NORTON GOLD FIELDS

Native Vegetation Clearing Permit – Supporting Document

Paddington Solar Farm

Tenements

M24/020, M24/251 and M24/240

16 March 26

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Executive Summary

Norton Gold Fields Pty Ltd (Norton) proposes to clear native vegetation to enable the construction and operation of the Paddington solar farm, a 6.5MW off-grid renewable energy facility. The solar farm will be located on mining tenements adjacent to Paddington Mill, approximately 35 km northwest of Kalgoorlie–Boulder in Western Australia's Goldfields region. The solar farm will operate in conjunction with the existing power station, providing power to the Paddington Mill, reducing the overall greenhouse gas emissions.

Norton is seeking approval to clear up to 60ha of native vegetation within a 121.72ha application area under a purpose permit. Approximately 6ha of the application area has already been disturbed by pastoral, mining and exploration activities.

Clearing is required for solar panels, inverter and transformer infrastructure, internal access tracks, cabling, drainage works, perimeter fencing and temporary construction laydown areas. Where practicable, previously disturbed areas will be utilised to minimise loss of native vegetation.

The application area lies within the Murchison IBRA region, in the Eastern Murchison subregion. Approximately 99% of the vegetation within the application area corresponds to the vegetation association 2903, which retains more than 96.55% of its pre-European extent at a regional scale, and more than 99% within the application area.

Baseline biological surveys identified three widespread eucalypt woodland vegetation communities in predominantly Good to Degraded condition. No Threatened or Priority flora, Threatened Ecological Communities, or conservation-significant vegetation communities occur within the application area. Vegetation associations retain more than 97% of their pre-European extent regionally. Fauna habitat within the site is typical of the surrounding Eastern Murchison landscape, and no conservation-significant fauna species or critical habitat were recorded. Targeted surveys confirmed the absence of suitable habitat for the Arid Bronze Azure Butterfly, the Inland Hairstreak Butterfly and the Southern Whiteface.

The application area contains one minor ephemeral drainage line and shallow overland flow paths. No wetlands, permanent watercourses, groundwater-dependent ecosystems or conservation reserves occur within or adjacent to the site. Flood modelling indicates development can avoid or manage shallow sheet flow through standard drainage design. Clearing is not expected to cause land degradation, hydrological changes, or flooding.

Environmental impacts are limited to localised vegetation removal and minor habitat loss within a landscape where similar vegetation and fauna habitats are extensive and well represented. Potential risks such as erosion, weeds, dust, fire and hydrocarbon spills will be managed through standard mining environmental procedures and site-specific controls.

The assessment against the ten principles in Schedule 5 of the *Environmental Protection Act 1986* found that the proposal is not at variance with any of them. The proposed clearing is small-scale, occurs within an already disturbed mining landscape, avoids conservation-significant environmental values and will not result in significant regional ecological impacts.

1 Introduction

1.1 Location, Ownership and Tenure

Norton Gold Fields Pty Ltd (Norton), through its wholly owned subsidiary Paddington Gold Pty Ltd, is the owner and proponent of the Paddington Solar Farm Area (Solar Farm). The proposed solar farm will be located adjacent to the Paddington Mill, approximately 35 kilometres north of Kalgoorlie, Western Australia (Figure 1-1). The area can be accessed via the Goldfields Highway. Evidence of authority for each tenement is provided in Appendix 1.

Table 1-1 – Paddington Solar Farm Tenements

Tenement	Area (ha)	Tenement Holder	Granted	Expiry
M 24/020	533.85	Paddington Gold Pty Ltd	20/09/1983	19/10/2025
M 24/240	641	Norton Gold Fields Pty Ltd	17/09/1988	20/09/2030
M 24/251	878.25	Norton Gold Fields Pty Ltd	25/11/1988	24/11/2030

1.2 Proposal Description

The clearing will be used to establish a 6.5MW off-grid renewable energy facility (solar farm). The solar farm will operate in conjunction with the existing diesel generator to supply power to the Paddington Mill. A summary of the proposed activities and clearing is provided in Table 1-2.

Table 1-2 – Proposal Summary.

Site Details	
Project Name	Paddington Solar Farm
Description of Activity	• Minor earthworks • Installation of pile foundations • Construction of the operation and maintenance building • Internal access tracks • Perimeter fencing • Drainage infrastructure • Temporary construction and laydown areas
Commencement Date	November 2026
Clearing Details	
Total Clearing Proposed	60ha
Clearing Method	Mechanical
Purpose of Clearing	Solar Farm
Proponent Details	
Company	Norton Gold Fields Pty Ltd
ABN	23 112 287 797
Address	Paddington Gold Mine Goldfields Highway, 40km North of Kalgoorlie, Kalgoorlie, WA 6430
Postal Address	PO Box 1653, Kalgoorlie, WA 6430
Key Contact	Tari Laatz Approvals Coordinator tari.laatz@padgold.com.au (08) 9080 6800

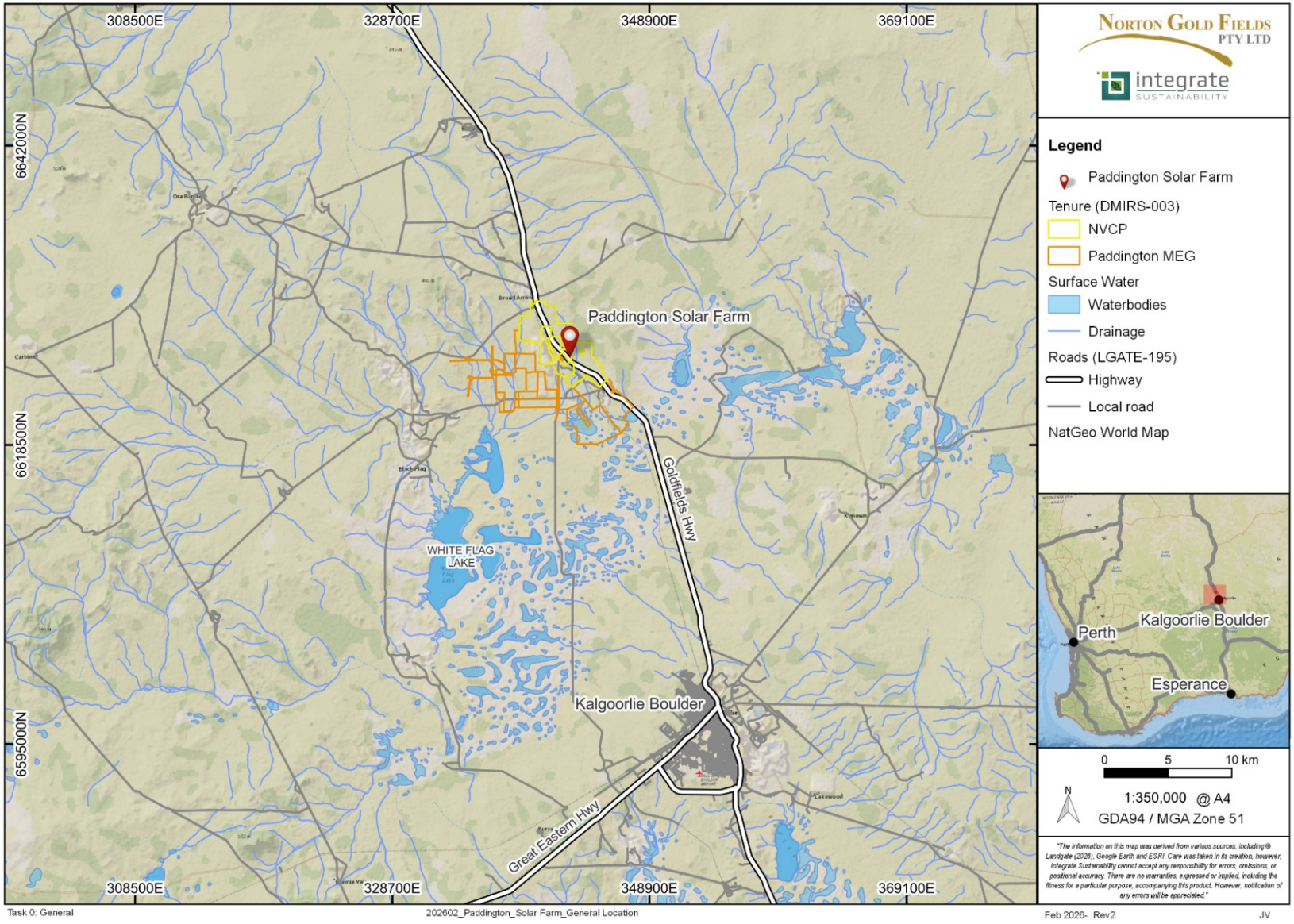

Figure 1-1 Paddington Solar Farm Area location

1.3 Proposed Clearing

Norton is applying to clear up to 60ha of native vegetation over three tenements (Table 1-1) under a purpose permit within the application area. The application area is 121.72ha (Figure 1-2). Clearing is required to enable the development and operation of a solar energy facility and associated infrastructure, including solar photovoltaic arrays, inverter and transformer stations, internal access tracks, underground electrical cabling, a substation and grid connection, perimeter fencing, drainage infrastructure, and temporary construction and laydown areas.

1.4 Previous Disturbance

Historic disturbance is present within the application area as a result of pastoral, mining and exploration activities. Approximately 6ha of the application area has been previously cleared.

1.5 Other Approvals

The proposed application does not form part of an existing *Environmental Protection Act 1986* (EP Act) Part IV proposal and is not envisaged to require an assessment under Part IV of the EP Act.

Additionally, this application does not require referral under the *Environment Protection and Biodiversity Act 1999* as no Matters of National Significance (MNES) have been recorded in the application area.

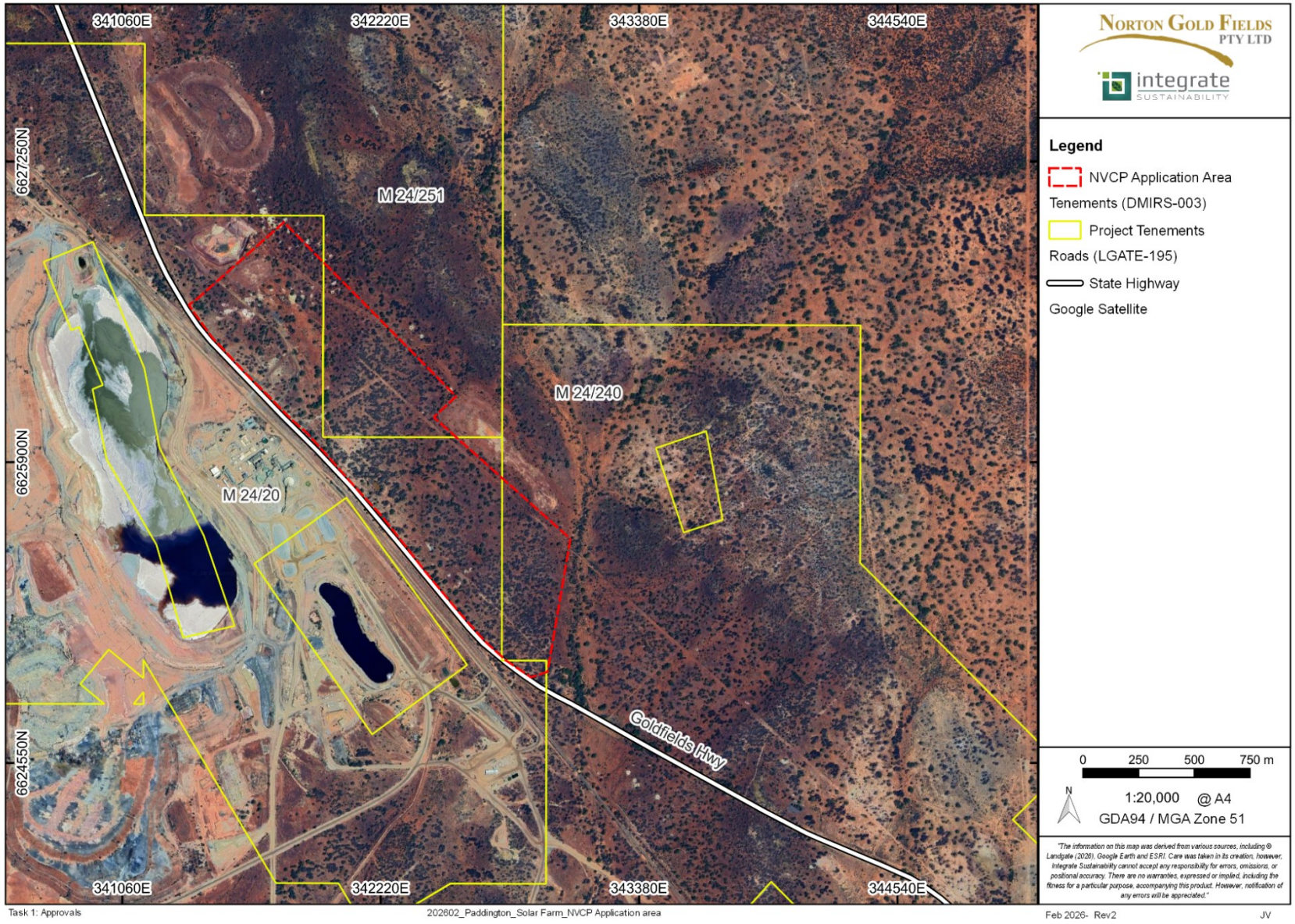

Figure 1-2 NVCP Application Area for the Paddington Solar Farm

2 Baseline Environmental Data

This section outlines the existing environmental data relevant to this application. The data has been used to define the environmental values and potential impacts, and to inform the impact assessment and management measures.

2.1 Climate

The proposed solar farm area near the Paddington Gold mine site is in the semi-arid region of Western Australia, characterised by hot, dry summers and mild winters typical of a Mediterranean climate. The nearest official meteorological weather station with the most complete and up-to-date information is Kalgoorlie-Boulder Airport station (Station No. 12038), which is located 40km south of the application area. Long-term climate data from this station indicate mean temperatures ranging from 33.7°C/18.4°C in January to 17.6°C/6.3°C in June (BOM, 2026). The station records an average annual rainfall of approximately 265.8mm, with the monthly totals typically occurring in September and the highest in February (Figure 2-1).

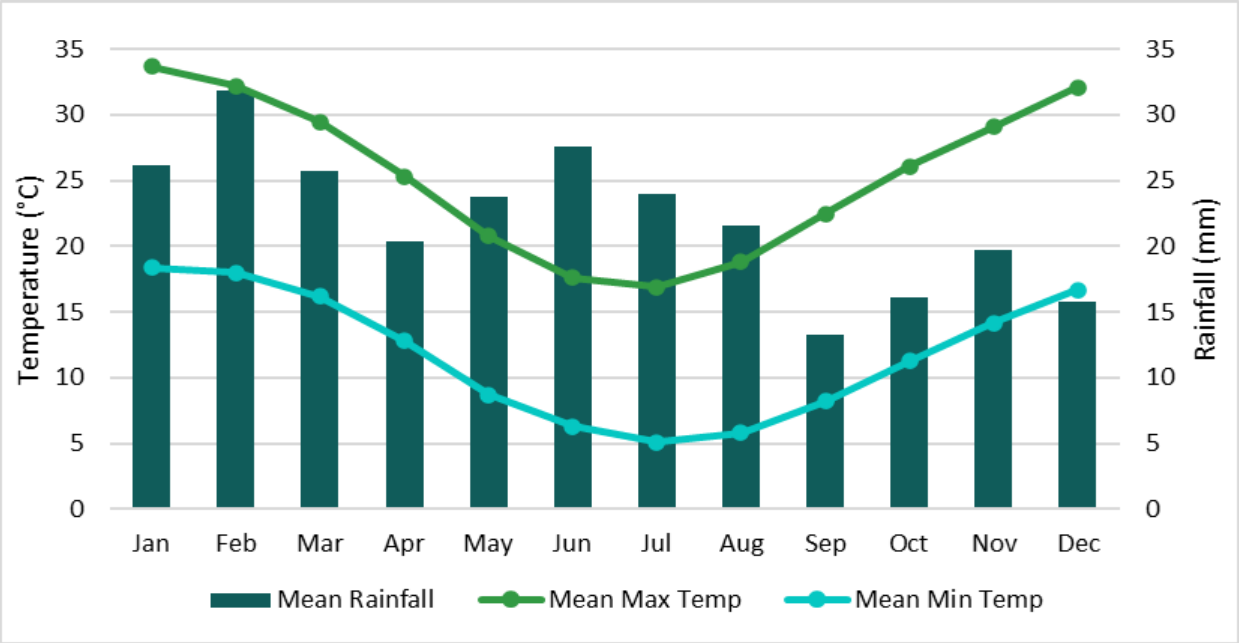

Figure 2-1 Monthly mean temperature and rainfall recorded at Kalgoorlie Airport Weather Station (1939- 2025).

2.2 Regional Environment

The Paddington solar farm project is situated within the Murchison Interim Biogeographic Regionalisation for Australia (IBRA) region (Figure 2-2). This region is characterised by low hills and mesas separated by flat plains, with vegetation dominated by low mulga woodlands. It supports extensive pastoral activities, mainly sheep and cattle grazing, and has significant mining for gold, iron and nickel (DCCEEW, 2008).

The Murchison bioregion comprises the Eastern and Western Murchison. The proposed clearing area lies within the Eastern Murchison IBRA subregion, which is dominated by red desert sandplains with internal drainage and minimal dune development. It contains broad plains of red-brown soils, Salt Lake systems, and breakaway complexes with vegetation dominated by mulga woodlands, hummock (spinifex) grasslands, saltbush, and samphire shrublands. The climate is arid with mainly winter rainfall, and the principal land use is grazing of native pastures, with some mining and limited conservation reserves (DBCA, 2001).

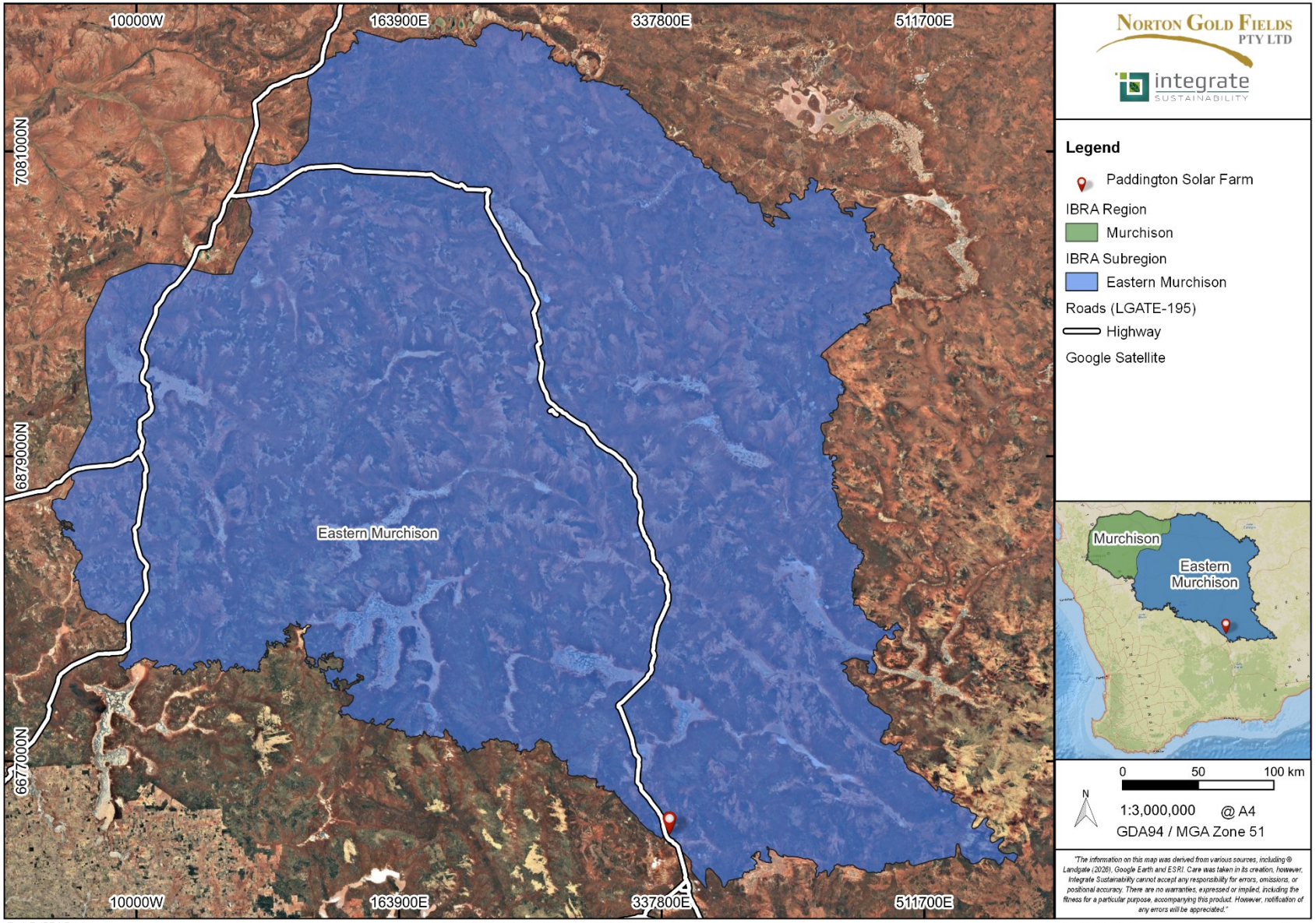

Figure 2-2 IBRA Region and Subregion location.

2.3 Geology

The application area is underlain by Cenozoic superficial deposits mapped as Czc (Colluvium) and Czl (Laterite) (DMPE, 2020) (Figure 2-3).

The dominant unit within the application area is Czc, comprising gravel, sand and silt deposited as sheetwash or talus on gently inclined slopes (colluvial origin). These materials are typically from thin to moderate surficial veneers derived from local weathering and slope processes.

Portions of the site are also mapped as Czl (laterite), comprising laterite and reworked lateritic products representing residual duricrust development. These units are typically associated with ferruginous indurated profiles formed through prolonged weathering.

