in addition to supporting mapped evidence. Fire regime data can then be applied as an overlay to demonstrate temporal variation in habitat suitability relative to the baseline prospectivity layer.

Table 2.1: Criteria used to assess prospective Bilby habitat.

Habitat Prospectivity	Criteria
High	1. Sandy habitat supporting long-lived shrubs or forbs known to contain root-dwelling larvae and other important food source plants (e.g. *Acacia monticola, A. eriopoda, A. dictyophleba, A. melleodora, A. stellaticeps, A. hilliana, Senna notabilis* and *Indigofera georgei*), and/or; 2. Sandy habitat supporting short-lived shrubs or forbs known to contain root-dwelling larvae and other important food source plants (e.g. *Senna notabilis* and *Yakirra australiensis*), and/or; 3. Mapped records of evidence (tracks, scats, diggings and burrows attributed to Bilby with High certainty).
Moderate	1. Sandy habitat supporting plant species that are broadly typical of suitable Bilby habitat in the Great Sandy Desert or Little Sandy Desert (e.g. other *Acacia* spp., *Melaleuca* spp. and *Triodia* grasslands), but with no mapped records of important food source plant species.
Low	1. Habitat does not meet any of the criteria listed above.

Mapping Bilby habitat in this way represents a conservative and precautionary approach, as it is based primarily on the presence of suitable food source plants and landforms, rather than key plant species abundance or age class. In practice, where vegetation mapping identified these species within the upper, mid or lower strata of a vegetation unit, the mapped area was assigned High prospectivity regardless of whether the species was dominant within the community. The plant species listed in Table 2.1 have been observed to support Bilby foraging within the Great Sandy Desert bioregion. However, additional *Acacia* species known to host root-dwelling larvae (RDL) have also been identified as important Bilby foraging resources in adjacent bioregions, including *Acacia bivenosa*, *A. colei* and *A. tumida* within the Pilbara and Dampierland bioregions. Accordingly, occurrences of other known RDL-hosting *Acacia* species within the DE were also considered where supporting evidence was available.

While the entirety of the DE broadly coincides with landforms recognised as primary Bilby habitat (i.e. residual landforms, plains and dunefields), the approach adopted here further delineates areas according to their relative habitat suitability. Incorporating additional variables such as vegetation species abundance and age classes would likely enable a finer-scale assessment of habitat prospectivity. Similarly, fire history has been applied as an overlay to demonstrate the temporal nature of habitat suitability. Available fire scar mapping does not incorporate fire intensity, despite intensity having a substantial influence on habitat condition and recovery. For example, high-intensity fires may remove vegetation and render habitat unsuitable for extended periods, whereas low-intensity fires may only temporarily reduce habitat suitability.

In the absence of more detailed ecological and disturbance data, the approach used here is considered an appropriately precautionary and best-available approximation of Bilby habitat prospectivity.

2.3 Bilby Habitat Prospectivity

The baseline Bilby habitat prospectivity mapping showing the fire scar history from the start of the project (first survey in 2019) to date (2026) is presented in Figure 2.1 - Figure 2.4. This mapping incorporates all areas that have been subject to floristic survey and vegetation mapping, including areas extending beyond the DE boundary.

Within the DE, this study found that:

- High prospectivity habitat was mapped for a total of 12,655 ha (6% recently burnt, 37% unburnt and 57% in long unburnt);
- Moderate prospectivity habitat was mapped for 10,893 ha (5% in recently burnt, 34% in unburnt and 61% in long unburnt); and
- Low prospectivity habitat was mapped for 100 ha (none in recently burnt, 11% in unburnt and 89% in long unburnt) (see Table 2.2).

Table 2.2: Bilby habitat prospectivity mapping within the DE- area calculations.