Table 2-1 - Surface geology units in the application area (DMPE, 2020)

Code	Description	Area (ha)	% Application Area
Czc	Colluvium – gravel, sand, and silt as sheetwash or talus	104.26	85.65%
Czl	Laterite and reworked products	17.56	14.35%

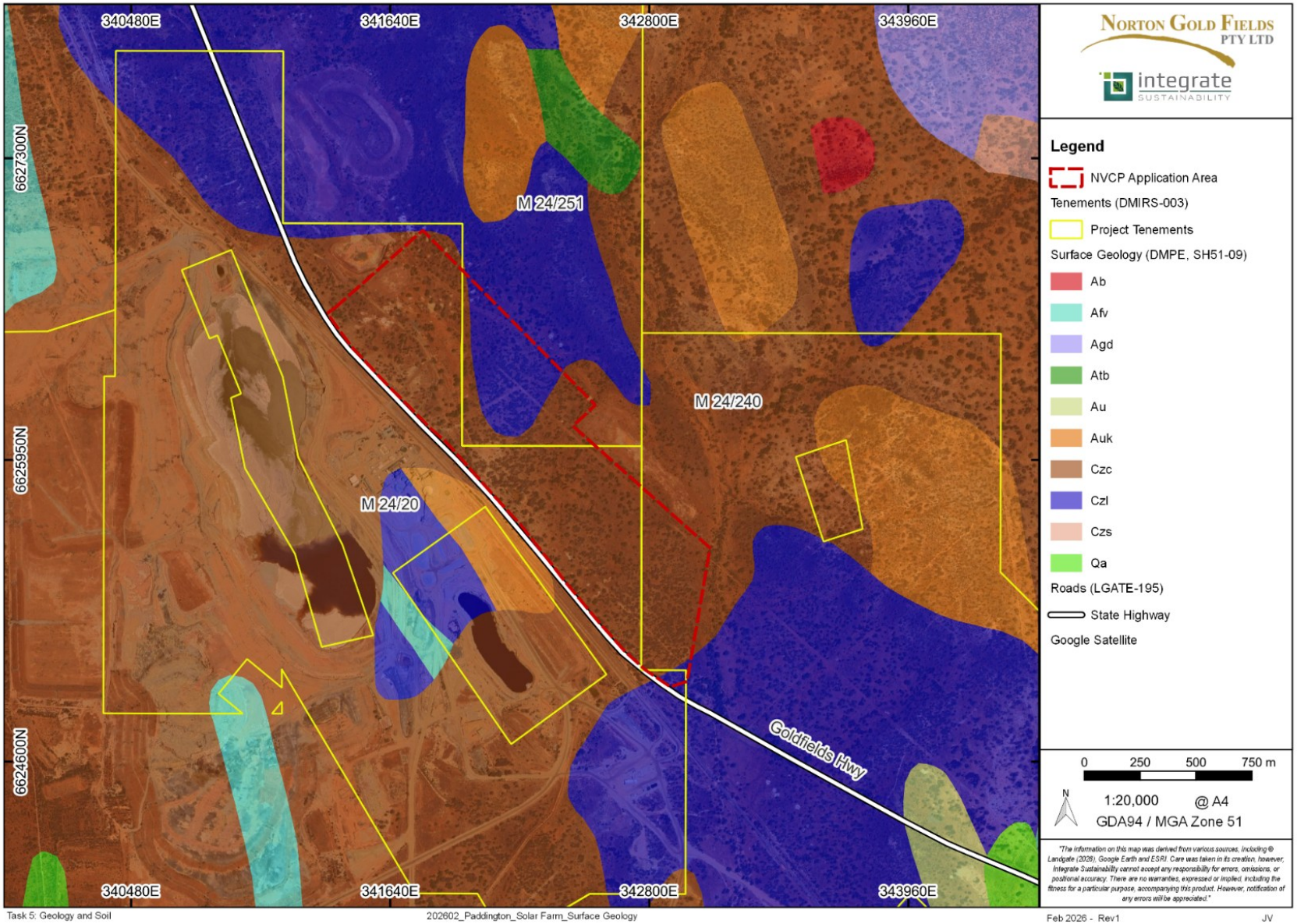

Figure 2-3 Surface geology in the application area.

2.4 Soils and Landscape Systems

The proposed area for the solar farm is located within the Kambalda soil and landform zone of the Kalgoorlie Province (southern Goldfields region of Western Australia). Landscapes are developed on Yilgarn Craton geology (granite-greenstone terrains). They are typically expressed as low-relief plains to gently undulating surfaces. Localised landforms include breakaways, low rises, and rocky pavements/outcrops. Internally drained Salt Lake and claypan depressions are also common features. These landforms reflect long-term weathering under arid-to-semiarid geomorphic processes.

The Kalgoorlie Province is further divided into six soil-landscape zones, with the survey area located within the Kambalda zone (265) (Figure 2-4). The Kambalda zone (265) is in the south-eastern Goldfields between Menzies, Norseman and the Fraser Range and contains flat to undulating plains (with hills, ranges and some salt lakes and stony plains) on greenstone and granitic rocks of the Yilgarn Craton (Botanica, 2024).

Soils consist of calcareous loamy earths and red loamy earths with salt lakes soils and some red brown hardpan, shallow loams, and red sandy duplexes. Vegetation includes red mallee, blackbutt-salmon gum-gimlet woodlands with mulga and halophytic shrublands and some spinifex grasslands (Botanica, 2024).

The soil materials are generally nutrient-poor, may exhibit surface hardsetting or crusting, and can be sensitive to disturbance where vegetation removal increases exposure to wind and water erosion. These soil-landform relationships influence vegetation patterns, water movement, surface runoff, erosion susceptibility and rehabilitation potential (Tille, 2006).

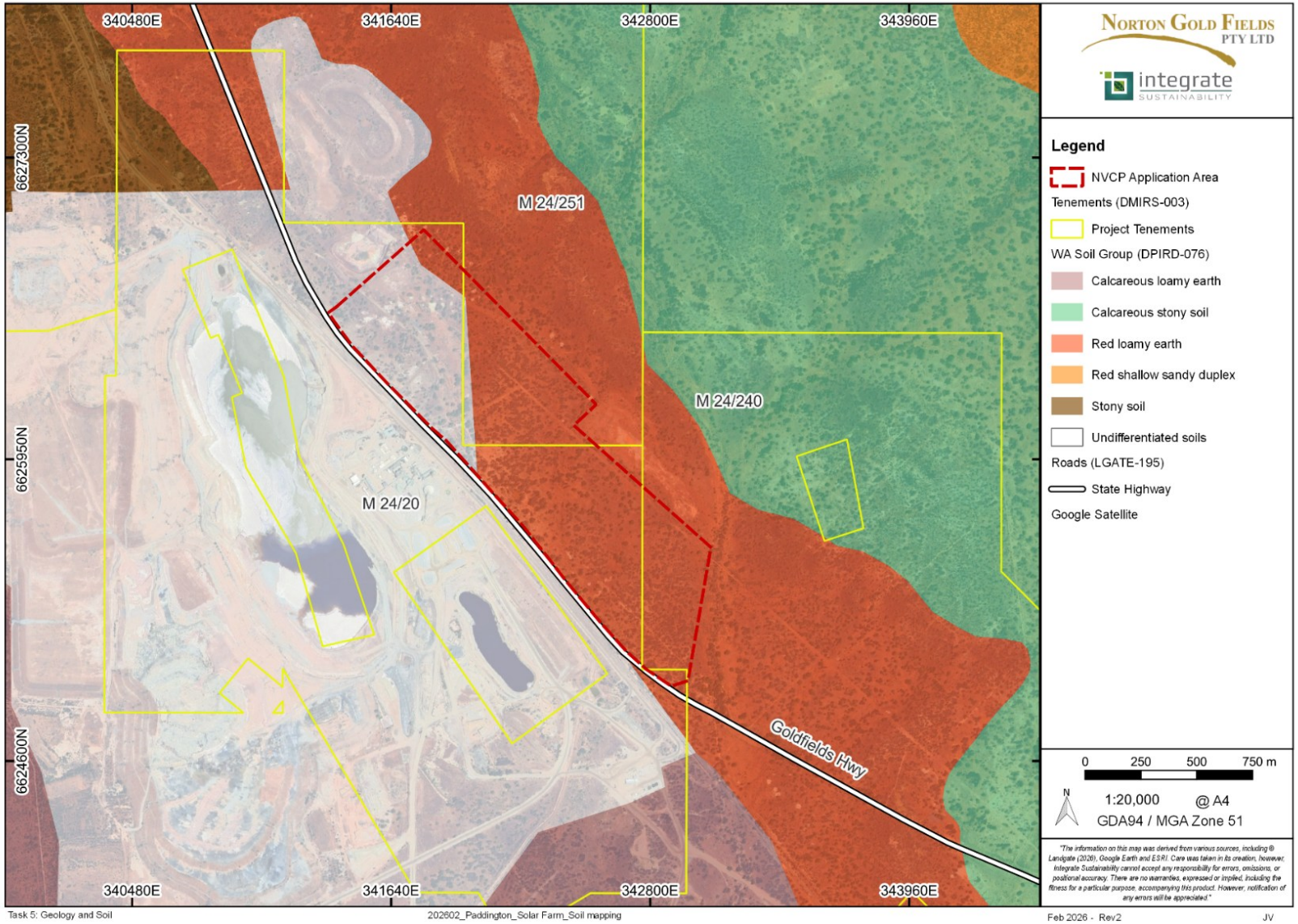

Figure 2-4 Soil mapping in the application area

2.5 Hydrology

Based on the Geoscience Australia database (2015) and a review of the satellite imagery, there are no clay pans or salt lakes within the survey area. There is one minor ephemeral drainage line occurring through the survey area (Figure 2-5).

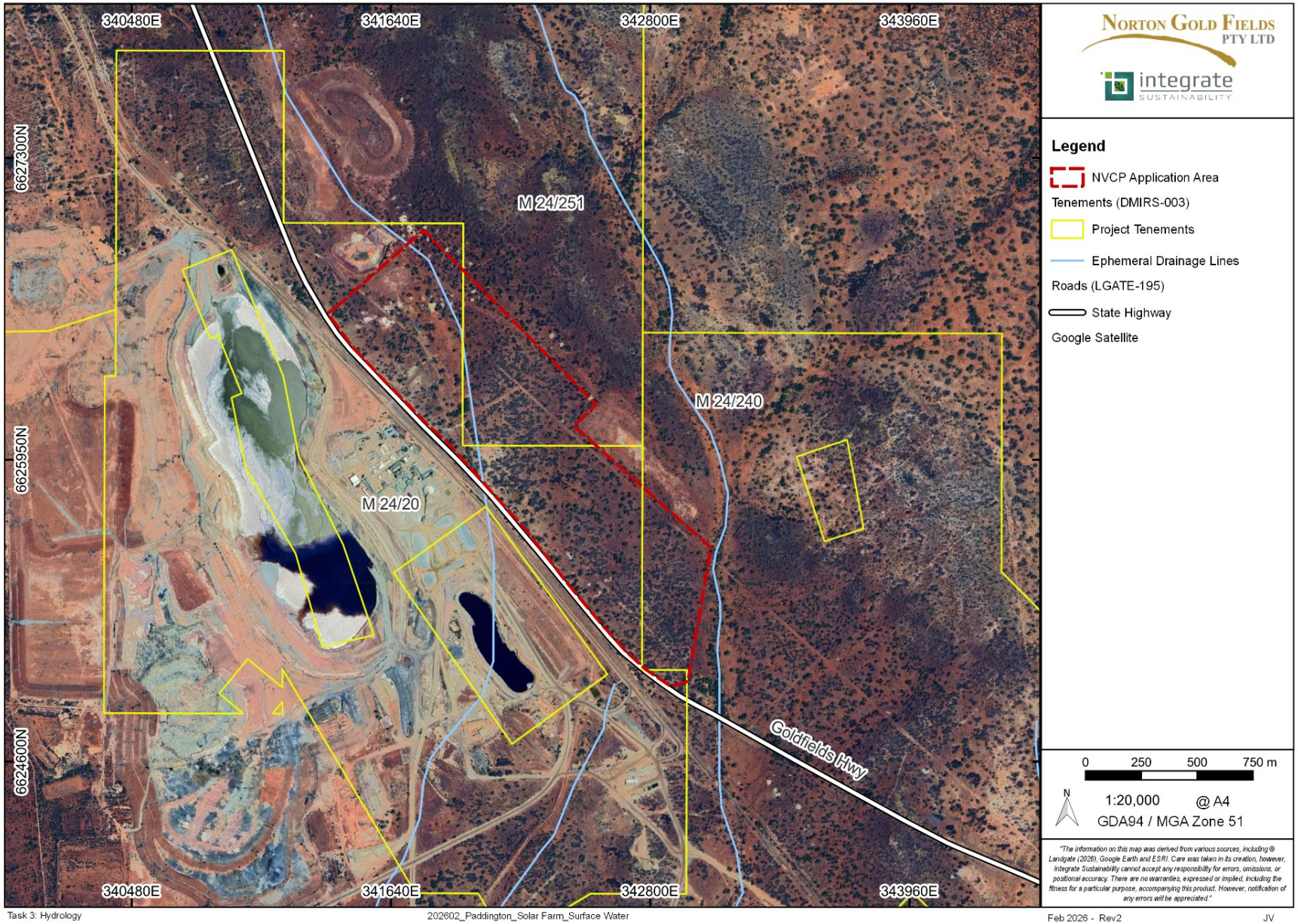

Figure 2-5 Local hydrology in the application area.

Engeny was engaged to undertake a flood assessment over the application area and its surroundings (Appendix 2). The assessment evaluated the behaviour of existing stormwater catchments and overland flow paths traversing and adjoining the application area. The 1% Annual Exceedance Probability (AEP) design flood event was modelled to determine flood extent, depth, and behaviour across the site.

The modelling identified two principal overland flow paths (Flow Path A and Flow Path B) intersecting the broader study area (Figure 2-6). Flow Path A originates from a relatively small upstream catchment (approximately 50ha) and conveys shallow overland flow through the northern and northwestern portions of the application area, generally aligned with the northwestern ephemeral drainage line. Model results indicate shallow flow depths within this corridor during 1%AEP. Potential mitigation measures, such as diversion drains along the north-eastern boundary of this flow path, could redirect flows away from the developable footprint.

Flow Path B represents runoff from a substantially larger catchment located east of the application boundary and draining southward. The mapped 1%AEP flood extent associated with Flow Path B remains outside the application area. However, the south-eastern corner lies in close proximity to the modelled flood boundary

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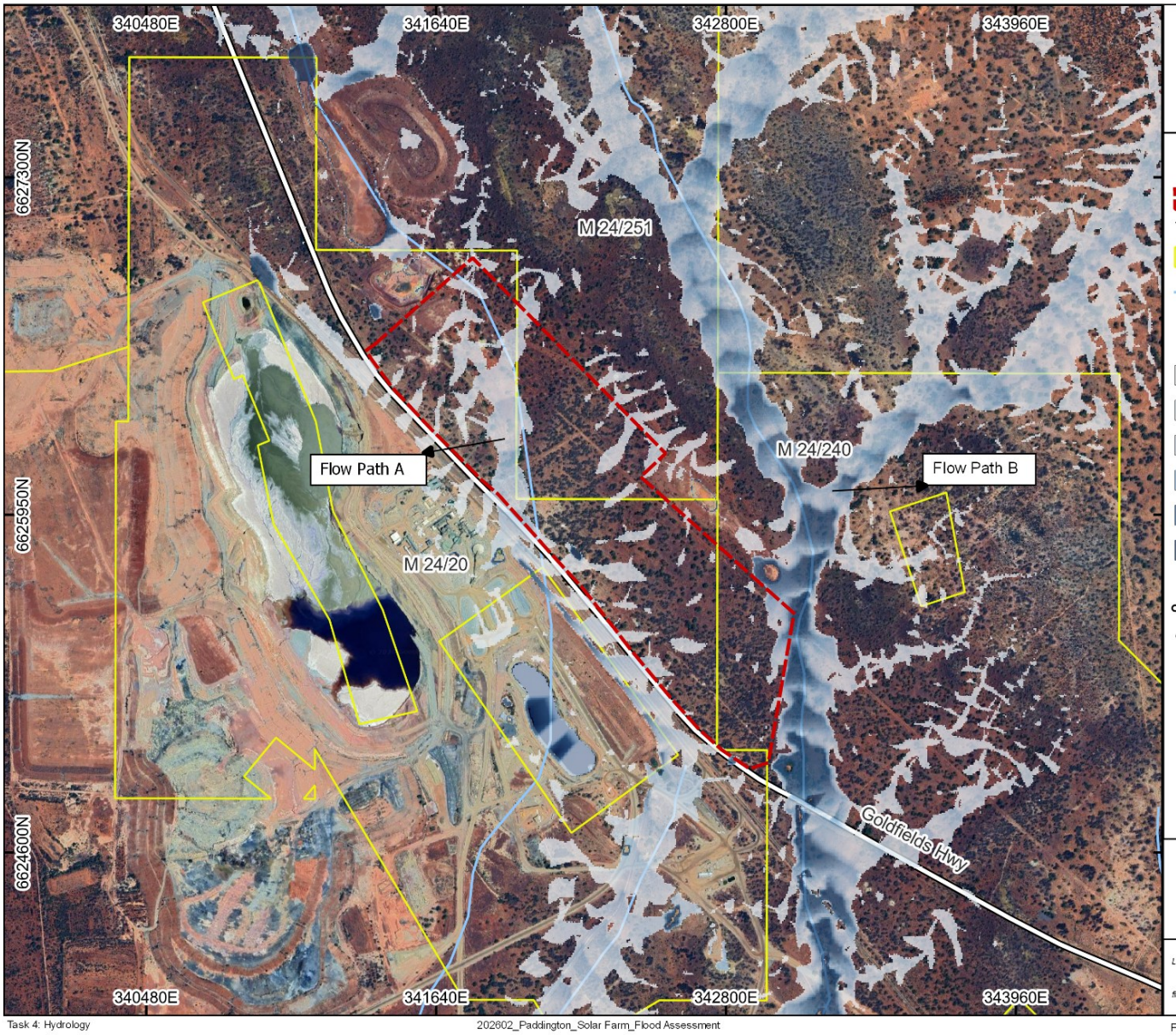

Figure 2-6).

Overall, the central to north-western portion of the application areas is subject to shallow overland flow during the 1% AEP event, with potential mitigation measures (e.g. diversion drains) available to achieve flood immunity. The southern section is generally outside the mapped flood extent.

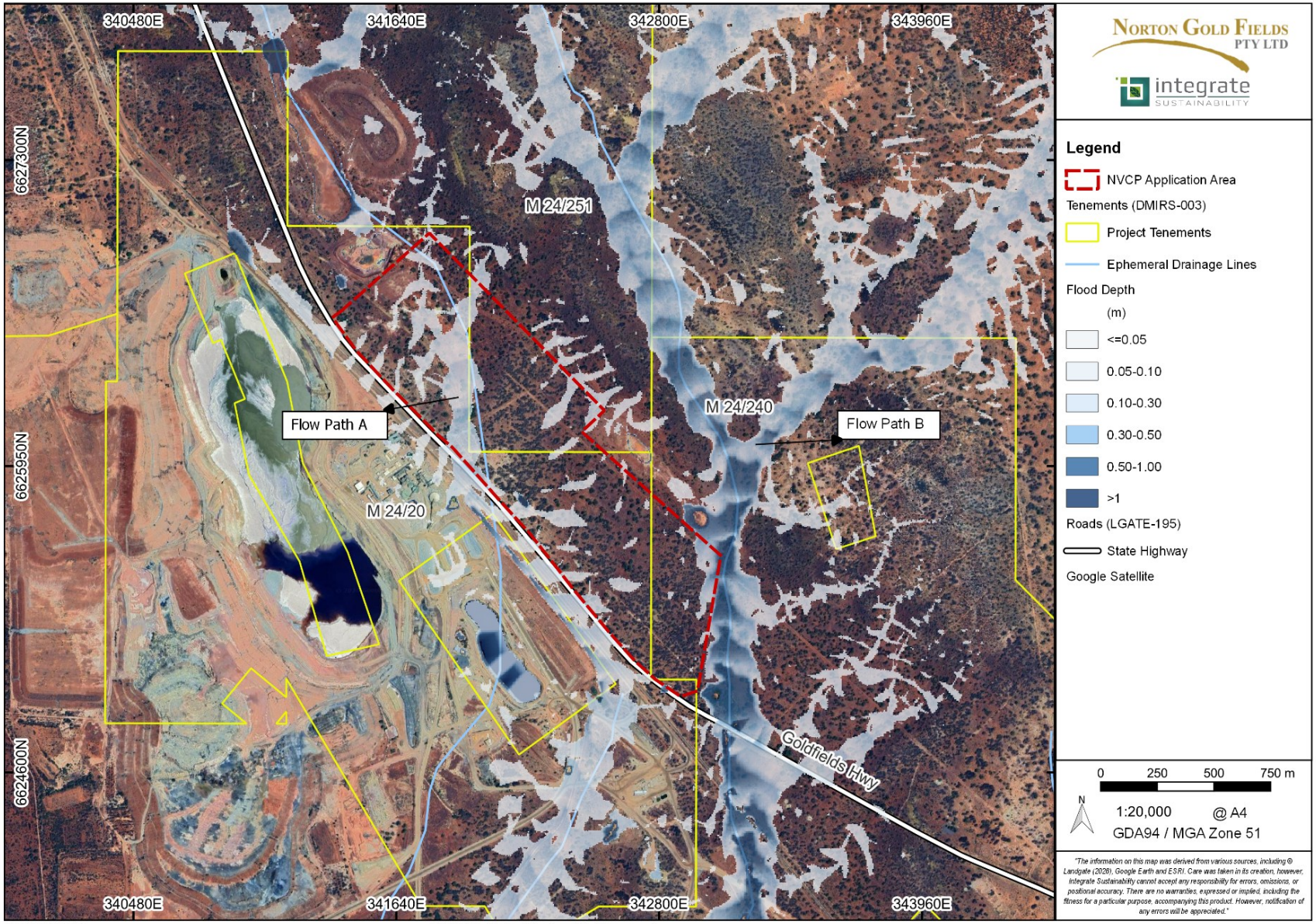

Figure 2-6 Flood Assessment in the application area.

2.6 Hydrogeology

The Kalgoorlie region is underlain by highly weathered and fractured Archean bedrock. Local palaeochannel sediments and broader alluvial and lake deposits occur above the bedrock. This setting forms part of the Yilgarn Goldfields fractured-rock groundwater province (Kern, 1995).

Groundwater occurs mainly in fractured and deeply weathered rocks. Local aquifers provide minor to moderate supplies. Fracture zones and permeable horizons within the weathering profile can locally yield significant water. Subsurface materials include weathered mafic and ultramafic rocks, basalt, komatiite and minor metasediments; often altered to clay. These materials influence groundwater storage and flow (Kern, 1995).

Groundwater Dependent Ecosystems (GDE) include biological assemblages of species, such as wetlands or woodlands, that use groundwater either opportunistically or as their primary water source (Botanica, 2024). In accordance with the BoM *Atlas of Groundwater Dependent Ecosystems* (BoM, 2021) database, there is no known or potential aquatic GDE. One known or potential terrestrial GDE covers the entire survey area, as described in Table 2-2 and Figure 2-7.