	High (ha)	Moderate (ha)	Low (ha)	Total (ha)
Recently Burnt (1-2 years; 2026, 2025)	806 (6%)	593 (5%)	0	1,400 (6%)
Unburnt (3-6 years; 2024, 2023, 2022, 2021)	4,641 (37%)	3,665 (34%)	11 (11%)	8,317 (35%)
Long Unburnt (>6 years; 2020, 2019 onwards)	7,208 (57%)	6,635 (61%)	89 (89%)	13,932 (59%)
Total (Ha)	12,655 (100%)	10,893 (100%)	100 (100%)	23,649 (100%)

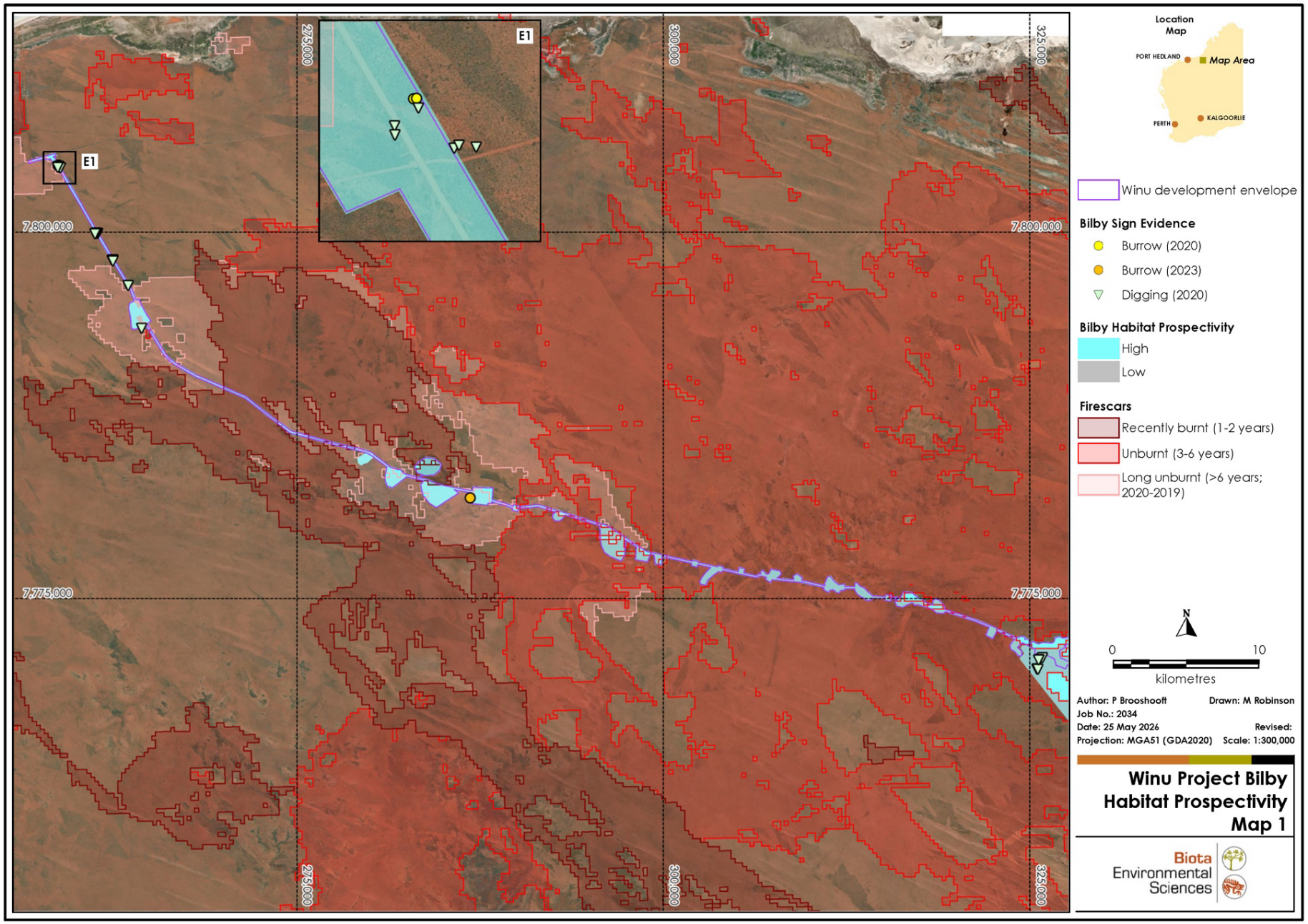