Table 2-2 - Potential terrestrial GDE within the survey area (Botanica, 2024)

Geomorphology	Potential	Vegetation description	Area (ha)
Undulating plains with some sandplains, ferruginous breakaways; ridges of metamorphic rocks and granitic hills and rises; calcretes, large salt lakes and dunes along valleys.	High	Low greenstone rises and stony plains supporting chenopod shrublands with patchy eucalypt overstoreys	105.64
Total			**105.64**

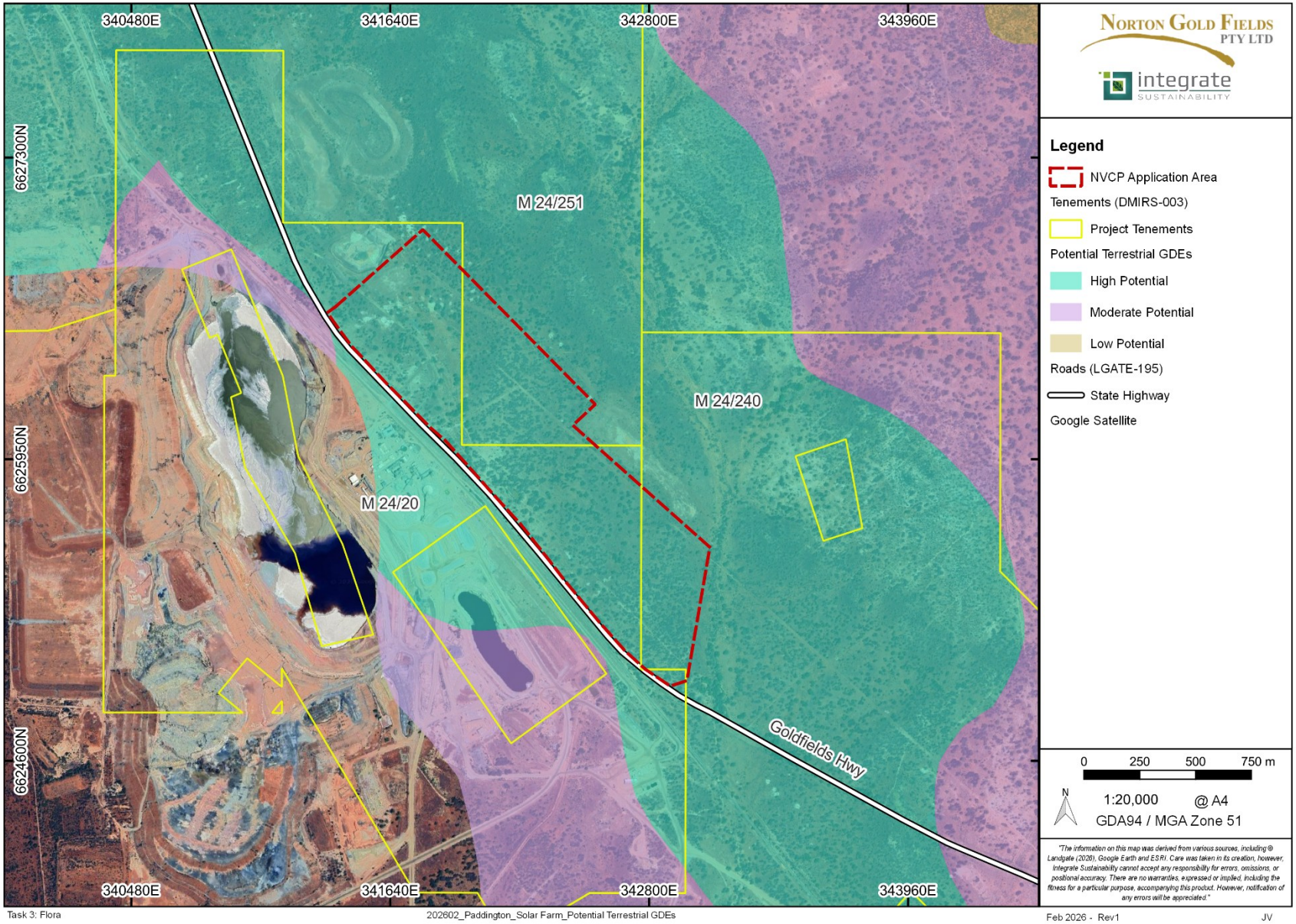

Figure 2-7 Potential terrestrial GDEs across the application area

2.7 Flora and Vegetation

In 2024, Botanica was commissioned to conduct a reconnaissance flora/vegetation survey over the Solar Farm area (Appendix 3). The survey was undertaken in accordance with the Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment – December 2016 (EPA, 2016). This survey covered an area of 105ha over tenements M24/020, M24/240 and M24/251. The area was traversed on foot and by a four-wheel drive vehicle.

The field survey identified 77 vascular flora taxa within the survey area. These taxa represented 36 genera across 19 families, with the most diverse families being Chenopodiaceae (18 species). Dominant genera include Eucalyptus (10 species) and Eremophila (9 species). Five annual species were observed during the survey (Botanica, 2024).

2.7.1 Conservation Significant Flora

Assessment of the Threatened and Priority Flora records (Ref: 08-0224FL) (DBCA, 2024b), EPBC Protected Matters (DCCEEW, 2024a) and the relevant literature identified no Threatened or Priority Flora within the survey area. One Threatened taxa and twenty-two Priority Flora were identified as occurring within 40km. No Threatened or Priority species were identified in the survey area (Botanica, 2024).

2.7.2 Weeds

The desktop review identified 57 introduced flora (weed) species as known to occur within 40km of the survey area. Three weed species were recorded within the survey (Table 2-3). None were identified as a Declared Pest on the Western Australian Organism List (WAOL) under the *Biosecurity and Agriculture Management (BAM) Act 2007* or as a Weed of National Significance (Botanica, 2024).

Table 2-3 - Introduced flora species within the survey area (Botanica, 2024)

Family	Taxon	Common Name
Asteraceae	*Dittrichia graveolens*	Stinkwort
Asteraceae	*Carthamus lanatus*	Saffron thistle
Lamiaceae	*Salvia verbenaca*	Wild sage

2.7.3 Regional Vegetation Units

Pre-European vegetation in Western Australia was first mapped by Beard et al (2013) and later updated to align with the Native Vegetation Information System (NVIS) at 1:250,000 scale. State-wide data on the pre-European and current extent of each vegetation association, including areas within DBCA-managed lands, can be used to determine if a vegetation association is rare or of conservation significance (DBCA, 2019).

The application area occurs predominantly within vegetation associations 2903, with less than 1% mapped within vegetation association 468 (Figure 2-8). The vegetation association 2903 occurs primarily within the Murchison IBRA region.

A review of the publicly available DPIRD-005 (DPIRD, 2025a) and DPIRD-006 (DPIRD, 2025b) spatial layers indicate that vegetation association 2903 retains approximately 96.55% per cent of its pre-European extent of 28,309ha, with the current mapped extent estimated at 27,331ha. Descriptions of the vegetation associations and their remaining extent are provided in Table 2-4.

Both vegetation associations retain more than 97% of their pre-European extent, and the proposed development within the survey area will not significantly reduce the current extent of these vegetation associations (Botanica, 2024).

Table 2-4 - Pre-European vegetation associations within the survey area (Botanica, 2024)

Vegetation Association	Pre-European extent remaining	% Protected for Conservation	Floristic Description	Extent within Survey Area
Barlee 2903	96.55%	0%	Woodland other	104.95 ha (99.4%)
Kununulling 468	89.55%	0%	Woodland other	0.67 ha (0.6%)
Total				**105.64 ha (100%)**

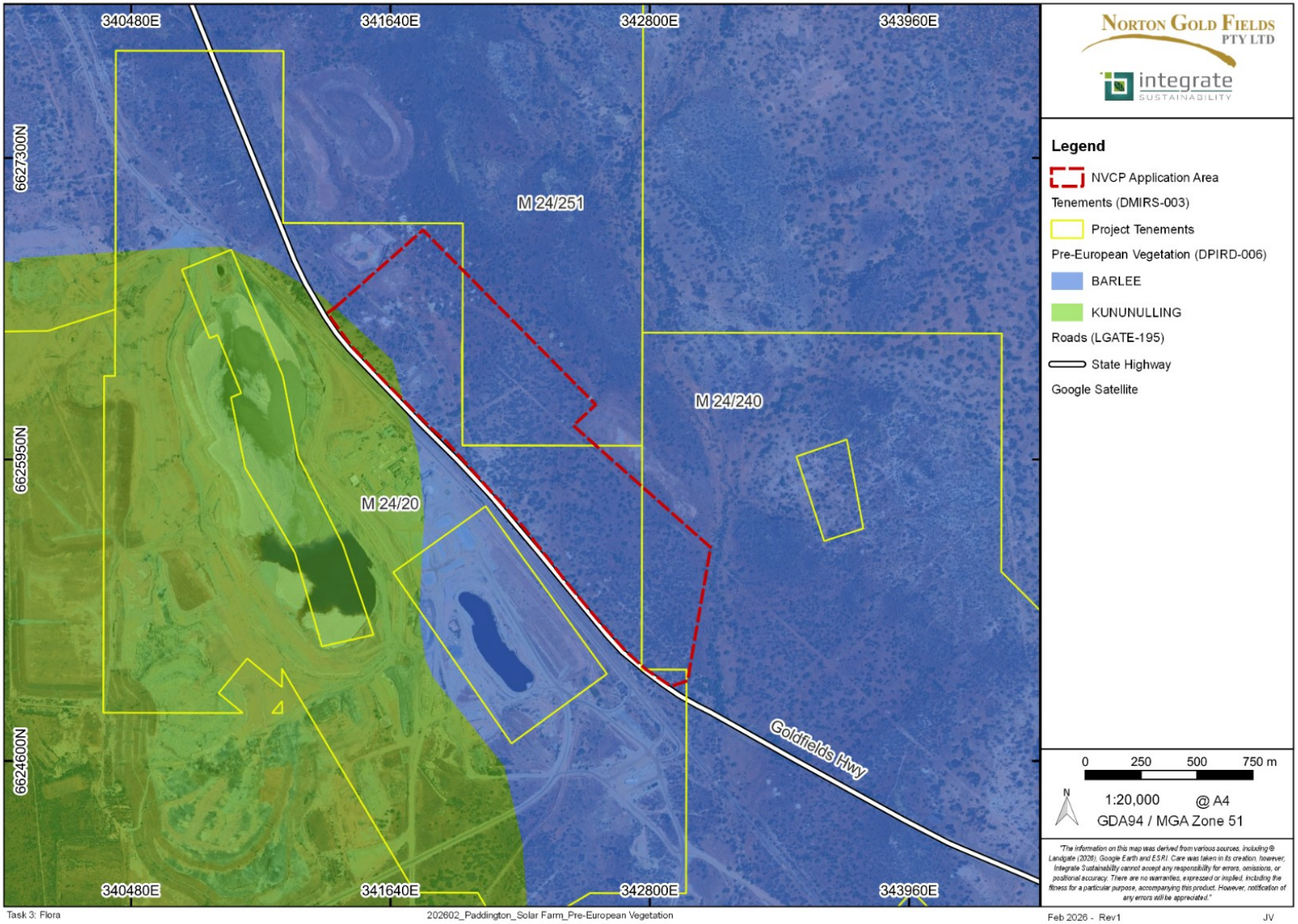

Figure 2-8 Pre-European Vegetation within the survey area.

2.7.4 Local Vegetation Communities

Three broad-scale vegetation communities were identified within the survey area. These communities were identified within two landform types and comprised one major vegetation group according to the NVIS Major Vegetation Group (MVG) definition. Vegetation community descriptions and extent are listed below in Table 2-5 and illustrated spatially in Figure 2-9. Vegetation community descriptions and extents were determined from field survey results, aerial imagery interpretation and extrapolation of the communities (Botanica, 2024).

The survey found CLP-EW1 was the most widespread community in the survey area, occupying 65.75 ha (62.8%), while DD-EW1 was the most restricted with 10 ha (9.5%). The diversity of species across the vegetation types was consistent. The most diverse vegetation type was CLP-EW2, with 44 species (57%), while the least diverse was CLP-EW1 with 41 species (53%) (Botanica, 2024).

Table 2-5 –Vegetation Communities in the application area

Vegetation Community	Description	Area (ha)	Application Area (%)
CLP-EW1	Mid woodland of *Eucalyptus salmonophloia* over mid open shrubland of *Acacia hemiteles/ Eremophila scoparia* and low open shrubland of *Ptilotus obovatus* on clay-loam plain.	65.75	54%
CLP-EW2	Mid woodland of *Eucalyptus clelandiorum/E lesouefii* over mid open shrubland of *Acacia hemiteles* and low open chenopod shrubland of Atriplex vesicaria on clay-loam plain	24	19.71%
DD-EW1	Mid woodland of *Eucalyptus salmonophloia* over mid open shrubland of *Acacia hemiteles Eremophila scoparia* and low open shrubland	10	8.21%
NA	Mining disturbance, cleared areas.		

2.7.5 Vegetation Condition

Native vegetation was categorised as 'completely degraded' to 'good' (Table 2-6) (Figure 2-10). Impacts to vegetation include access tracks, dams, historical and current mining and exploration activities (Botanica, 2024).

Table 2-6 – Summary of local vegetation condition (Botanica, 2024).

Condition rating	Description	Area (ha)	Application Area (%)
Good	More obvious signs of damage caused by human activity since European settlement, including some obvious impact on the vegetation structure, such as that caused by low levels of grazing or slightly aggressive weeds.	61.55	58.2%
Degraded	Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration, but not to a state approaching good condition without intensive management.	38.15	36.1%
Completely Degraded	Cleared vegetation.	5.91	5.59%
Total		**105.64**	**100%**

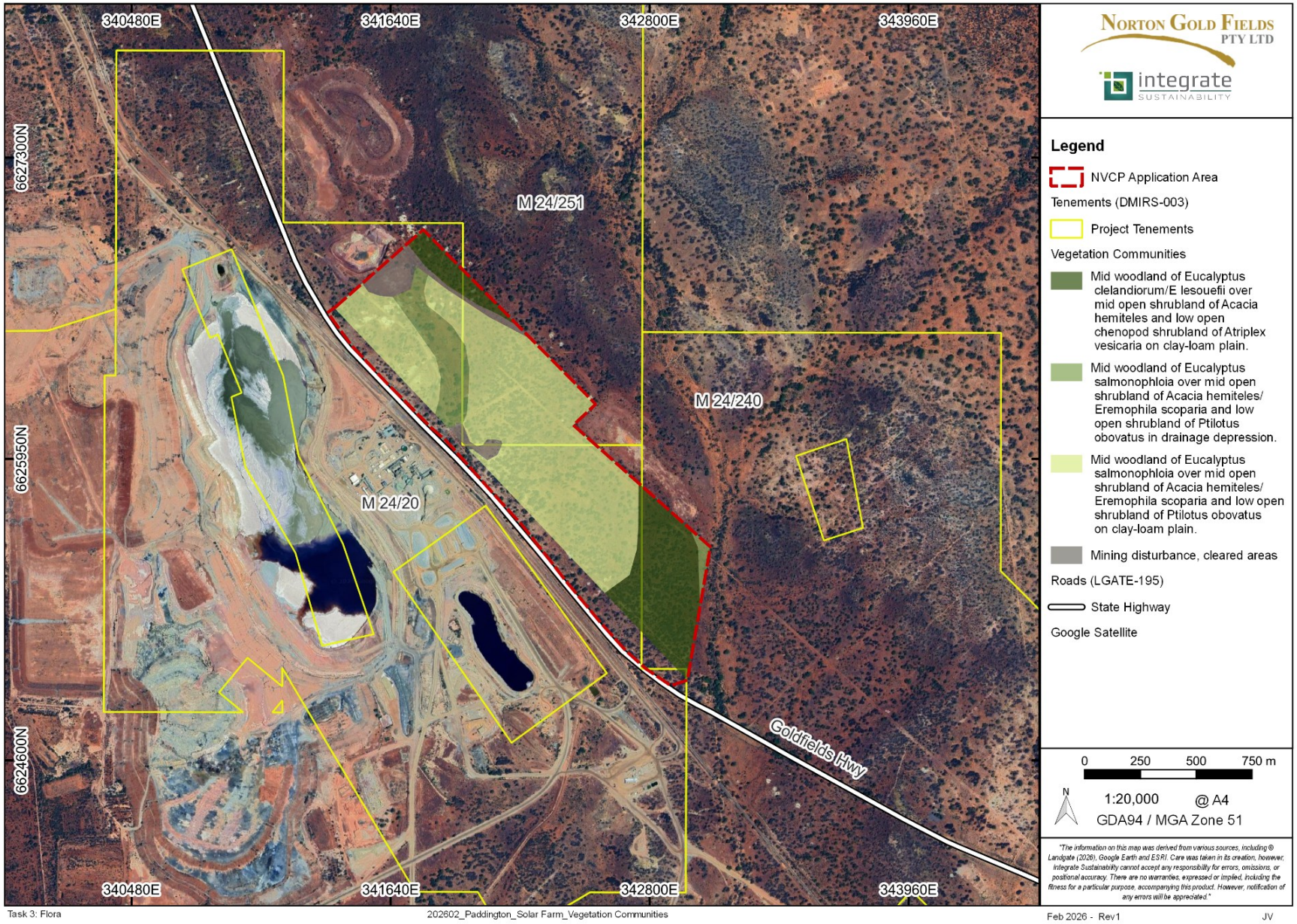

Figure 2-9 Vegetation communities within surveyed areas.

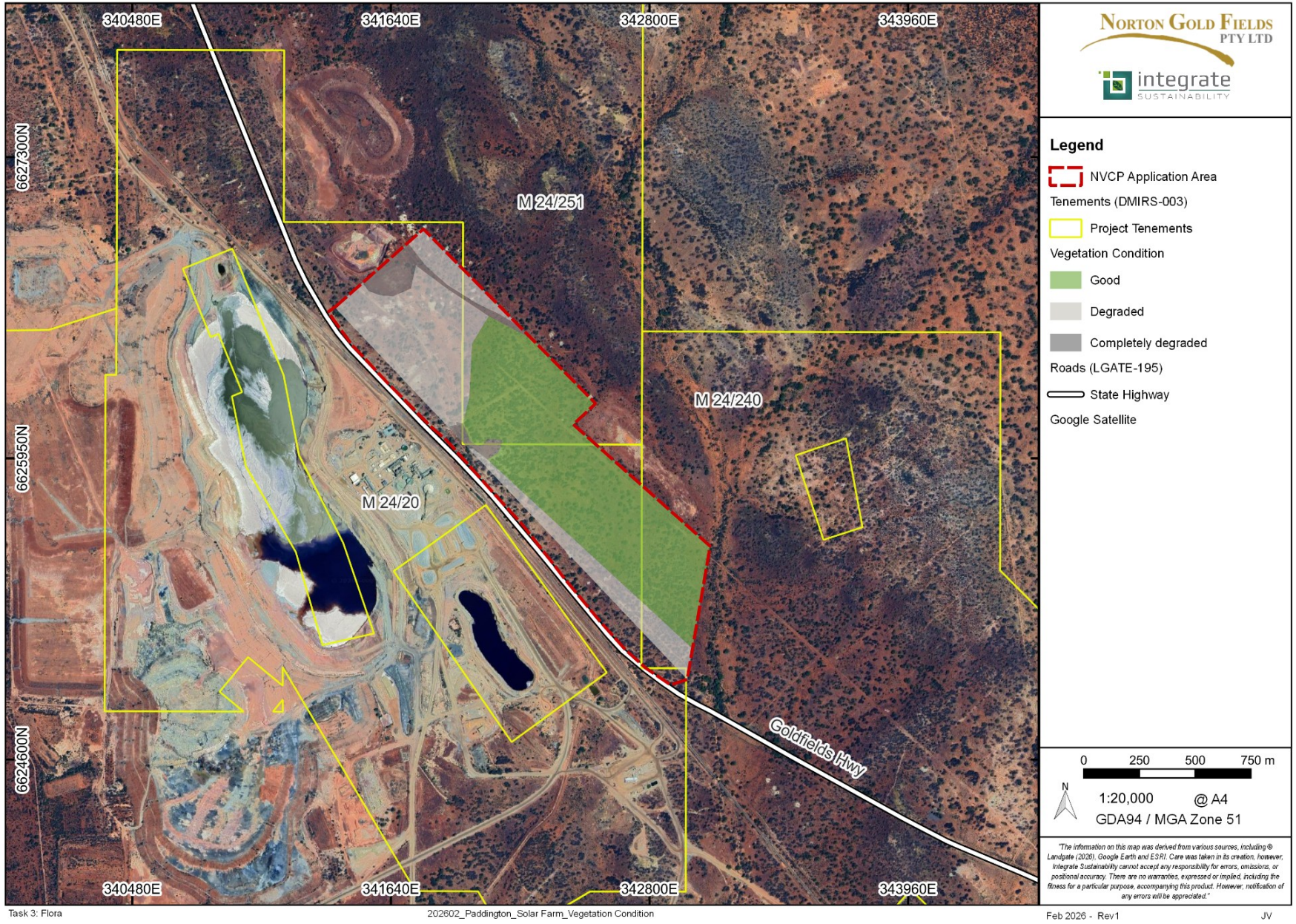

Figure 2-10 Vegetation condition within survey areas

2.7.6 Conservation Significant Vegetation Communities

The desktop assessment and survey determined that no Threatened Ecological Communities (TEC) listed under the Commonwealth EPBC Act, or the Western Australian Biodiversity Conservation Act (BC Act), are known to occur within the survey area or within 40 km of the survey area. No DBCA-listed Priority Ecological Communities (PEC) are known to occur within the survey area; there are three PECs known to occur within 40 km of the survey area (Botanica, 2024) (Table 2-7).

Table 2-7 - Priority Ecological Communities within a 40 km radius of the survey area (Botanica, 2024).

Veg Unit / Priority Ecological Community	Conservation Status	Description	Location
Emu Land System	Priority 3 (P3)	The Emu Land System PEC is defined as a paperbark shrubland-wetland system. It contains fresh- or brackish-water ephemeral lakes and swamps, with cane grass, lignum, and paperbark shrublands.	This PEC is 34 km northwest of the survey area.
			This PEC is 33 km northeast of the survey area.
			This PEC is 38 km east of the survey area

There are no Ramsar wetlands or wetlands of national importance within the survey area or within 40 km of the survey area. There are no Environmentally Sensitive Areas (ESAs) listed under the EP Act within the survey area; however, one is located approximately 36km north of the survey area. Disturbances within the survey area are unlikely to impact these areas (Botanica, 2024).

There are no DBCA-managed lands, gazetted or proposed reserves, within the survey area. Four gazetted reserves are within 40km, the closest being the Kalgoorlie Arboretum (R42657), approximately 28km southeast of the survey area. Disturbances within the survey area are unlikely to impact these areas (Botanica, 2024).

No Threatened, Priority or otherwise significant ecological communities were identified within the survey area (Botanica, 2024).

2.8 Terrestrial Fauna

The fauna assessment conducted by Botanica in 2024 was in accordance with the requirements of a basic terrestrial fauna survey as defined in Technical Guidance - Terrestrial Fauna Surveys for Environmental Impact Assessment – June 2020 (EPA, 2020). This survey covered an area of 105ha over tenements M24/020, M24/240 and M24/251. The area was traversed on foot and by a four-wheel drive vehicle (Botanica, 2024).

Subsequently, in 2025, Botanica undertook targeted fauna surveys for selected conservation-significant species identified as potentially occurring within the survey area. The scope and outcomes of these targeted surveys are described in 2.8.2 Conservation Significant Fauna section.2.8.2

The data search identified a total of 282 terrestrial vertebrate fauna taxa within 40 km of the survey area, consisting of 150 birds, 36 mammals, 90 reptiles, one fish and five amphibian taxa (Botanica, 2024).