Figure 2.1: **Bilby habitat prospectivity – RAC (Map 1 of 4).**

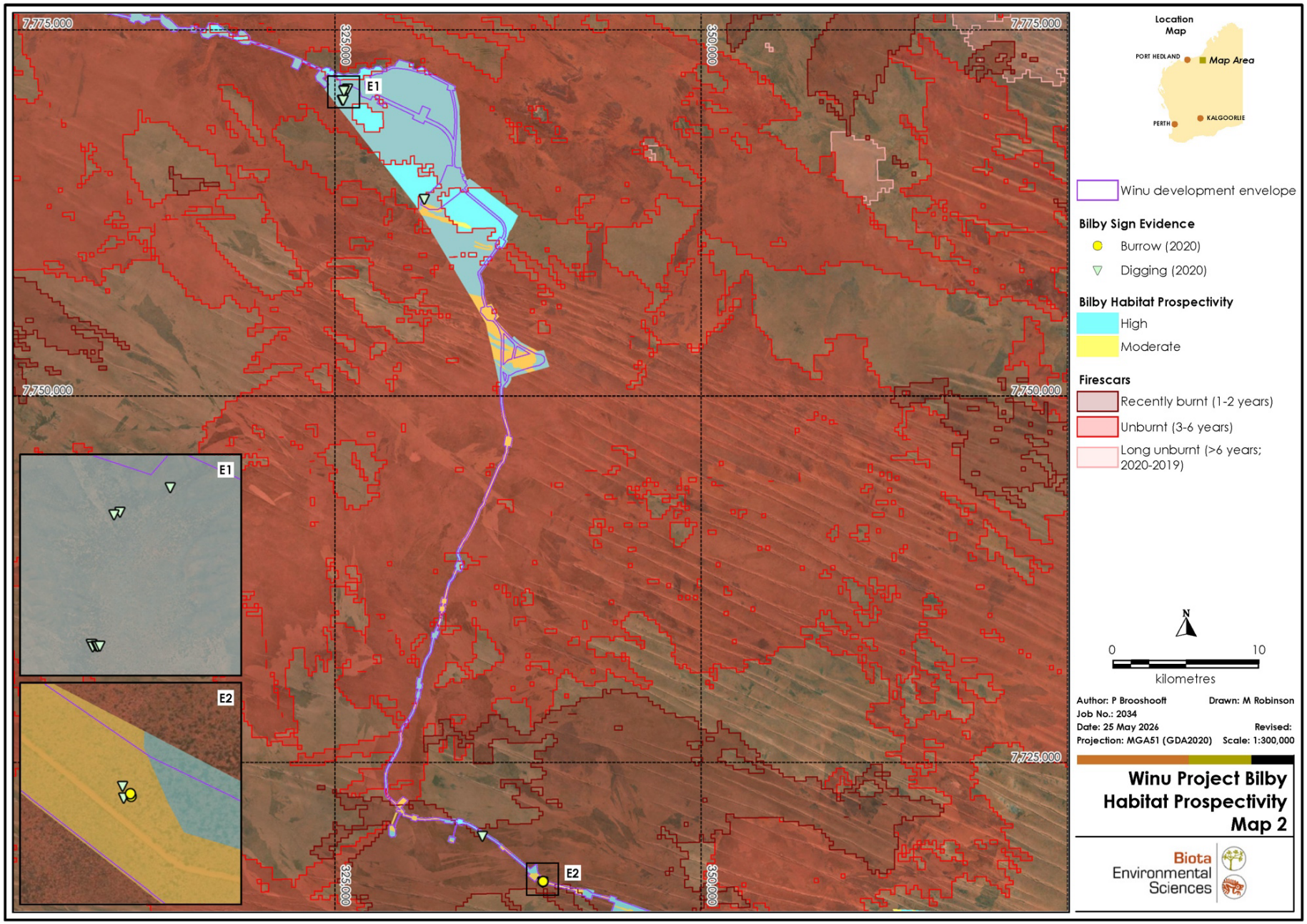

Figure 2.2: **Bilby habitat prospectivity - RAC (Map 2 of 4).**

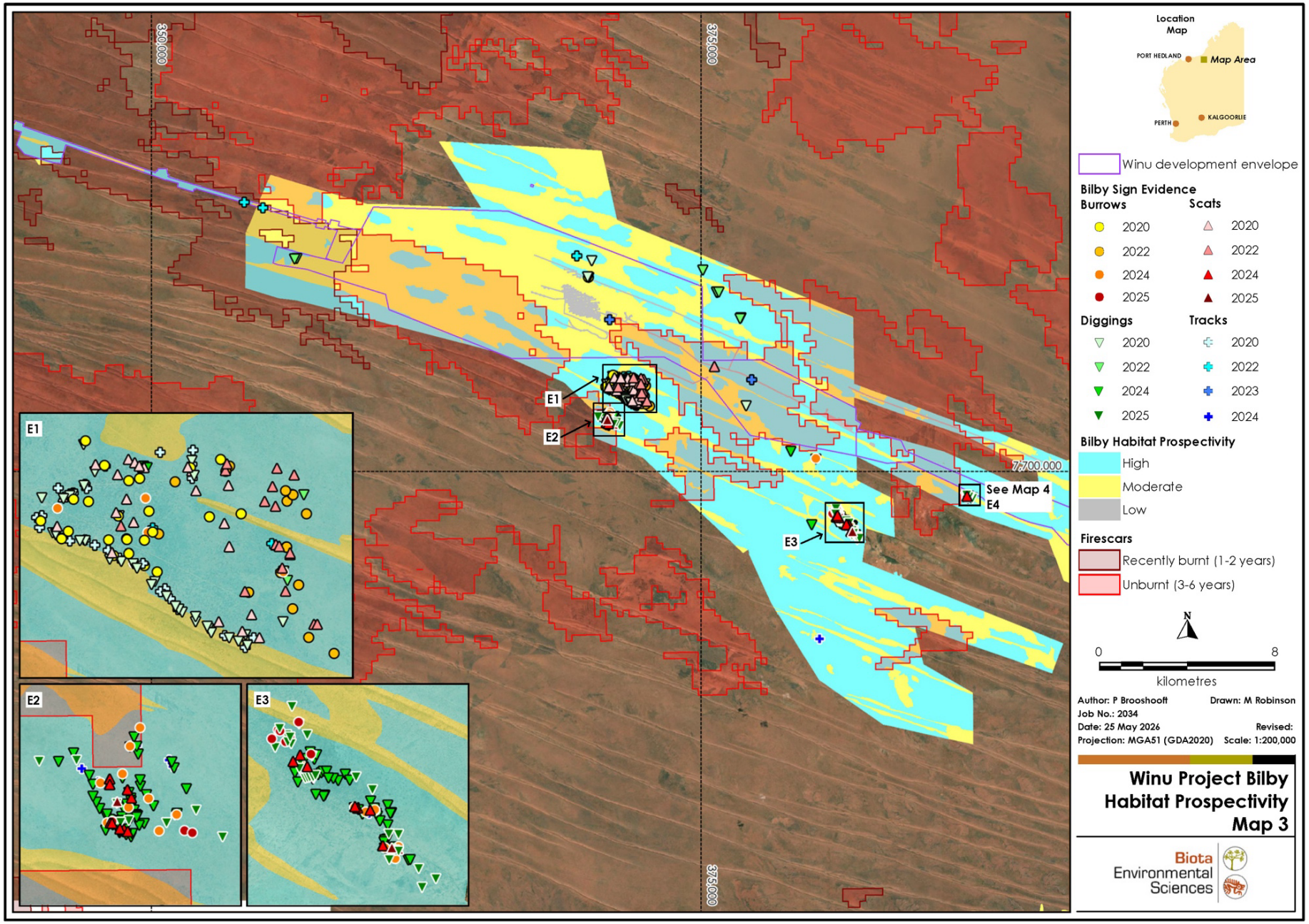