A list of opportunistic observations of fauna species that were made during the fauna field survey, with a total of nine fauna species observed, is presented in Table 2-8.

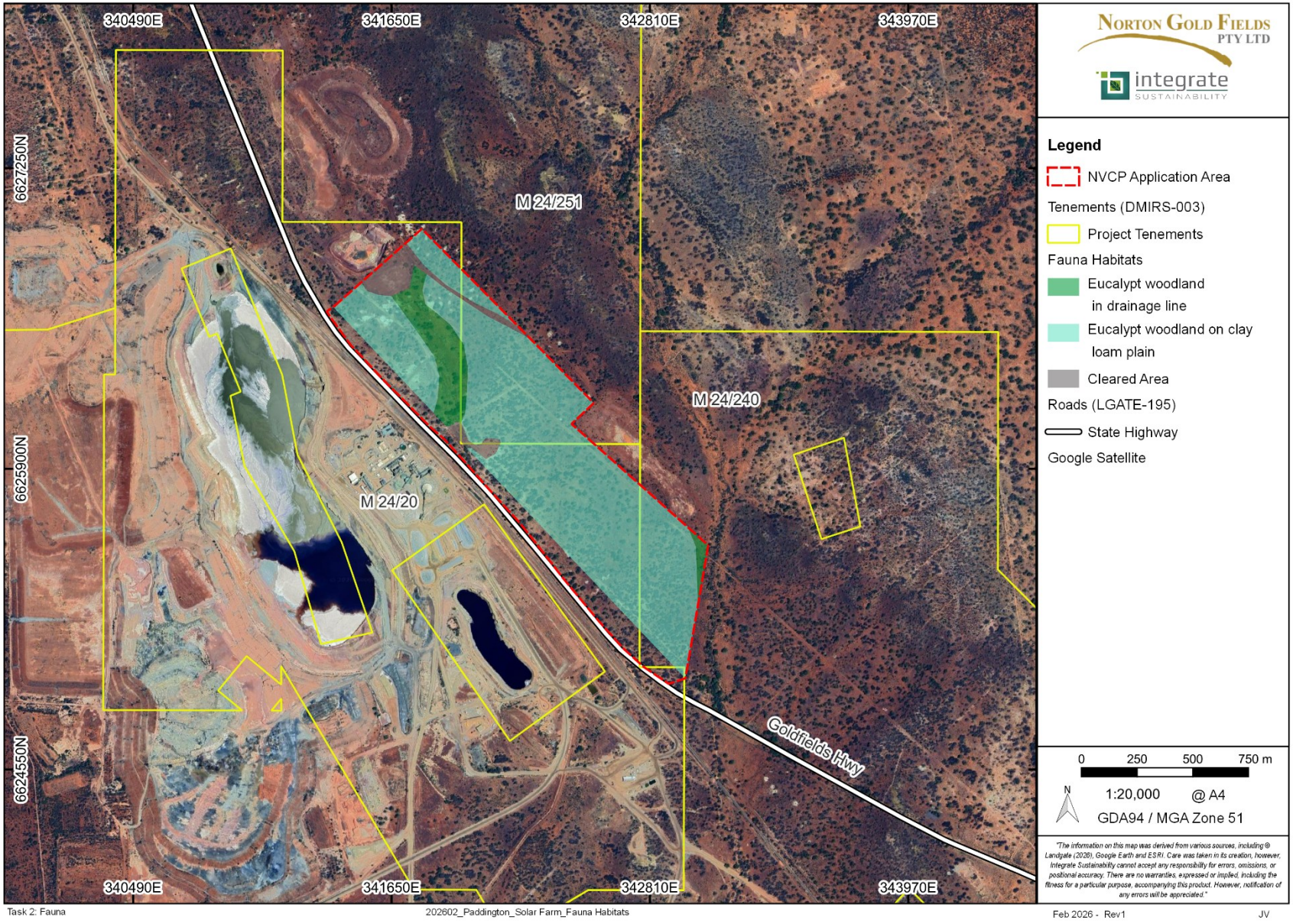

Figure 2-11 Fauna habitats identified in surveyed areas.

Table 2-8 - Fauna species observed during the field survey (Botanica, 2024)

Taxon	Common Name	Comments
Avifauna		
Barnardius zonarius	Ringneck parrot	Observed
Cacatua roseicapilla	Galah	Observed
Coracina novaehollandiae	Black-faced cuckoo-shrike	Observed
Corvus coronoides	Australian raven	Observed
Grallina cyanoleuca	Magpie lark	Observed
Lichmera indistincta	Brown honey eater	Observed
Mammals		
Felis catus	Cat	Tracks observed
Oryctolagus cuniculus	Rabbit	Scats Observed
Macropus fuliginosus melanops	Western grey kangaroo	Scats Observed

2.8.1 Fauna Habitat

Based on vegetation and associated landforms identified during the flora and vegetation assessment, two broad-scale terrestrial faunal habitats, with a third mapping the previously cleared or disturbed areas, were identified within the survey area. Given its proximity to the Goldfields Highway, it is unlikely to support high levels of faunal numbers and diversity (Botanica, 2024). Table 2-9 provides the area and a visual representation of fauna habitat types, and the extent of fauna habitats is shown spatially in Figure 2-11.

Table 2-9 – Summary of fauna habitats (Botanica, 2024).

Fauna Habitat	Attributes	Possibly Occurring Conservation Significant Species	Area (ha)	Application Area (%)
Eucalypt woodland in drainage line	• Ground moderately suited to burrowing species. • Low to moderate diversity vegetation strata supporting avifauna assemblage. • Low to moderate vegetation density and leaf litter, providing some refuge for reptiles.	Malleefowl (*Leipoa ocellata*) Southern Whiteface (*Aphelocephala leucopsis*)	10.01	9.4%
Eucalypt woodland on clay loam plain	• Ground moderately suited to burrowing species. • Low to Moderate diversity vegetation strata supporting avifauna assemblage. • Moderate vegetation density and leaf litter, providing some refuge for reptiles.	Malleefowl (*Leipoa ocellata*) Southern Whiteface (*Aphelocephala leucopsis*)	89.79	84.99%
Cleared area	• Ground not particularly suited to burrowing species. • Very low diversity vegetation strata supporting minimal avifauna assemblage • Very low vegetation density and very low leaf litter.	N/A	5.9	5.5%

2.8.2 Conservation Significant Fauna

The desktop review (DBCA, 2024c; DCCEEW, 2024a) identified 30 terrestrial vertebrate species and 1 invertebrate species of conservation significance as previously recorded within 40km of the survey area, including 12 migratory terrestrial species. The assessment identified four conservation-significant fauna, potentially occurring in the survey area.

These consisted of two Vulnerable Threatened (VU) species and two priority species (Botanica, 2024). The two Threatened species were:

- Malleefowl (*Leipoa ocellata*) - Vulnerable (EPBC Act and BC Act)
  This species is occasionally recorded in the Eastern Murchison subregion. Habitat appears unsuitable for breeding due to the open canopy and low levels of leaf litter present; however, occasional transients could potentially occur. No evidence of Malleefowl activity (inactive or active mounds, tracks, feathers or bird observations, etc.) was observed within the survey area.
- Southern Whiteface (*Aphelocephala leucopsis*)- Vulnerable (EPBC Act)
  This species is sparsely recorded throughout inland Australia. The survey area likely represents the southern limit of the species' range. Suitable habitat may be present.

No evidence of either conservation-significant fauna was observed during the 2024 survey, including no evidence of Malleefowl (*Leipoa ocellata*) mounds or other activity (Botanica, 2024).

In response to assessing the presence of suitable habitat of conservation-significant fauna, Botanica was commissioned to undertake targeted fauna surveys in 2025. These surveys focused on:

- Arid Bronze Azure Butterfly (*Ogyris subterrestris petrina*) – Critically endangered (EPBC Act and BC Act)
- Inland Hairstreak (*Jalmenus aridus*) – Priority 2 (DBCA)
- Southern Whiteface (*Aphelocephala leucopsis*) Vulnerable (EPBC Act and BC Act)

Arid Bronze Azure Butterfly and Inland Hairstreak Butterfly
A targeted survey was conducted in September 2025 for the two conservation-significant butterflies (Appendix 4A). The survey area was traversed on foot, covering approximately 105ha.

The Arid Bronze Azure Butterfly (ABAB) (*Ogyris subterrestris petrina*) has an obligate association with a sugar ant, *Camponotus sp. nr. terebrans.* The ABAB's larvae live entirely within the ant's nest during their development, where they predate on the ants' brood (myrmecophagous) or steal food from the ants (kleptoparasite). The most critical factor for habitat occupancy by the butterfly is the presence of large colonies of the host ant; only large colonies can support the ABAB because, being a parasitic species, it requires large numbers of hosts (Botanica, 2025a).

ABAB and their host ants are known to prefer open eucalypt woodlands dominated by smooth-barked eucalypts, including *Eucalyptus salubris* (Gimlet), *E. salmonophloia* (Salmon Gum), *E. capillosa* (Wheatbelt Wandoo), and *E. loxophleba* (York Gum). The ABAB butterflies and ants also require a mixed understorey of flowering shrubs such as *Eremophila, Cratystylis, Senna,* and *Scaevola* (Botanica, 2025a).

The site was not considered suitable to host the ABAB for the following reasons:

- Although there were many smooth-barked Eucalypts in the survey area, many of these were in a low-lying area/drainage depression, and these would not suit the host sugar ant *Camponotus sp. nr. terebrans.*
- The lower canopy consisted mainly of chenopod shrubs, and the ABAB prefers a mid-shrub layer with mixed shrubs, containing, for example, *Eremophila* species.

Several smooth-barked Eucalyptus trees were surveyed for ants, and none were found. It is unlikely that the ABAB would be present in this survey area (Botanica, 2025a)

The Inland Hairstreak's preferred habitat is open woodland with mature *Senna artemisioides ssp. filifolia,* as well as mixed flowering shrubs with open areas of well-drained exposed ground adjoining the host plants. The ant *Froggattella kirbii* must be present (Botanica, 2025a).

The site was not considered suitable for hosting the Inland Hairstreak due to the absence of host plants. Very few *Senna artemisioides subsp. filifolia* were observed in the survey area. It is unlikely that the Inland Hairstreak would be present in this survey area (Botanica, 2025a).

Southern Whiteface (Aphelocephala leucopsis).
A targeted survey for the Southern Whiteface (*Aphelocephala leucopsis)* was undertaken across the application in September 2025 (Appendix 4B). The survey area was traversed on foot (Botanica, 2025b).

No evidence of the Southern Whiteface were seen in the survey area (Botanica, 2025b).

2.8.3 Introduced Fauna

The desktop search identified nine introduced (non-native) species, these are:

- *Bos taurus* (Cattle)
- *Canis spp.* (Wild Dog);
- *Capra hircus* (Feral Goat);
- *Carassius auratus* (Goldfish);
- *Felis cattus* (Feral Cat);
- *Mus musculus* (House mouse);
- *Oryctolagus cuniculus* (Rabbit);
- *Ovis spp.* (Feral Sheep); and
- *Vulpes* (Fox).

During the field survey, the opportunistic observations identified two introduced fauna species: cat and rabbit (Botanica, 2024).

2.9 Aboriginal Heritage

A search of the publicly available Aboriginal Heritage inquiry system spatial layers (DPLH-099) (DPLH, 2026a) and DPLH-100 (DPLH, 2026b) found no registered Aboriginal heritage site was identified (Figure 2-12). A lodged site 'Broad Arrow Myth Site' (Lodged site 38894) was identified within 4km of the application area.

Terra Rosa Consulting was engaged to undertake an archaeological and ethnographic site-avoidance heritage survey on behalf of the Marlinyu Ghoorlie Traditional Owners (Appendix 5). A heritage survey was conducted on part of the application area, covering approximately 36ha, on April 2 2025 (Figure 2-12). As a result of the heritage investigation, no Aboriginal heritage sites were identified within the survey area (Terra Rosa, 2025).

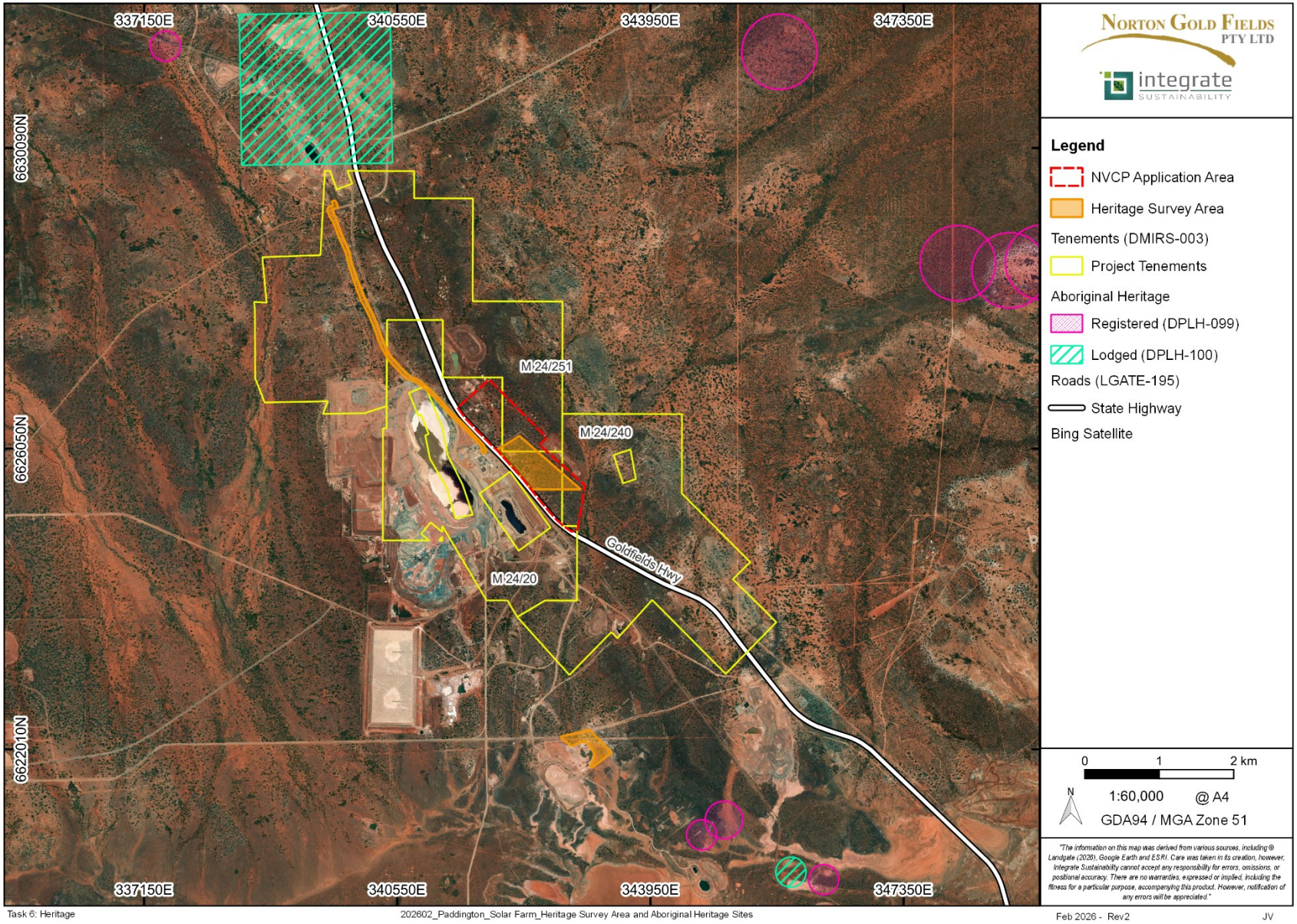

Figure 2-12 Registered and Lodged Aboriginal heritage sites close to the application area.

3 Environmental Impacts and Management

3.1 Potential Impacts to Flora and Vegetation

The construction of the solar farm will require the clearing of up to 60ha of native vegetation within the 121.72ha application area. Potential impacts on flora and vegetation include direct loss of native vegetation communities, removal of conservation-significant flora, and degradation of adjacent areas.

3.1.1 Direct Loss of vegetation

Norton proposes clearing up to 60ha of native vegetation within the 121.72ha application area. Where possible, Norton will utilise previously disturbed areas to preserve existing vegetation.

3.1.2 Direct Loss of Conservation Significant Flora

No threatened or priority species have been identified within the application area. Based on the survey outcomes, it is unlikely that threatened or priority flora species listed under Commonwealth or Western Australian legislation occur within the application area, and it is not envisaged that the proposed clearing will significantly impact flora.

3.1.3 Degradation of Vegetation

Vegetation degradation can result from direct and indirect impacts of the proposed up to 60ha clearing. The possible impacts include:

- Uncontrolled vehicle access leading to physical damage of vegetation;
- Land clearing and construction activities deposit dust on vegetation;
- Vehicles and/or equipment spreading or introducing weeds;
- Hydrocarbon or chemical spills contaminating soils, surface water or groundwater;
- Clearing and associated activities accidentally causing a fire.

3.2 Potential Impacts to Fauna

The proposed clearing and construction activities may result in direct and indirect impacts to fauna species and their habitats. These impacts may include habitat loss, fragmentation, reduced foraging availability, disturbance from construction activities, and increased risk from vehicle movements and fires.

3.2.1 Fragmentation of Habitat

The vegetation clearing may result in localised habitat fragmentation. This, in turn, can reduce the habitat connectivity, alter movement patterns and increase edge effects such as predation and weed invasion (EPA, 2020).

However, the vegetation communities recorded within the application area are well represented in the broader Eastern Murchison subregion and occur extensively in the surrounding landscape. The proposed clearing footprint is relatively small and located adjacent to existing mining disturbance and the Goldfields Highway, where habitat is already partially fragmented.

No fauna habitat identified within the survey area is considered unique or restricted to the site. Therefore, while minor local fragmentation will occur, it is unlikely to significantly affect regional habitat connectivity or the viability of fauna populations.

3.2.2 Loss of Foraging Area or Habitat

Vegetation clearing will result in a reduction of available foraging habitat. However, no habitat type will be entirely removed from the application area under the proposed site layout. The mapped fauna habitats are well represented across the wider region, and no unique habitats have been identified within the application area

3.2.3 Increased Vehicle Strikes

Construction and operational phases will increase vehicle movements within the application area. Increased traffic may increase the risk of wildlife mortality from vehicle strikes, particularly for reptiles and small mammals that traverse access tracks.

Given the proximity of the site to existing mining infrastructure and the Goldfield highway, the fauna present are likely already exposed to vehicle disturbance. The risk is therefore considered low to moderate and largely localised.

3.2.4 Fire

Clearing and construction activities introduce potential ignition sources through machinery operation, welding, vehicle exhaust systems, and human activity. Fire may result in loss of habitat for wildlife, direct mortality of less mobile species, and changes in vegetation structure.

The proposed works represent a short-term ignition risk rather than a long-term change to the fire regime. With appropriate fire management procedures in place, the risk of uncontrolled fire is considered low.

3.3 Potential Impacts to Surface Water

The proposed clearing and construction of the solar farm could affect local surface-water processes within and adjacent to the application area. Soil disturbance and changes in landform may influence runoff patterns and sediment mobilisation, particularly during rainfall events. The primary potential impacts are increased turbidity and alterations to existing surface-water flow regimes.

3.3.1 Increased Turbidity

Vegetation clearing and minor earthworks may expose soils to wind and water erosion. During rainfall events, mobilised sediments could enter local ephemeral drainage lines, increasing turbidity and temporarily reducing water quality.

Given that drainage lines within the application area are ephemeral and flow primarily during high rainfall events, any increase in turbidity would likely be short-term and localised. Implementing erosion and sediment control measures will minimise sediment mobilisation.

No permanent watercourses or wetlands occur within the application area, and no downstream conservation-significant aquatic ecosystems have been identified.

3.3.2 Altered Surface Water Flows

The installation of solar panel arrays, internal access tracks, and minor earthworks may modify local overland flow patterns by altering surface roughness and microtopography.

However, the project layout has considered the findings of the flood assessment (Engeny, 2022), and infrastructure will be designed to maintain existing flow paths where practicable. The use of appropriately sized culverts, low-profile access tracks and drainage controls will allow continuation of natural sheet flow across the site.

The proposal is not expected to significantly increase flood levels, redirect major drainage lines or exacerbate downstream flooding.

4 Management Measures

4.1 Threatened and Priority Flora

Database searches and field surveys confirmed that no Threatened or Priority Flora occur within the disturbance area.

Notwithstanding this, personnel will be instructed to report any vegetation that appears unusual or inconsistent with the surrounding vegetation community. If such vegetation is identified during works, activities in the immediate area will cease and seek independent management advice.

4.2 Threatened and Priority Fauna

Although the presence of Threatened or Priority fauna within the disturbance area is considered unlikely, relevant personnel will receive environmental induction material outlining key identification features of fauna species that may occur, including the Malleefowl and the Southern Whiteface.

If the proposed works unexpectedly encounter Threatened or Priority fauna, Norton will cease work and seek independent management advice.

4.3 Weed Species

To minimise the risk of weed introduction, all earth-moving equipment will be cleaned prior to entering the site. Cleaning will remove soil and plant material, which will be appropriately contained and disposed of before the equipment is mobilised to the site.

4.4 Hydrocarbon Spills

As heavy machinery and vehicles will be used during the proposed works, there is a potential for minor hydrocarbon spills. Storage, handling, disposal, and spill response will be managed in accordance with Norton's existing hydrocarbon management procedures. Spill kits will be available on-site to address incidents, and any contaminated material will be collected, contained, and disposed of appropriately.

4.5 Dust

Due to ground surface exposure resulting from the proposed works, fugitive and temporary dust may be generated on site. During the construction phase of the solar farm, dust will be managed through dust-suppressing techniques, including the use of saline water delivered by water carts. A water cart will be available for use as required.

5 Stakeholder Engagement

5.1 Ongoing Community and Stakeholder Engagement

The application area is located in a remote part of the Goldfields region, north of Kalgoorlie-Boulder and does not have any immediate neighbouring landholders or sensitive receptors. Engagement will be undertaken as required with relevant government agencies, Traditional Owners, and other stakeholders, particularly if project activities change or any other relevant matters are identified during the life of the project.

6 Assessment Against Clearing Principles

An assessment of the proposed native vegetation clearing against the ten clearing principles outlined in Schedule 5 of the EP Act is provided in Table 6-1. This assessment was undertaken based on the information provided in the supporting studies attached to this application.

The assessment shows that the proposed clearing does not conflict with any of the ten principles, and, where necessary, management measures will be implemented to minimise any potential unacceptable environmental impacts.

Table 6-1 – Assessment against clearing principles.

Clearing Principle	Not at Variance	Likely at Variance
a) Native vegetation should not be cleared if it comprises a high level of biological diversity	X	
b) Native vegetation should not be cleared if it comprises the whole or part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to WA	X	
c) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of rare flora	X	
d) Native vegetation should not be cleared if it comprises the whole or part of, or is necessary for the maintenance of, a Threatened Ecological Community	X	
e) Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared	X	
f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland	X	
g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation	X	
h) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area	X	
i) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water	X	
j) Native vegetation should not be cleared if clearing of the vegetation is likely to cause, or exacerbate, the incidence of flooding	X	

a) Native vegetation should not be cleared if it comprises a high level of biological diversity

A flora and Vegetation survey undertaken in 2024 recorded 77 taxa across three broadly distributed eucalypt woodland communities typical of the Eastern Murchison IBRA subregion. Species richness and vegetation structure are consistent with the surrounding landscape, and no locally restricted or unusually diverse communities were identified. The vegetation to be cleared is well represented outside the survey area; therefore, the proposal is considered to have low biological diversity and is well represented outside the survey area (Botanica, 2024).

b) Native vegetation should not be cleared if it comprises the whole or part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to WA

Fauna habitat within the surveyed area consists of common eucalypt woodland on clay-loam plains and minor drainage-line woodland, both widespread in the region. Survey and targeted assessments recorded no conservation-significant fauna species or critical habitat features (e.g. nesting mounds, breeding sites). Similar habitat occurs extensively in the surrounding areas. The vegetation proposed for clearing is not considered a significant habitat for fauna (Botanica, 2024; Botanica, 2025a; Botanica, 2025b).

c) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of rare flora

Desktop database searches and field surveys recorded no Threatened Flora species within the survey area. Habitat suitability for listed flora is low, and none were detected during the survey. The clearing is therefore unlikely to affect the continued existence of rare flora (Botanica, 2024).

d) Native vegetation should not be cleared if it comprises the whole or part of, or is necessary for the maintenance of, a Threatened Ecological Community

No Threatened Ecological Communities or Priority Ecological Communities occur within the application area, and none were identified during surveys. The nearest PEC occurrences are more than 30km from the site. The proposed clearing will not affect any TEC or PEC (Botanica, 2024).

e) Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared

The application area lies within two vegetation associations retaining over 97% of their pre-European extent at the regional scale (Botanica, 2024). Native vegetation remains widespread across the surrounding Eastern Murchison landscape. The vegetation proposed for clearing is not a significant remnant within a highly cleared environment.

f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland

One minor ephemeral drainage line traverses part of the application area. No wetlands, permanent watercourses or riparian systems occur. Drainage features are shallow and typical of sheet-flow plains. Clearing will avoid major flow paths where practicable and maintain surface drainage connectivity. Vegetation associated with significant watercourses or wetland environments will not be affected (Botanica, 2024).

g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation

Soils are typical arid-zone loams and lateritic gravels with low salinity risk. The region is not extensively cleared, and landscape stability is maintained by widespread surrounding vegetation. Clearing is small-scale and will be managed through erosion and surface-water controls. The proposal is unlikely to cause land degradation issues such as salinity, waterlogging, or acidic soils (Botanica, 2024).

h) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area

No conservation reserves or DBCA-managed lands occur within or adjacent to the application area. The nearest reserve is approximately 28km away. Clearing within the survey area is unlikely to impact any conservation reserves (Botanica, 2024).

i) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water

The site has only ephemeral drainage and shallow sheet flow. No permanent surface waters, wetlands or groundwater-dependent ecosystems occur. Clearing activities are unlikely to impact hydrological systems (Botanica, 2024).

j) Native vegetation should not be cleared if clearing of the vegetation is likely to cause, or exacerbate, the incidence of flooding

Flood assessment indicates shallow overland flow across parts of the site during extreme rainfall events. Solar Farm infrastructure will maintain flow paths and incorporate drainage controls. Clearing will not alter catchment scale hydrology or flood behaviour. The proposal will not cause or exacerbate flooding.

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Appendix 2 – Flood Assessment

ENGENY

ENERGYZE CONSULTING SERVICES

Paddington Energy Hub

Flood Assessment

WC1007_001-REP-001-0

16 DECEMBER 2022

DISCLAIMER

This Report has been prepared on behalf of and for the exclusive use of Energyze Consulting Services and is subject to and issued in accordance with Energyze Consulting Services instruction to Engeny Australia Pty Ltd (Engeny). The content of this Report was based on previous information and studies supplied by Energyze Consulting Services.

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Rev	Date	Description	Author	Reviewer	Project Mgr.	Approver
0	16/12/2022	Client Issue	TS	DH	CW	DH
Signatures:						

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1. INTRODUCTION

Engeny Australia Pty Ltd (Engeny) has been engaged by Energyze Consulting Services (hereby referred to as Energyze or the Client) to provide a flood assessment to assist the development of the Paddington Energy Hub tender package. Engeny understands that the proposed Paddington Energy Hub is to be located adjacent to Paddington Gold Mine which is approximately 34 kilometres north of Kalgoorlie in Western Australia (see Figure 1.1).

Figure 1.1: Site Location

Figure 1.2: Proposed Pad Locations

There are currently two pads proposed, nominally named Pad 1 and Pad 2 (see Figure 1.2). The footprint areas for Pad 1 and Pad 2 are 29 ha and 30 ha respectively.

The primary objective of this study is to undertake a preliminary localised flood investigation of the existing stormwater catchments that flow through and adjacent to the proposed pad locations suitable to inform a tender process. The following scope of work has been undertaken to deliver this objective:

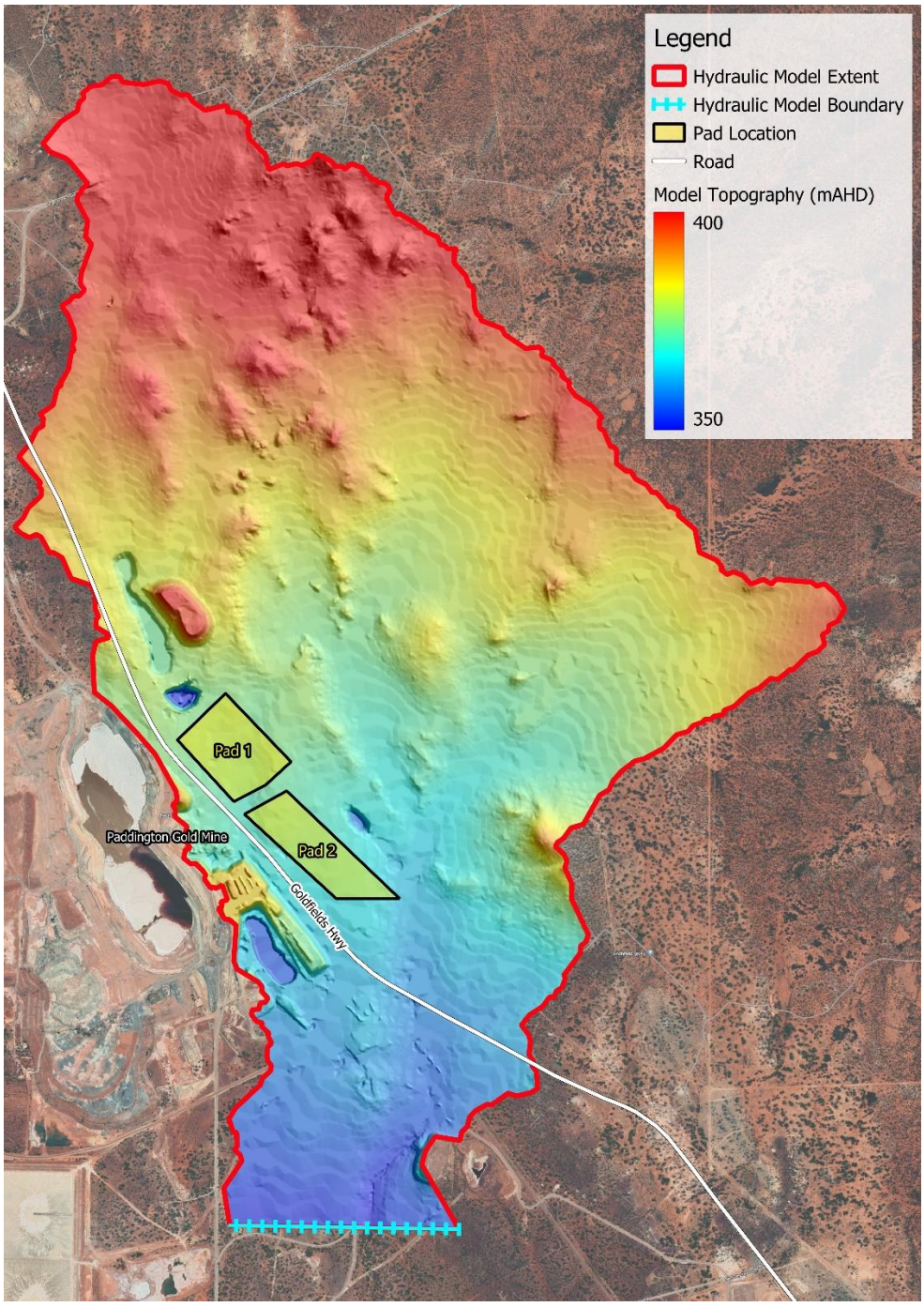
- Develop a localised hydraulic model of the site incorporating current catchment conditions and hydrologic responses (i.e., rainfall-runoff).
- Simulate the hydraulic model for the 1% AEP (1:100 AEP) design flood event in accordance with Australian Rainfall and Runoff 2019 (ARR 2019) guidelines.
- Provide documentation and flood mapping to assist in identifying any flooding constraints to the proposed pad locations and inform progression of future design stages.

2. HYDROLOGIC AND HYDRAULIC MODELLING

2.1 Model Description

A 2D hydraulic Rain on Grid (RoG) model was developed for the catchment contributing to the site. The hydraulic assessment utilised the TUFLOW modelling software package (specifically Build 2020-10-AE-w64). The following sections of this report provide details of the TUFLOW hydraulic model developed for the site. The layout of the TUFLOW model is provided in Figure 2.1.

Figure 2.1: TUFLOW Model Layout



2.2 Design Rainfall and Losses

Intensity-Frequency-Duration (IFD) data provided by the Bureau of Meteorology's (BoM) Design Rainfall Data System (http://www.bom.gov.au/water/designRainfalls/revised-ifd/) in accordance with ARR 2019 guidelines was applied within the TUFLOW model for the design event. A unique IFD extracted at the centroid of the site (*Coords: -30.477, 121.367,*) was adopted.

To estimate the amount of rainfall-runoff generated within the study area, the Initial Loss - Continuing Loss (ILCL) model was used. The initial loss is the amount of rainfall that occurs before the start of surface runoff, while the continuing loss is the average loss rate throughout the remainder of the rainfall event. The proposed Paddington Energy Hub site is located in the arid region where there is a lack of suitable gauged catchments and rainfall losses were not available from the Australian Rainfall and Runoff (ARR) Data Hub website (Babister et al., 2019). Therefore, losses for the Eastern Goldfields region were adopted from the previous ARR Guidelines (Pilgrim et al., 1998) as summarised in Table 2.1. There is a high level of uncertainty regarding rainfall loss parameters in the arid regions of Western Australia and especially in the Goldfields region due to the lack of gauged catchments and the ephemeral nature of the hydrology.

TABLE 2.1: ADOPTED DESIGN INITIAL AND CONTINUING RANFALL LOSSESS

Storm AEP	Initial Loss (mm)	Continuing Loss (mm/hr)
1%	38	3

2.3 Existing Scenario Model Inputs

2.3.1 Model Topography

A digital elevation model (DEM) generated for the hydraulic modelling was developed using 1m spaced contour data of the site provided by Energyze. It should be noted that the contour lines provided were not smooth and contained several 'bumps and irregularities. Therefore, generation of the DEM from the contour lines provided has created artificial 'benching' between contour elevation intervals which limits the accuracy of the modelling outputs.

2.3.2 Grid Resolution and Timestep

A grid cell size of 5 m was selected for the TUFLOW model. This resolution was considered to be of sufficient accuracy to model the flooding behaviour whilst minimising model simulation times.

2.3.3 Hydraulic Roughness

The hydraulic roughness has been selected based on Google Maps aerial imagery. The adopted Manning's 'n' Roughness values are summarised below in Table 2.2.

TABLE 2.2: ADOPTED MANNING'S N ROUGHNESS

Roughness Description	Manning's 'n' Value
Sealed road	0.025
Unsealed road	0.035
Waterbody i.e. stagnant water	0.015
Disturbed mine area	0.045
Pit/Void	0.040
Dump/Spoil	0.060
Open space, some sporadic trees, light shrubbery (Global)	0.040

2.3.4 Model Inflow

The Rain on Grid (ROG) method was adopted for the model in which the design rainfall are applied to all cells within the active 2D model domain. Rainfall losses were incorporated in the model as described in Section 2.2.

2.3.5 Model Outflow Boundary

A normal depth (i.e., water level – flow (HQ)) boundary was adopted at the model outlet located 1.5 km south of the Goldfields Hwy and 2.8 km downstream of the proposed solar pad locations.

2.4 Design Event Simulations

2.4.1 AEP Events and Rainfall Durations

The design event simulations have been performed for the 1% AEP.

A series of rainfall durations have been simulated in order to identify the critical durations. The analysed rainfall durations are listed as follows: 1hr, 1.5hr, 2hr, 3hr, 4.5hr, 6hr, 9hr and 12hr. The critical duration ranges between the 2- and 3-hour storm for flow through Pad 1. Flood extents that intersect with sections of Pad 2 demonstrate show a 6-hour critical duration.

2.4.2 Temporal Patterns

Ten temporal patterns for each rainfall duration have been simulated, with the median temporal pattern selected to represent the critical pattern in accordance with ARR 2019 guidelines. A 'max-max' water surface profile was developed for each design event by interrogating the results for all representative critical temporal patterns for each storm duration to obtain the design flood result grids (including level, depth, velocity).

2.5 Results Discussion

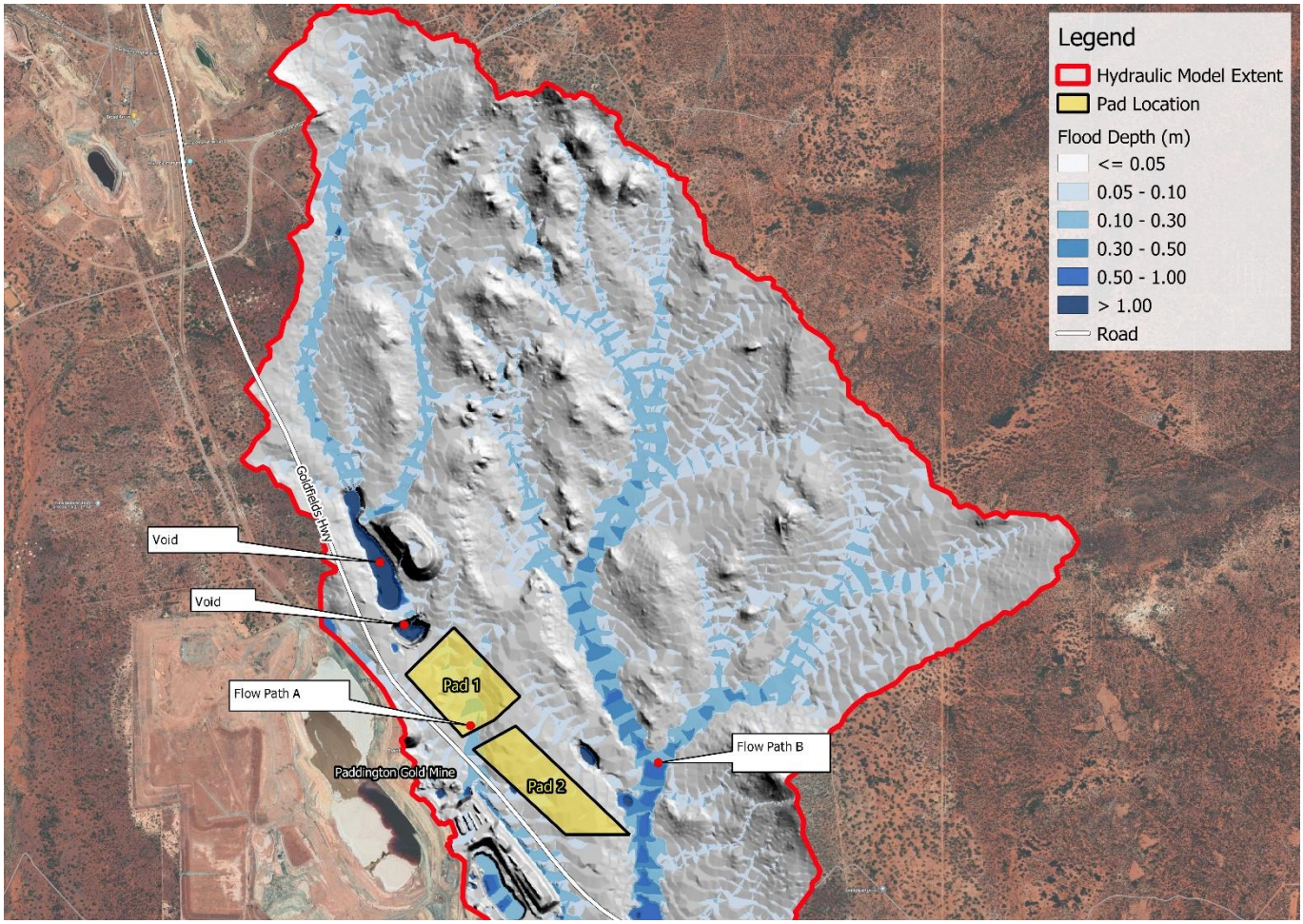
Flood mapping for the 1% AEP event has been provided in Appendix A. These maps include:

- Flood depth.
- Flood level.
- Flood velocity.

The flood results indicate there are two flow paths that intersect the pad locations. These flow paths have been identified as Flow Path A and B on Figure 2.2. Flow accumulates upstream of Flow Path A before discharging directly through the indicative location of Pad 1. As the contributing catchment for Flow Path A is relatively small (~50 ha), the flow depths through this area are shallow. A potential mitigation opportunity is to construct drains along the north-east side to capture and divert flows away from Pad 1.

Flow Path B represents flows from the much larger catchment draining south located east of Pad 2. Pad 1 and Pad 2 are outside of the flood extent of Flow Path B in the 1% AEP design flood event; however, it is noted that the south-east corner of Pad 2 is close to the flood extent of Flow Path B. In the absence of site mining information, for the purposes of this assessment, it has been assumed that the void will remain as a permanent depression to capture the runoff from these two flow paths. If not, it is expected that the flooding results are potentially under-conservative for flow from these flow paths which would have a confluence with Flow Path A in the vicinity of Pad 1.

Figure 2.2: Flow Path Locations



It is important to note that because of limitations in the topographic data (described in Section 2.3.1) used to develop the model, there are irregularities in the results produced by the model. Generation of the DEM from the contour lines provided created artificial 'benching' between contour elevation intervals. Whilst the results still provide a reasonable indication of the flood extent and flood levels, these 'benching' irregularities may manifest as differences particularly to the predicted water depths and velocities at different points along the flow paths. It is recommended, to improve the the accuracy of the model the topographic data is updated.

There are two flow paths identified terminating into the voids, north of Pad 1. The 1% AEP flows from these flow paths are captured completed by the voids and do not spill further downstream.

3. CONCLUSIONS

The key findings from the study are:

- Hydraulic model results for the 1% AEP design flood event have been generated for the proposed pad locations.
- There is a shallow depth flow path (Flow Path A) discharging through the proposed footprint of Pad 1.
- There are opportunities to divert flows around Pad 1 to ensure flood immunity in the 1% AEP design event.
- Refinement of the site topography is required to improve model accuracy.
- Flooding results are potentially under-conservative for flow from these flow paths discharging into the voids, north of Pad 1. If the voids are not deemed a permanent depression, flows will divert downstream, merging with Flow Path A.

4. REFERENCES

Ball, J., Babister, M., Nathan, R., Weeks, W., Weinmann, E., Retallick, M., & Testoni, I. (2019). *Australian Rainfall and Runoff: A Guide to Flood Estimation.* Brisbane: Commonwealth of Australia.

Pilgram et al. (1998). *Australian Rainfall and Runoff: A Guide to Flood Estimation (Volume One): Reprinted Edition 1998.* Canberra: Institution of Engineers Australia.

5. QUALIFICATIONS

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APPENDIX A: 1% AEP FLOOD MAPPING

Appendix 3 – Reconnaissance Flora and Basic Fauna Assessment

PADDINGTON SOLAR FARM PROJECT

Reconnaissance Flora and Basic Fauna Assessment

Prepared for Norton Gold Fields Pty Ltd
December 2024

Prepared by
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Disclaimer

Quality Assurance

An internal quality review process has been implemented to each project task undertaken by BC. Each document and its contents is carefully reviewed by core members of the Consultancy team and signed off at Director Level prior to issue to the client. Draft documents are submitted to the client for comment and acceptance prior to final production.

Cover Photo: Vegetation within the Paddington Solar Farm project area (5/09/2024)

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EXECUTIVE SUMMARY

Botanica Consulting Pty Ltd (Botanica) was commissioned by Norton Gold Fields Pty Ltd. to undertake a reconnaissance flora/ vegetation survey and basic fauna survey of their Paddington Solar Farm project (referred to as the 'survey area'). The survey area is located approximately 29 km northwest of Kalgoorlie in the City of Kalgoorlie-Boulder and covers an area of 105 ha.

The survey area lies within the Eastern Murchison (MUR1) subregion of the Murchison Bioregion, as defined by the Interim Biogeographic Regionalisation of Australia (IBRA). There are no gazetted or proposed conservation reserves and no pastoral properties within the survey area.

Botanica conducted a flora/ vegetation and basic fauna survey on the 5th of November 2024. The area was surveyed by Jim Williams (Principal Botanist) and the area was traversed on foot and by four-wheel drive vehicle.

The field survey identified 77 vascular flora taxa within the survey area. These taxa represented 36 genera across 19 families, with the most diverse families being Chenopodiaceae (18 species). Dominant genera include Eucalyptus (10 species) and Eremophila (9 species). Five annual species was observed during the survey

Three weed species were recorded within the survey. These species are not listed as a Declared Pest on the Western Australian Organism List (WAOL) under the *Biosecurity and Agriculture Management* (BAM) *Act 2007* or as a Weed of National Significance.

No Threatened or Priority species were identified in the survey area.

A total of three broad-scale vegetation communities were identified within the survey area. Native vegetation was categorized as 'completely degraded' to 'good'. Impacts to vegetation include access tracks, dams, historical and current mining and exploration activities.

No Threatened, Priority or otherwise significant ecological communities were identified within the survey area. No Environmentally Sensitive Areas, wetlands of international importance (Ramsar Wetlands) or national importance (Australian Nature Conservation Agency Wetlands) are found within the survey area. One known or potential terrestrial Groundwater Dependant Ecosystem (GDE) covers the entire survey area.

Based on vegetation and associated landforms identified during the flora and vegetation assessment, two broad scale terrestrial fauna habitats were identified as occurring within the survey area. No evidence of significant fauna species, including Malleefowl, were observed.