Figure 2.3: **Bilby habitat prospectivity - MIA (Map 3 of 4).**

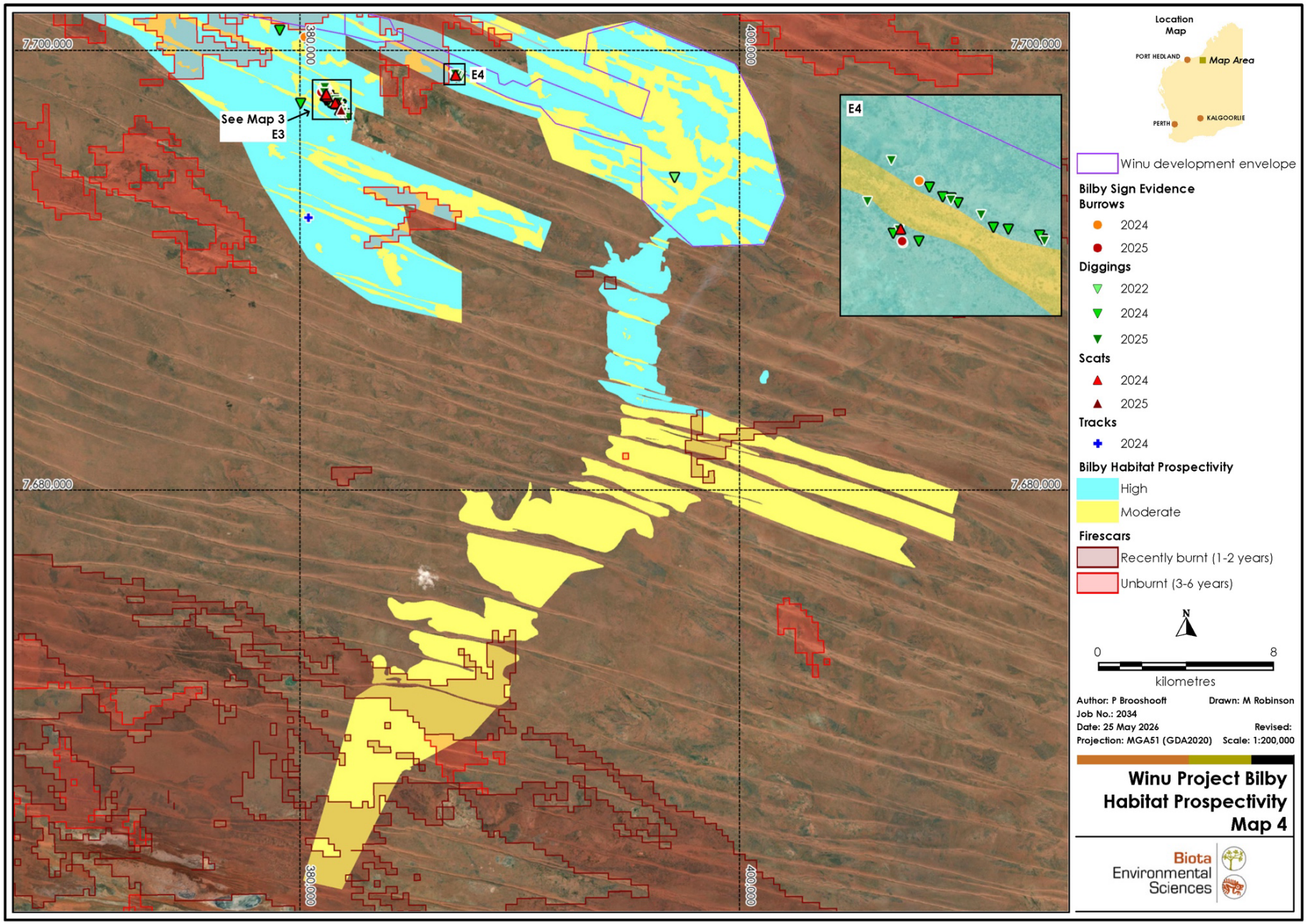

Figure 2.4: **Bilby habitat prospectivity – Rimfire and surrounds (Map 4 of 4).**

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