Based on the outcomes from the survey undertaken, Botanica assessed the results of the desktop and field survey with regards to the native vegetation clearing principles listed under Schedule 5 of the EP Act. The assessment found that the proposed vegetation clearing activities are unlikely to be at variance with any clearing principle.

1 INTRODUCTION

Botanica Consulting Pty Ltd (Botanica) was commissioned by Norton Gold Fields Pty Ltd. to undertake a reconnaissance flora/vegetation survey and basic fauna survey of their Paddington Solar Farm project area (referred to as the 'survey area'). The survey area is approximately 105 ha in extent and is located approximately 29 km northwest of Kalgoorlie and 93 km south of Menzies in the City of Kalgoorlie-Boulder (Figure 1-1).

The purpose of survey is to support the submission of a clearing permit for the Paddington Solar Farm development.

1.1 Objectives

The flora assessment was conducted in accordance with the requirements of a reconnaissance flora survey as defined in Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment – December 2016 (EPA, 2016a). The objectives of the assessment were to:

- gather background information on flora and vegetation in the target area (literature review, database and map-based searches);
- identify significant flora, vegetation and ecological communities and assess the potential sensitivity to impact;
- conduct a field survey to verify / ground truth the desktop assessment findings;
- undertake floristic community mapping to a scale appropriate for the bioregion and described according to the National Vegetation Information System (NVIS) structure and floristics;
- undertake vegetation condition mapping;
- assess the project area's plant species diversity, density, composition, structure and weed cover, using NVIS classification system for vegetation description;
- assess Matters of National Environmental Significance (MNES) and indicate whether potential impacts on MNES as protected under the EPBC Act are likely to require referral of the project to the Commonwealth DCCEEW; and
- determine the State legislative context of environmental aspects required for the assessment.

The fauna assessment was conducted in accordance with the requirements of a basic terrestrial fauna survey as defined in *Technical Guidance - Terrestrial Fauna Surveys for Environmental Impact Assessment – June 2020* (EPA, 2020). The objectives of the assessment were to:

- Undertake a literature review, including map-based information searches of all current and relevant literature sources and databases relating to the survey area;

- Undertake a desktop investigation to identify any previously recorded occurrences of or potentially occurring Threatened and Priority listed fauna within the survey area;
- Undertake searches on available databases for details relating to any Threatened and Priority listed fauna previously identified as occurring or potentially occurring within the survey area;
- Conduct fauna habitat mapping and identify habitat types which are suitable for each significant fauna considered likely or possible to occur, or fauna recorded in the survey area;
- Undertake opportunistic, low intensity sampling of fauna; and
- Report on the conservation status of species present using the Western Australian Museum and *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act) databases for presence of Threatened and Priority listed fauna species within the survey area.

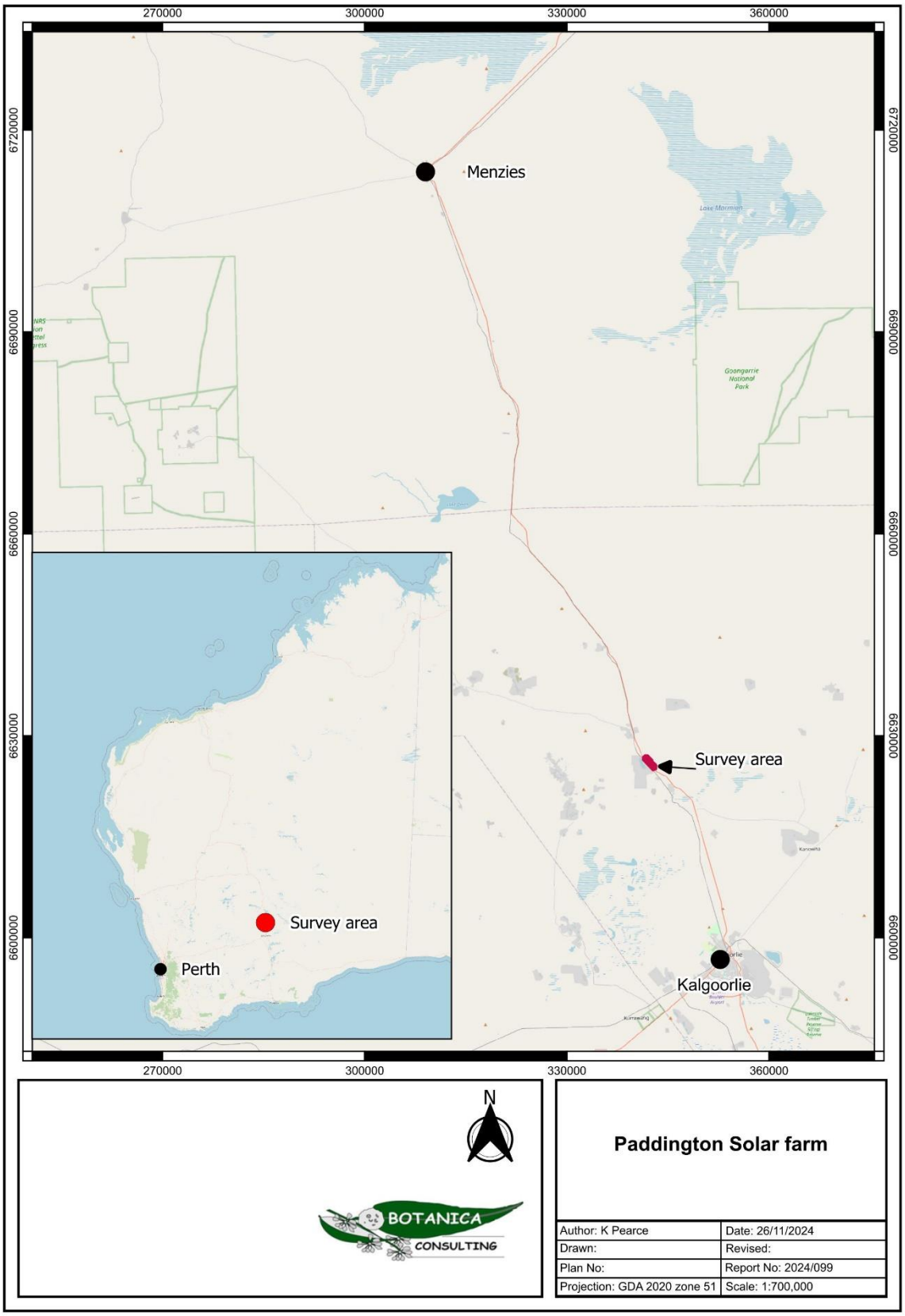


Figure 1-1: Regional map of the survey area

2 BIOPHYSICAL ENVIRONMENT

2.1 Regional Environnent

Based on the Interim Biogeographic Regionalisation of Australia (IBRA, Version 7) (DCCEEW, 2020) the survey area is located on the western edge of within the Murchison Bioregion of WA. This bioregion is further divided into subregions with the survey area located on the western edge of the Eastern Murchison (MUR1) subregion (Figure 2-1), just east of the Eastern Goldfields subregion (COO3).

The landscape of the Murchison bioregion comprises low hills, mesas of duricrust separated by flat colluvium and alluvial plains (Commonwealth Government, 2008). It is dominated by the Archaean (over 2500 million years ago) granite greenstone terrain of the Yilgarn Craton (Commonwealth Government, 2008). Alluvial soils and sands mantle the granitic and greenstone units of the Yilgarn Craton. These soils are shallow, sandy and infertile. Underlying the soils in low areas is a red-brown siliceous hard pan (Curry et al. 1994). The soils in the eastern half of the bioregion are typically red sands, lithosols, calcareous red earth soil, duplex soil and clays. There are 41 vegetation associations (hummock grasslands, succulent steppe or low woodlands) that have at least 85 per cent of their total area in the bioregion. The bioregion is rich and diverse in both its flora and fauna, but most species are wide ranging and usually occur in adjoining regions (McKenzie, May and McKenna, 2002).

The Eastern Murchison subregion comprises the northern parts of the craton's Southern Cross and Eastern Goldfields Terrains and is characterised by internal drainage and extensive areas of elevated red desert sandplains with minimal dune development. Salt Lake systems are associated with the occluded paleodrainage system. Broad plains of red-brown soils and breakaways complexes as well as red sandplains are widespread. Vegetation is dominated by Mulga woodlands and is often rich in ephemerals, hummock grasslands, saltbush shrublands and *Tecticornia* shrublands (Cowan, 2001).

2.2 Land Use

The dominant land uses of the Eastern Murchison subregion include grazing native pastures (85.47%), unallocated crown reserves (11.34%), conservation (1.4%) and mining (1.79%) (Cowan, 2001). The survey area is not located on any pastoral lease.

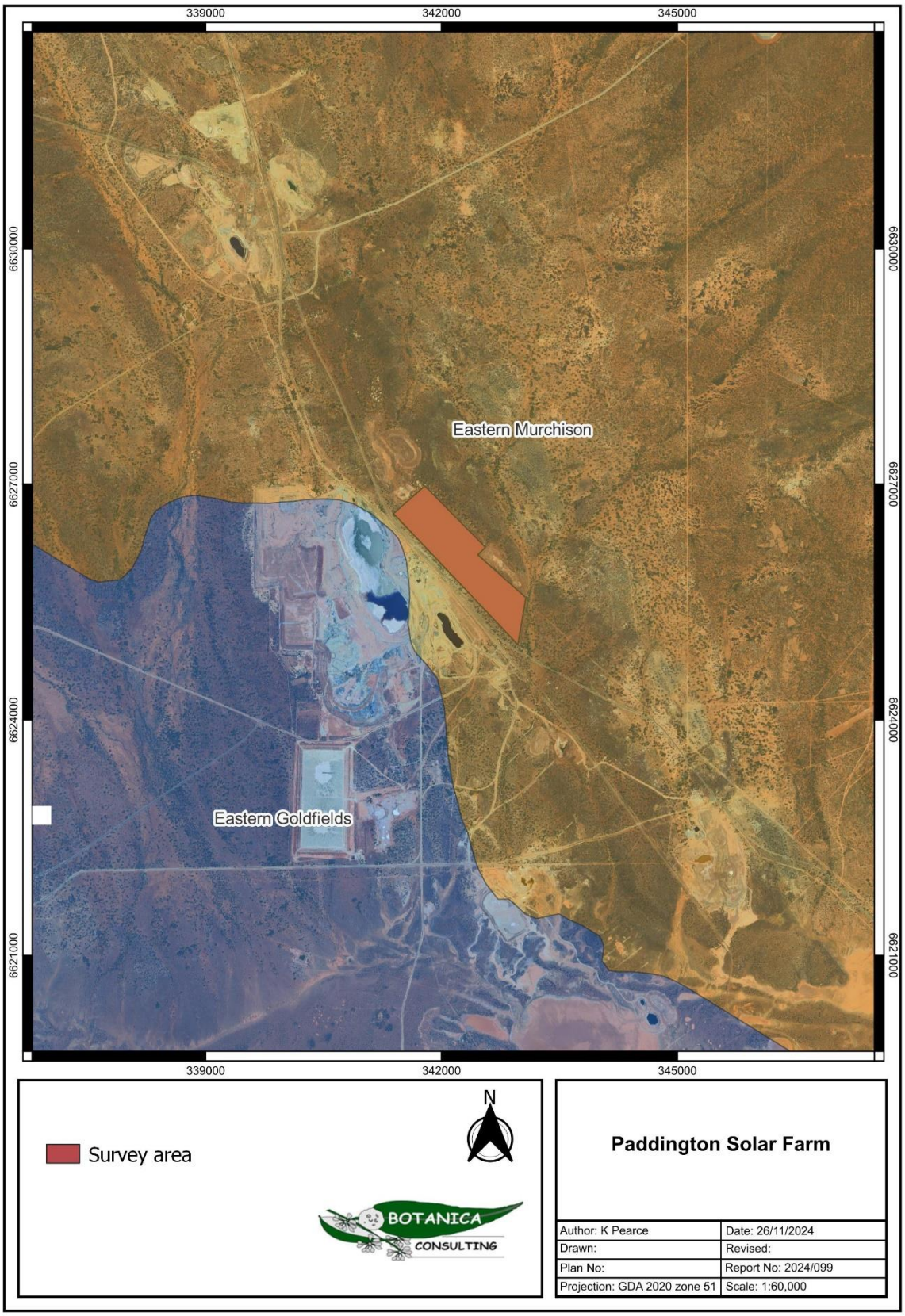


Figure 2-1: Map of IBRA Bioregions in relation to the survey area

2.3 Soil Landscape Systems

The survey area lies within the Kalgoorlie Province, located in the southern Goldfields between Paynes Find, Menzies, Southern Cross and Balladonia. The landscape consists of undulating plains (with some sandplains, hills and salt lakes) on the granitic rocks and greenstone of the Yilgarn Craton. Soils range from calcareous loamy earths and red loamy earths with some Salt Lake soils to red deep sands, yellow sandy earths, shallow loams and loamy duplexes. Vegetation communities are predominately Eucalypt woodlands with some acacia-casuarina thickets, mulga shrublands, halophytic shrublands and spinifex grasslands (Tille, 2006).

The Kalgoorlie Province is further divided into six soil-landscape zones, with the survey area located within the Kambalda zone (265).

The Kambalda zone (265) is in the south-eastern Goldfields between Menzies, Norseman and the Fraser Range and contains flat to undulating plains (with hills, ranges and some salt lakes and stony plains) on greenstone and granitic rocks of the Yilgarn Craton. Soils consist of calcareous loamy earths and red loamy earths with salt lakes soils and some red brown hardpan shallow loams and red sandy duplexes. Vegetation includes red mallee, blackbutt-salmon gum-gimlet woodlands with mulga and halophytic shrublands and some spinifex grasslands (Tille, 2006).

In accordance with soil landscape system mapping data (Government of Western Australia, 2019), the soil landscape zones are divided into soil landscape systems. The survey area is located within the Moriarty landscape system, as described in Table 2-1 and shown in Figure 2-2.

Table 2-1: Soil landscape systems within the survey area

Soil Landscape System	Description	Extent within Survey Area
Moriarty System (265Mo)	Low greenstone rises and stony plains supporting chenopod shrublands with patchy eucalypt overstoreys.	105.64 ha (100%)
Total		105.64 ha (100%)

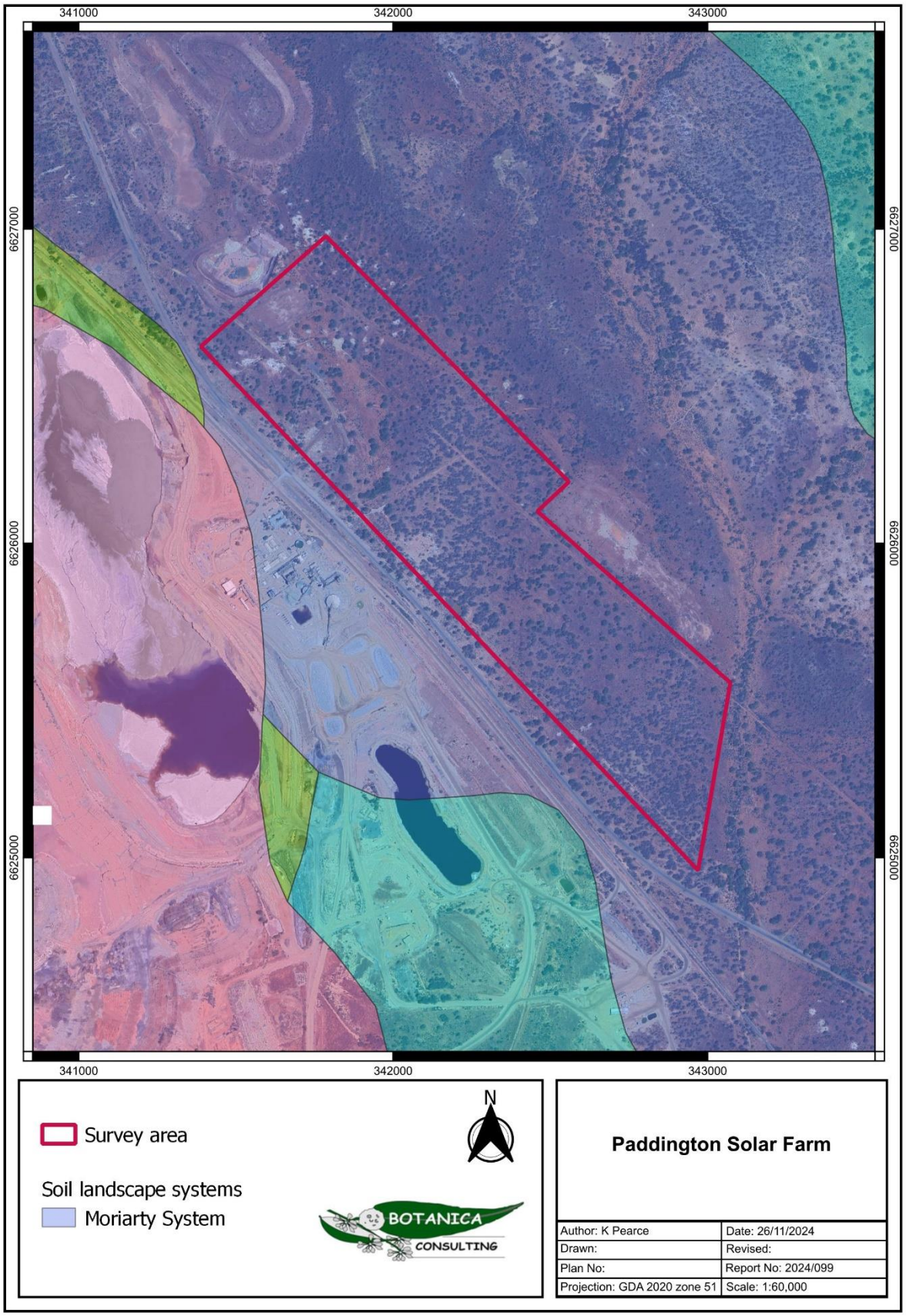


Figure 2-2: Map of soil landscape systems within the survey area

2.4 Regional Vegetation

The vegetation of the Kalgoorlie Province is described by Tille (2006) as woodlands of redwood (*Eucalyptus transcontinentalis*), red mallee (*E. oleosa*), Dundas blackbutt (*E. dundasii*), merrit (*E. flocktoniae*) and salmon gum (*E. salmonophloia*), found on undulating plains over granite. There are also some hummock grasslands with red mallee over spinifex (*Triodia scariosa*) and thickets of Acacia, Casuarina and Melaleuca spp. Plains on greenstone have woodlands of York gum (*E. loxophleba*), salmon gum and gimlet (*E. salubris*). The valley plains have woodlands of salmon gum, red mallee, Goldfields blackbutt (*E. lesouefii*), gimlet, York gum and morrel (*E. longicornis*). These sometimes have an understorey of saltbush (*Atriplex* spp.), pearl bluebush (*Maireana sedifolia*), sago bluebush (*M. pyramidata*) and *Eremophila* spp. There are areas of spinifex grasslands with red mallee, mallees (e.g. *E. youngiana*) and marble gum (*E. gongylocarpa*). Low woodlands of mulga (*Acacia aneura*) and black sheoak (*Casuarina pauper*) over bluebush and saltbush are also present. Apart from the bare salt lake surfaces, saline valley floors have shrublands of samphire (*Tecticornia* spp.) and *Frankenia* spp. in lower areas, shrublands of saltbush and bluebush on red deep sandy duplexes, and woodlands of salmon gum, merrit, red mallee, gimlet and York gum. *Acacia neurophylla, A. beauverdiana* and *A. resinimarginea* thickets grow on gently sloping uplands on granite, with thickets of acacia, casuarina and melaleuca. There are also scrub-heaths and York gum-salmon gum-gimlet woodlands on these uplands. The hilly terrain on greenstone supports woodlands of salmon gum, Goldfields blackbutt, coral gum (*E. torquata*), York gum, gimlet, morrel, Dundas blackbutt and black sheoak. Thickets of granite wattle (*Acacia quadrimarginea*) are also present. The stony plains support scattered woodlands of Goldfields blackbutt, gimlet and salmon gum, along with shrublands of saltbush and bluebush. Sandplains in the west have acacia (*A. coolgardiensis, A. ramulosa, A. aneura, A. burkittii* and *A. tetragonophylla*) shrublands, commonly with patchy native pine (*Callitris columellaris, C. preissii*) and mallees (*E. leptopoda, E. longicornis and E. loxophleba*). Native box (*Bursaria occidentalis*), *Melaleuca uncinata* and *Hakea recurva* may also be present. Hard spinifex (*T. basedowii*) grasslands with mulga, marble gum and mallees (e.g. *E. kingsmillii*) are found on sandplains to the east. The sandy-surfaced plains support acacia, casuarina and melaleuca thickets; woodlands of York gum, cypress pine (*Callitris columellaris*), salmon gum, gimlet and mulga; and shrublands of bowgada (*A. ramulosa*) (Tille, 2006).

2.4.1 Pre-European Vegetation

The Pre-European vegetation association spatial mapping dataset (DPIRD, 2019) identified two vegetation associations as occurring within the survey area (Figure 2-3). The association description and their remaining extent, as specified in the 2018 Statewide Vegetation Statistics (DBCA, 2019) are provided in Table 2-2. Areas retaining less than 30% of their pre-European vegetation extent generally experience exponentially accelerated species loss, while areas with less than 10% are considered “endangered” (EPA, 2000). Both vegetation associations retain >97% of their pre-

European extent, and development within the survey area will not significantly reduce the current extent of these vegetation associations.

Table 2-2: Pre-European vegetation associations within the survey area

Vegetation Association	Pre-European extent remaining	% Protected for Conservation	Floristic Description	Extent within Survey Area
Barlee 2903	96.54%	0%	Woodland other	104.95 ha (99.7%)
Kununulling 468	89.55%	0%	Woodland other	0.67 ha (0.6%)
Total				105.64 ha (100%)

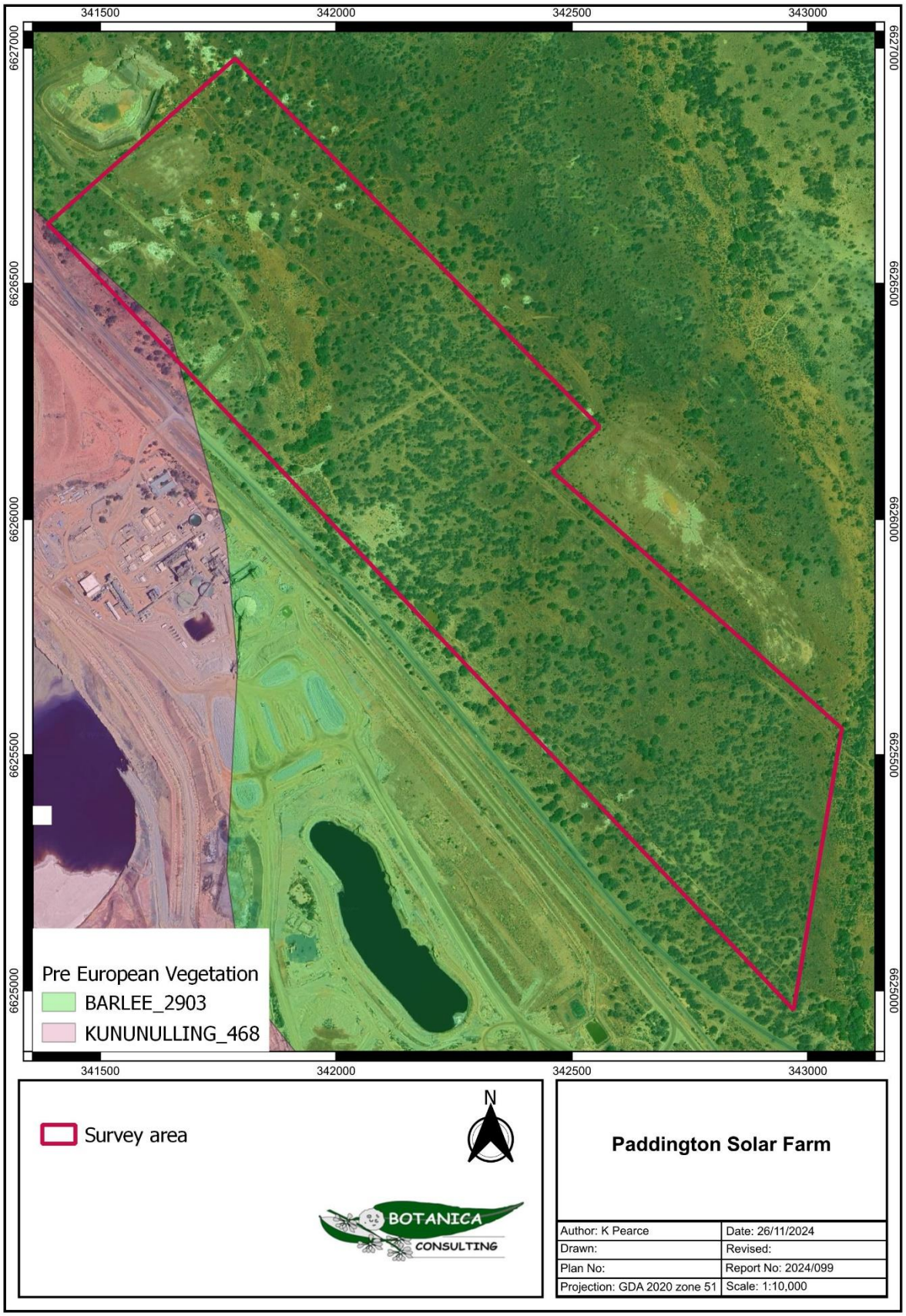
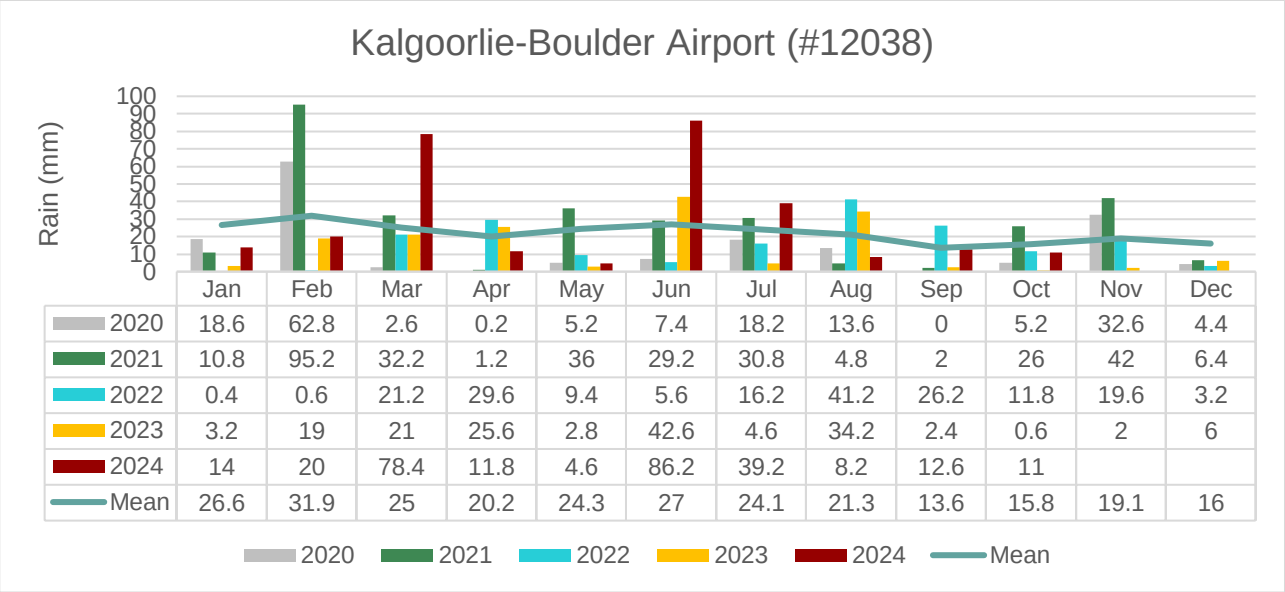


Figure 2-3: Pre-European vegetation systems within the survey area

2.5 Climate

The climate of the Eastern Murchison subregion is characterised as an arid climate with summer and winter rainfall of approximately 200 mm annually (Beard, 1990). Rainfall data for the Kalgoorlie-Boulder Airport weather station (#12038), located approximately 29 km southeast of the survey area, is shown in Figure 2-4 (BoM, 2024). Kalgoorlie-Boulder generally receives a mean annual rainfall of 264.6 mm. The data shows rainfall for March, June and July 2024 preceding the survey were all above average, however only 11mm fell in October, prior to the survey.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2020	18.6	62.8	2.6	0.2	5.2	7.4	18.2	13.6	0	5.2	32.6	4.4
2021	10.8	95.2	32.2	1.2	36	29.2	30.8	4.8	2	26	42	6.4
2022	0.4	0.6	21.2	29.6	9.4	5.6	16.2	41.2	26.2	11.8	19.6	3.2
2023	3.2	19	21	25.6	2.8	42.6	4.6	34.2	2.4	0.6	2	6
2024	14	20	78.4	11.8	4.6	86.2	39.2	8.2	12.6	11		
Mean	26.6	31.9	25	20.2	24.3	27	24.1	21.3	13.6	15.8	19.1	16

Figure 2-4: Climate data for Kalgoorlie-Boulder (#12038) (BoM, 2024)

2.6 Conservation Values

The Murchison Bioregion contains 41 vegetation associations (hummock grasslands, succulent steppe or low woodlands) that have at least 85 per cent of their total extent in the Bioregion. The Bioregion is rich and diverse in flora and fauna, but most species are wide ranging and usually occur in adjoining regions.

There are six wetlands of national importance (ANCA Wetlands) in the Bioregion, all of which are salt lakes: Lake Ballard, Lake Barlee, Lake Marmion, Lake Wooleen, Lake Breberle and Lake Anneen. There is one wetland of regional importance within the Murchison Bioregion: the Mungawolagudgi Claypan on Muggon Station.

No Threatened Ecological Communities (TEC) listed under the Commonwealth EPBC Act, or the Western Australian BC Act are known to occur within the survey area or within 40 km of the survey area. No DBCA listed Priority Ecological Communities (PEC) are known to occur within the survey area, there are three PECs known to occur within 40 km of the survey area (Table 2-3, Figure 2-5).

Table 2-3: Priority Ecological Communities within a 40 km radius of the survey area

Priority Ecological Community	Conservation Status	Description	Location
Emu Land System	Priority 3	The Emu Land System PEC is defined as a paperbark shrubland and wetland system. It contains fresh or brackish ephemeral lakes and swamps with cane grass, lignum and paperbark shrublands.	This PEC is 34 km northwest of the survey area.
Emu Land System	Priority 3		This PEC is 33 km northeast of the survey area.
Emu Land System	Priority 3		This PEC is 38 km east of the survey area.

There are no Ramsar wetlands or wetlands of national importance within the survey area or within 40 km of the survey area. There is no Environmentally Sensitive Areas (ESA) as listed under the EP Act within the survey area, however one is found approximately 36km north of the survey area (Figure 2-5). Disturbances within the survey area are unlikely to impact these areas.

There are no DBCA-managed lands, gazetted or proposed reserves within the survey area. Four gazetted reserves are within 40km, the closest gazetted Kalgoorlie Arboretum (R42657) approximately 28km southeast of the survey area. Disturbances within the survey area are unlikely to impact these areas. The location of vested Conservation Reserves, ESA's and Nationally Important Wetlands in relation to the survey area is provided in Figure 2-5.

2.6.1 Great Western Woodlands

The survey area is located just outside the northeastern edge of the Great Western Woodlands (GWW; Figure 2-5). The GWW is considered by The Wilderness Society of WA to be of global biological and conservation importance as one of the largest and healthiest temperate woodlands on Earth, containing many endemic taxa. The region covers almost 16 million hectares (160,000 square kilometres), from the southern edge of the Western Australian Wheatbelt to the pastoral lands of the Mulga country in the north, the inland deserts to the northeast, and the treeless Nullarbor Plain to the east.

The Great Western Woodlands provides a connection between southwest forests and inland deserts (Gondwana Link) as well as linking the north-west passage to Shark Bay. The majority of the Great Western Woodlands is unallocated crown land (61.1%) with other interests including pastoral leases (20.4%), conservation reserves (15.4%) unallocated crown land, ex pastoral (2%) managed by the Department of Biodiversity, Conservation and Attractions (DBCA) and private land (approximately 1%).

No specific management strategy or formal conservation status applies to the Great Western Woodlands. The Great Western Woodlands currently includes towns, highways, roads, railways, private property, Crown Reserves, agricultural activities and mining tenements.

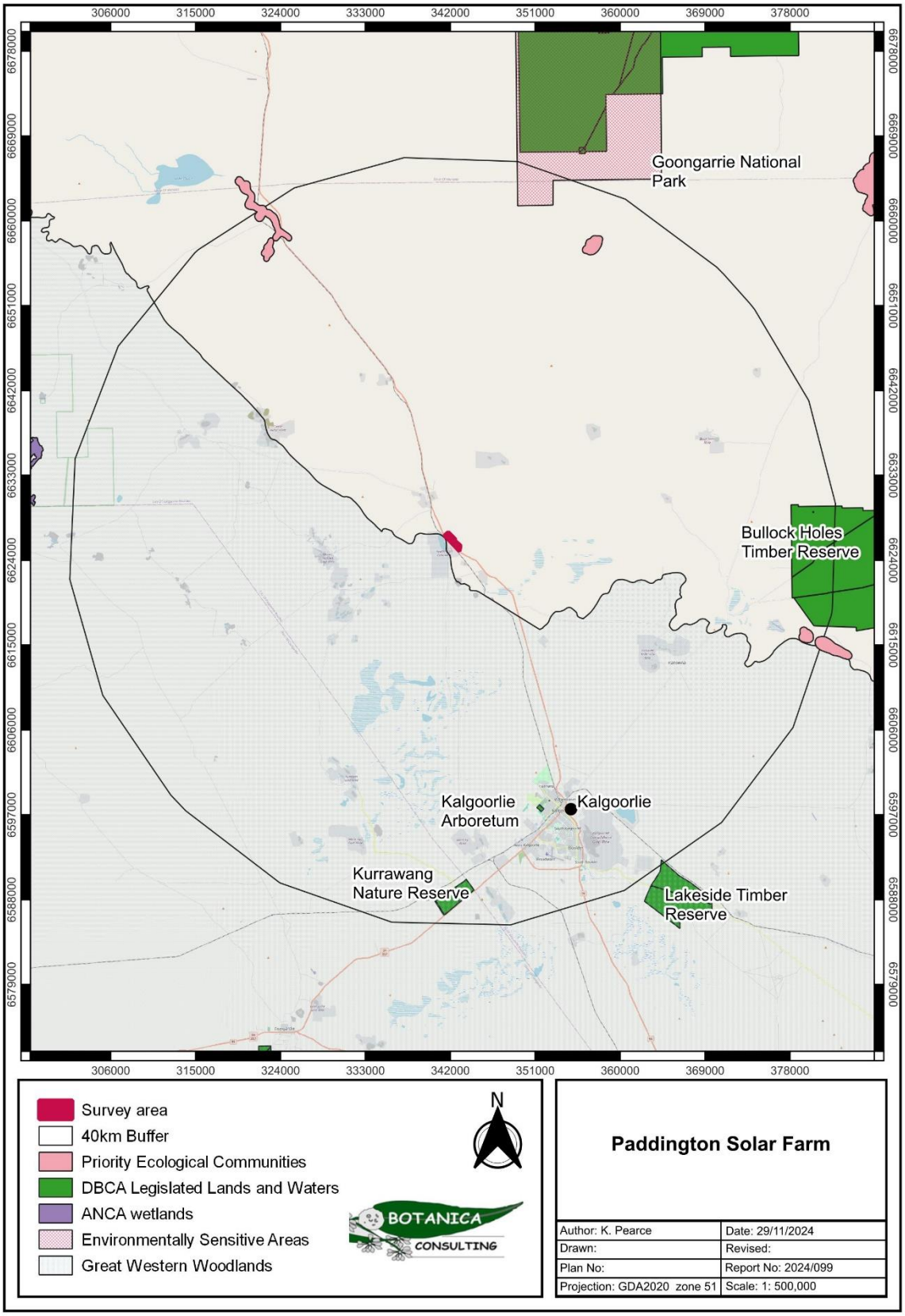


Figure 2-5: Conservation areas in relation to the survey area

2.7 Hydrology

According to the Geoscience Australia database (2015) there are no inland waters (salt lakes) within the survey area. There is one minor ephemeral drainage line occurring through the survey area (Figure 2-6).

Groundwater Dependent Ecosystems (GDE) includes biological assemblages of species such as wetlands or woodlands that use groundwater either opportunistically or as their primary water source. For the purposes of this report, a GDE is defined as any vegetation community that derives part of its water budget from groundwater and must be assumed to have some degree of groundwater dependency. In accordance with the BoM *Atlas of Groundwater Dependent Ecosystems* (BoM, 2021) database, there is no known or potential aquatic GDE. One known or potential terrestrial GDE covers the entire survey area as described in Table 2-4, Figure 2-6.

Table 2-4: Potential terrestrial Groundwater Dependent Ecosystems within the survey area

Geomorphology	Potential	Vegetation Description	Area (ha)
Undulating plains with some sandplains, ferruginous breakaways; ridges of metamorphic rocks and granitic hills and rises; calcretes, large salt lakes and dunes along valleys.	High	Low greenstone rises and stony plains supporting chenopod shrublands with patchy eucalypt overstoreys	105.64 ha
Total			**105.64 ha**

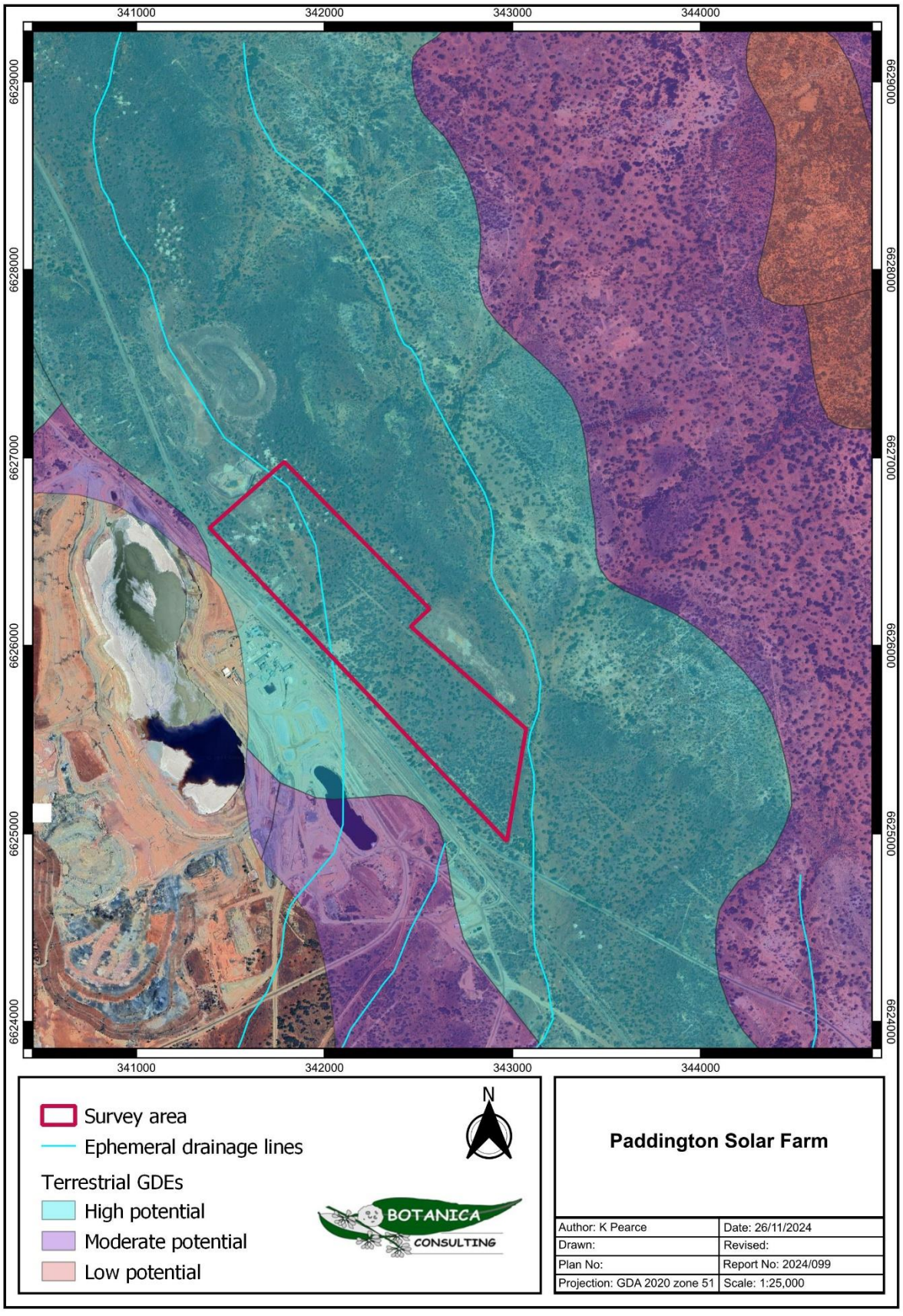


Figure 2-6: Regional hydrology of the survey area

3 SURVEY METHODOLOGY

3.1 Desktop Assessment

Prior to the field assessment a literature review was undertaken of previous flora and fauna assessments conducted within the local region. Documents reviewed included:

- Botanica Consulting (2021). *Flora and Fauna Assessment of the Strategic Water Management Project Stage 1 (SWMP1*). Unpublished report prepared for Norton Gold Fields Pty Ltd.
- Botanica Consulting (2022). *Binduli North Operations. Reconnaissance Flora/vegetation and Basic Fauna Assessment.* Unpublished report prepared for Norton Gold Fields Pty Ltd.
- Botanica Consulting (2024). *Mt Jewel project. Detailed Flora/vegetation survey and Basic Fauna Assessment*. Prepared for Norton Gold Fields Pty Ltd.
- Keighery, G.J., Milewski, A.V. and Hnatiuk, R.J. (1992). Vegetation and flora. In: N.L. McKenzie and N.J. Hall (eds) *The Biological Survey of the Eastern Goldfields of Western Australia: Part 8 Kurnalpi-Kalgoorlie Study Area*. Records of the Western Australian Museum, Supplement No. 41.
- Waddell, P. A., and Galloway, P. D. (2023). *Land systems, soils and vegetation of the southern Goldfields and Great Western Woodlands of Western Australia.* Technical bulletin 99, vol 1, Department of Primary Industries and Regional Development, Western Australian Government.

In addition to the literature review, online database search requests were also undertaken (using the survey area as centre-point and 40 km buffer) to aid in the compilation of a list of potential significant flora and fauna within the survey area:

- DBCA request for significant flora (DBCA, 2024b);
- DBCA request for ecological communities (DBCA, 2024d).
- DBCA request for significant fauna (DBCA, 2024c)
- NatureMap database search (DBCA 2024a)
- EPBC Protected Matters search tool (DCCEEW, 2024a).

Database record results list conservation significant flora and fauna but do not give locations.

Significant flora species identified by the desktop review were assessed with regards to their population extent and distribution and preferred habitat to determine their likelihood of occurrence within the survey area. The assessment categorised flora species as follows:

- **Unlikely:** Suitable habitat is not expected to occur and/or the survey area is outside the known range of the species.
- **Possible:** Suitable habitat may be present, and the area is within the known range of the species. This option is also used when there is insufficient information to determine the preferred habitat of a species.
- **Likely:** Suitable habitat is expected to occur and there are records within 10 km of the survey area.
- **Previously Recorded:** A record for this species is located within the survey area. Field survey will ground-truth currently occurring individuals and populations.

It should be noted that these lists are based on observations from a broader area than the assessment area (40 km radius) and therefore may include taxa not present. The databases also often include very old records that may be incorrect or in some cases the taxa in question have become locally or regionally extinct. Information from these sources should therefore be taken as indicative only and local knowledge and information also needs to be taken into consideration when determining what actual species may be present within the specific area being investigated.

The conservation significance of flora taxa was assessed using data from the following sources:

- Environment Protection and Biodiversity and Conservation (EPBC) Act 1999. Administered by the Australian Government (DCCEEW);
- Biodiversity Conservation (BC) Act 2016. Administered by the WA Government (DBCA);
- Red List produced by the Species Survival Commission (SSC) of the World Conservation Union (also known as the IUCN Red List – the acronym derived from its former name of the International Union for Conservation of Nature and Natural Resources). The Red List has no legislative power in Australia but is used as a framework for State and Commonwealth categories and criteria; and
- Priority Flora list. A non-legislative list maintained by DBCA for management purposes (released November 2024).

The EPBC Act also requires the compilation of a list of migratory species that are recognised under international treaties including the:

- Japan Australia Migratory Bird Agreement 1981 (JAMBA)[1];
- China Australia Migratory Bird Agreement 1998 (CAMBA);
- Republic of Korea-Australia Migratory Bird Agreement 2007 (ROKAMBA); and
- Bonn Convention 1979 (The Convention on the Conservation of Migratory Species of Wild Animals).

Most but not all migratory bird species listed in the annexes to these bilateral agreements are protected in Australia as Matters of National Environmental Significance (MNES) under the EPBC Act. Descriptions of conservation significant species and communities are provided in Appendix A.

3.2 Flora and Vegetation Field Assessment

Botanica conducted a reconnaissance flora/ vegetation and basic fauna surveys on the 5th of November 2024. This was conducted by Jim Williams (Principal Botanist). The area was traversed on foot and four-wheel drive vehicle. Jim Williams has a Diploma of Horticulture and has been conducting flora and fauna in the Goldfields of Western Australia for more than 20 years.

Prior to the commencement of field work, aerial photography was inspected and obvious differences in the vegetation assemblages were identified. The different vegetation communities identified were then inspected during the field survey to assess their validity. A handheld GPS unit was used to record the coordinates of the boundaries between existing vegetation communities.

The survey was conducted using a series of survey sites (relevés) as shown in Figure 3-1. At each relevé site, the area was walked on foot to observe and record all flora species. The distance surveyed at each relevé varied dependent on the diversity/ variability of species and landforms/ vegetation types. At each relevé, the following information was recorded:

- GPS location;
- Photograph of vegetation;
- Dominant taxa for each stratum;
- All vascular taxa (including annual taxa);
- Landform classification;
- Vegetation condition rating;
- Collection and documentation of unknown plant specimens; and
- GPS location, photograph, and collection of flora of conservation significance if encountered.

Unknown specimens collected during the survey were identified with the aid of samples housed at the Botanica Herbarium and Western Australian Herbarium. Vegetation was classified in accordance with NVIS classifications.

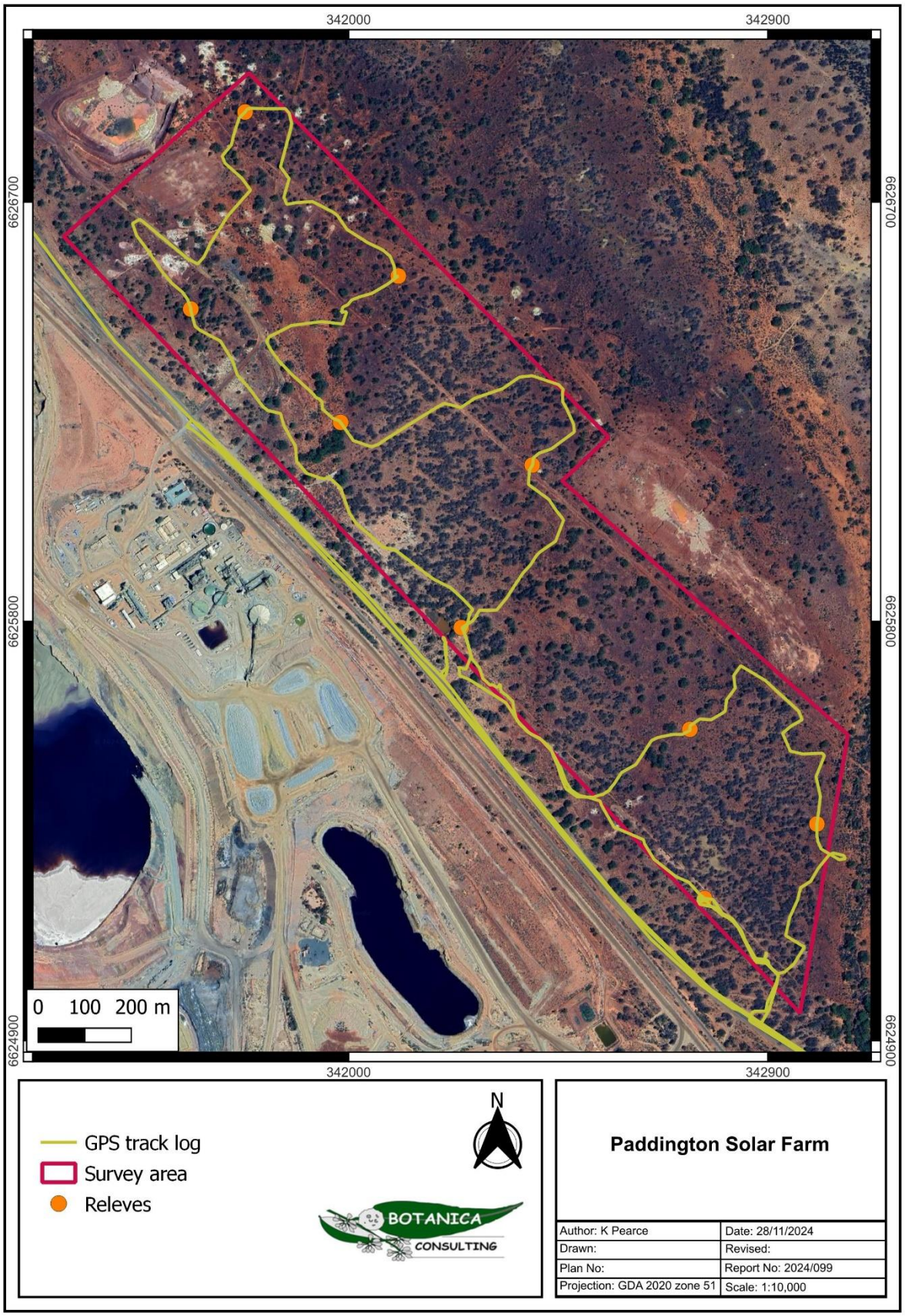


Figure 3-1 GPS relevé of the 2024 survey effort

3.3 Data Analysis Tools

Following field assessments, vegetation types and condition were mapped using the GIS program QGIS, and the hectare area/ percentage area of each vegetation type and condition within the survey area was calculated. Spatial maps illustrating the location of vegetation types, and any significant flora/ vegetation and fauna were generated using QGIS.

3.4 Terrestrial Fauna Field Assessment

Fauna habitat types were identified across the survey area based on broad major vegetation groups and associated landform. A handheld GPS unit was used to record the coordinates of the boundaries between fauna habitats and each habitat was photographed.

The main aim of the fauna habitat assessment was to determine the likelihood of a species of conservation significance utilising habitat within the survey area. The habitat information obtained was also used to aid in finalising the overall potential fauna list.

Available information on the habitat requirements of the species of conservation significance listed as possibly occurring in the area (determined from the desktop assessment) was researched. During the field survey, the habitats within the survey area were assessed and specific elements identified, if present, to determine the likelihood of listed Threatened and Priority species utilising habitat within the survey area.

Fauna of conservation significance identified during the literature review and database searches as previously being recorded in the general area were assessed and ranked for their likelihood of occurrence within the survey area. The rankings and criteria used were:

- **Would Not Occur:** There is no suitable habitat for the species in the survey area and/or there is no documented record of the species in the general area since records have been kept and/or the species is generally accepted as being locally/regionally extinct (supported by a lack of recent records).
- **Locally Extinct:** Populations no longer occur within a small part of the species natural range, in this case within 10 or 20 km of the survey area. Populations do however persist outside of this area.
- **Regionally Extinct:** Populations no longer occur in a large part of the species natural range, in this case within the Eastern Murchison subregion. Populations do however persist outside of this area.
- **Unlikely to Occur:** The survey area is outside of the currently documented distribution for the species in question, or no suitable habitat (type, quality and extent) was identified as being present during the field assessment. Individuals of some species may occur occasionally as vagrants/transients especially if suitable habitat is located nearby but the site itself would not support a population or part population of the species.

- **Possibly Occurs:** Survey area is within the known distribution of the species in question and habitat of at least marginal quality was identified as likely to be present during the field survey and literature review, supported in some cases by recent records being documented in literature from within or near the survey area. In some cases, while a species may be classified as possibly being present at times, habitat may be marginal (e.g. poor quality, fragmented, limited in extent) and therefore the frequency of occurrence and/or population levels may be low.

- **Known to Occur**: The species in question has been positively identified as being present (for sedentary species) or as using the survey area as habitat for some other purpose (for non-sedentary/mobile species) during field surveys within or near the survey area. This information may have been obtained by direct observation of individuals or by way of secondary evidence (e.g. tracks, foraging debris, scats). In some cases, while a species may be classified as known to occur, habitat may be marginal (e.g. poor quality, fragmented, limited in extent) and therefore the frequency of occurrence and/or population levels may be low.

3.5 Scientific Licences

Table 3-1: Scientific Licenses of Botanica Staff coordinating the survey

Licensed Staff	Permit Number	Date of Expiry
Jim Williams	FB62000457 (Licence to take flora for scientific purposes)	04/08/2025

3.6 Survey Limitations and Constraints

It is important to note that flora surveys will entail limitations notwithstanding careful planning and design. Potential limitations are listed in Table 3-2.

The conclusions presented in this report are based upon field data and environmental assessments and/or testing carried out over a limited period of time and are therefore merely indicative of the environmental condition of the site at the time of the field assessments. Also, it should be recognised that site conditions can change with time. Information not available at the time of this assessment which may subsequently become available may alter the conclusions presented.

Some species are reported as potentially occurring based on there being suitable habitat (quality and extent) within the survey area or immediately adjacent. The habitat requirements and ecology of many of the species known to occur in the wider area are however often not well understood or documented. It can therefore be difficult to exclude species from the potential list based on a lack of a specific habitats or microhabitats within the survey area. As a consequence of this limitation, the potential species list produced is most likely an overestimation of those species that utilise the survey area for some purpose.

In recognition of survey limitations, a precautionary approach has been adopted for this assessment. Any flora species that would possibly occur within the survey area (or immediately adjacent), as identified through ecological databases, publications, discussions with local experts/residents and the habitat knowledge of the author, has been listed as having the potential to occur.

Table 3-2: Limitations and constraints associated with the flora/ vegetation and fauna survey

Variable	Potential Impact on Survey	Details
Access problems	Not a constraint	The survey was conducted via 4WD and on foot. The survey area was accessible by numerous access tracks.
Competency/ Experience	Not a constraint	The Botanica personnel that conducted the survey were regarded as suitably qualified and experienced. **Coordinating Staff**: Jim Williams (Principal Botanist) has 30 years' experience doing flora and fauna surveys in WA. **Data Interpretation**: Jim Williams (Botanist), Kym Pearce and Jennifer Jackson.
Timing of survey, weather & season	Minor constraint	Fieldwork was undertaken outside the EPA's recommended primary survey time period for the Eremaean Province (i.e., 6-8 weeks following winter rainfall). However above average rainfall was received in June and July 2024 and with the coordinating botanist's local knowledge of flora in the region, the timing of the survey was considered appropriate.

Variable	Potential Impact on Survey	Details
Area disturbance	Not a constraint	The area has been disturbed from previous mining and exploration, cattle grazing and other human impacts; however, vegetation was mostly intact and comprised of native vegetation.
Survey Effort/ Extent	Not a constraint	Survey intensity was appropriate for the size/significance of the area with a reconnaissance survey completed to identify vegetation types/fauna habitats and conservation significant species/communities.
Availability of contextual information at a regional and local scale	Not a constraint	BoM, DWER, DPIRD, DBCA and DCCEEW databases were reviewed to obtain appropriate regional desktop information on the biophysical environment of the local region. Botanica has conducted numerous surveys within the Eastern Murchison bioregion and was also able to obtain information about the area from previous research conducted within the area. Results of previous assessments in the local area were reviewed to provide context on the local environment.
Completeness	Not a constraint	In the opinion of Botanica, the survey area was covered sufficiently in order to identify vegetation assemblages. All observed flora individuals were able to be identified to species level. The vegetation associations for this study were based on visual descriptions of locations in the field. The distribution of these vegetation associations outside the survey area is not known, however vegetation associations identified were categorised via comparison to vegetation distributions throughout WA given on NVIS (DotEE, 2017).

4 RESULTS

4.1 Desktop Assessment

4.1.1 Flora

The NatureMap database search (DBCA, 2024d) identified 594 vascular flora species as occurring within 40 km of the survey area. The full list of vascular flora identified by the desktop search is contained in Appendix B.

4.1.2 Introduced Flora

The desktop review identified 57 introduced flora (weed) species as known to occur within 40 km of the survey area. Nine of the species are listed as a Declared Pest on the Western Australian Organism List (WAOL) under the *Biosecurity and Agriculture Management* (BAM) *Act 2007*, six are listed as a Weed of National Significance (WoNS) (Table 4-1).

Table 4-1: Declared and WONs species of weeds known to occur within 40 km of the survey area

Taxon	Common Name	Declared	WoNS
Alhagi maurorum	Camel thorn	Y	N
Cylindropuntia fulgida var. *mamillata*	Boxing Glove cactus	Y	Y
Cylindropuntia imbricata	Devils rope	Y	Y
Cylindropuntia kleiniae	Kleins cholla	Y	Y
Echium plantagineum	Paterson's Curse	Y	N
Lycium ferocissimum	African Boxthorn	N	Y
Opuntia elata	Riverian pear	Y	Y
Opuntia ficus-indica	Indian fig, Prickly pear	Y	Y
Tamarix chinensis	Tamarisk	Y	N
Xanthium spinosum	Bathurst burr	Y	N

4.1.3 Significant Flora

Assessment of the DBCA's Threatened and Priority Flora database records (Ref: 08-0224FL) (DBCA, 2024b), EPBC Protected Matters (DCCEEW, 2024a) and previous relevant literature identified no Threatened or Priority Flora were previously recorded within the survey area. One Threatened taxa was identified as occurring within the 40km buffer, twenty-two Priority Flora were identified as occurring within a 40 km radius of the survey area.

These taxa were assessed for distribution and known habitat to determine their likelihood of occurrence within the survey area (Table 4-2). The locations of the DBCA database records are illustrated spatially in Figure 4-1.

Table 4-2: Significant flora previously recorded within 40km of the survey area

Taxon	Rank			Habitat Description (WA Herbarium 1998-)	Likelihood to occur in survey area
	EPBC	BC Act	DBCA		
Acacia epedunculata	-	-	P1	Yellow sand. Sandplains	Unlikely
Allocasuarina eriochlamys subsp. *grossa*	-	-	P3	Stony loam, laterite clay. Granite outcrops.	Unlikely
Alyxia tetanifolia	-	-	P3	Sandy clay, loam, concretionary gravel. Drainage lines, near lakes.	Unlikely
Angianthus prostratus	-	-	P3	Red clay or loamy soils. Saline depressions	Unlikely
Calandrinia lefroyensis	-	-	P1	Flat plain, orange clayey sand with fine quartz. Sparse chenopod shrubland.	Unlikely
Cyathostemon verrucosus	-	-	P3	Well drained deep sand, gentle undulating plain.	Unlikely
Elachanthus pusillus	-	-	P2	Red loam over limestone. Drainage flat.	Unlikely
Eleocharis papillosa	-	-	P3	Red clay over granite, open clay flats. Claypans.	Unlikely
Eremophila praecox	-	-	P2	Red/brown sandy loam. Undulating plains.	Possible
Eucalyptus jutsonii subsp. *jutsonii*	-	-	P4	Red sandy soil. Undulating areas and on dunes.	Unlikely
Eucalyptus x brachyphylla	-	-	P4	Sandy loam. Granite outcrops.	Unlikely
Frankenia glomerata	-	-	P4	White sand.	Unlikely
Gastrolobium graniticum	EN	T	-	Sand, sandy loam, granite. Margins of rock outcrops, along drainage lines.	Unlikely
Gompholobium cinereum	-	-	P3	Yellow sand, clayey sand, brown loam, sandy gravel, laterite. Well-drained open sites, slopes, plains, roadsides.	Unlikely
Lepidium fasciculatum	-	-	P3	No habitat description found	-
Melaleuca coccinea	-	-	P3	Sandy loam over granite. Granite outcrops, sandplain, river valleys.	Unlikely
Notisia intonsa	-	-	P3	Lake shore, moist red sand.	Unlikely
Ptilotus procumbens	-	-	P1	Red clay.	Unlikely
Ptilotus rigidus	-	-	P1	Quartz outcropping associated with large salt lakes.	Unlikely
Ptilotus sp. Kalgoorlie (J. Jackson & B. Moyle 260)	-	-	P1	Quartz outcropping.	Unlikely
Rhodanthe uniflora	-	-	P1	Brown earth. Open eucalyptus woodland.	Possible
Ricinocarpos digynus	-	-	P1	Rocky hillslope with *Casuarina pauper.*	Unlikely
Xanthoparmelia dayiana	-	-	P3	On small rock amongst Eucalyptus and Atriplex.	Possible

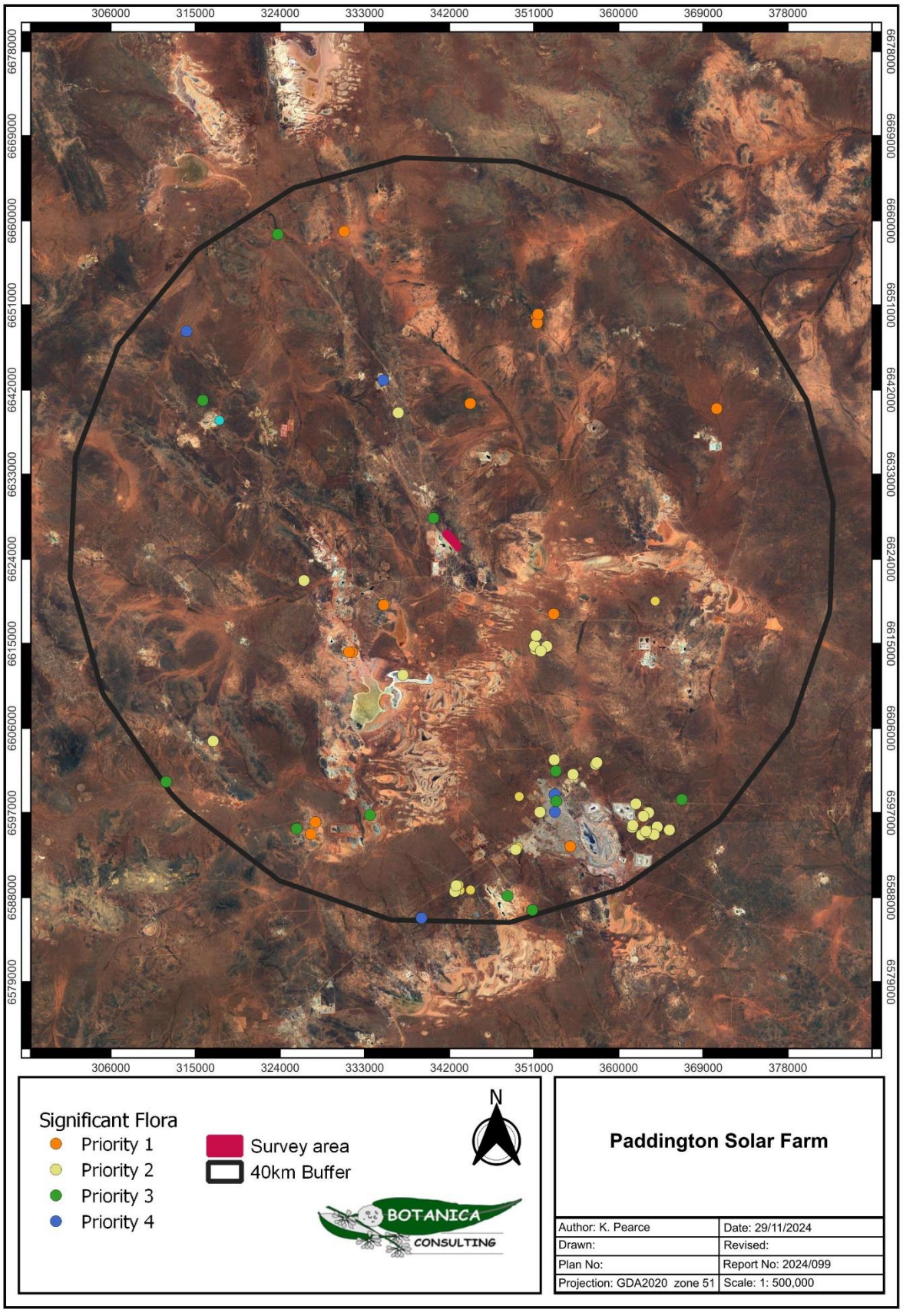


Figure 4-1: Significant flora within the desktop search area

4.1.4 Fauna

The NatureMap database search (DBCA, 2024c) identified a total 282 terrestrial vertebrate fauna taxa within 40 km of the survey area, consisting of 150 birds, 36 mammal, 90 reptile, one fish and five amphibian taxa. Of these, nine species are introduced (non-native) species:

- *Bos taurus* (Cattle)
- *Canis spp*. (Wild Dog);
- *Capra hircus* (Feral Goat);
- *Carassius auratus* (Goldfish);
- *Felis cattus* (Feral Cat);
- *Mus musculus* (House mouse);
- *Oryctolagus cuniculus* (Rabbit);
- *Ovis* spp. (Feral Sheep); and
- *Vulpes* (Fox).

The full list of vertebrate fauna identified by the desktop search is contained in Appendix B.

4.1.5 Conservation Significant Fauna

The desktop review (DBCA 2024c, DCCEEW 2024a) identified 30 terrestrial vertebrate species and one invertebrate species of conservation significance as previously being recorded within 40km of the survey area, including 12 migratory terrestrial species.

Habitat and distribution data was used to determine the likelihood of occurrence within the survey area. The assessment identified three significant fauna species, consisting of one Vulnerable (VU) taxa, and two priority species as potentially occurring in the survey area (Table 4-3).

Table 4-3: Potentially occurring significant fauna

Species	Conservation Status			Habitat Description	Assessment and likelihood
	EPBC	BC Act	DBCA		
Amtornis textilis textilis Western grasswren	-	-	P4	Habitat with dense cover and is currently known from shrublands where foliage is low (less than 1 metre) but forms dense clumps and thickets. Endemic to WA (DCCEEW 2024b).	Old record 1908. Unlikely to be found in survey area
Aphelocephala leucopsis Southern Whiteface	VU	-	-	Found in arid regions across most of the southern half of the Australian continent, Acacia woodlands, particularly those dominated by mulga and drought-resistant chenopod shrub species, including saltbush and bluebush (ALA, 2024).	PMST records state that the species or species habitat may be in the area. Possible.
Branchinella denticulata A fairy shrimp	-	-	P3	Historical record from Lake Gidgee. Habitat would be claypans, freshwater bodies.	Would not occur in the area. No habitat in the survey area.
Calidris acuminata Sharp-tailed Sandpiper	VU		MI	Intertidal mudflats, also freshwater swamps and saltwater lakes (ALA, 2024).	Would not occur in the area. No habitat in the survey area.
Calidris ferruginea Curlew Sandpiper	CR and MI	CR	-	Inland, where they are rarely seen, around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand (DCCEEW, 2024b).	Would not occur in the area. No habitat in the survey area.
Dasyurus geoffroii Chuditch	VU	VU	-	Deserts, woodlands, eucalypt shrubland, open forests and coastal areas. It is now found only in the southwest corner of Western Australia (ALA, 2024).	Would not occur. Considered to be regionally extinct.
Ergrnia stokesii badia Western spiny-tailed skink	EN	VU	-	Open eucalypt woodlands and Acacia-dominated shrublands in semi-arid to arid areas. It tends to shelter in logs, in cavities in the trunks and branches of shrubs, as well as in houses and ruins especially in accumulations of old corrugated iron (DCCEEW 2024b).	One record of unknown date. Unlikely to occur.

Species	Conservation Status			Habitat Description	Assessment and likelihood
	EPBC	BC Act	DBCA		
Falco hypoleucos Grey Falcon				Occurs at low densities across inland Australia. The species frequents timbered lowland plains, particularly acacia shrublands that are crossed by tree-lined water courses. The species has been observed hunting in treeless areas and frequents tussock grassland and open woodland, especially in winter (DCCEEW, 2024b).	Unlikely. Outside normal range (Harewood, 2012).
Jalmenus aridus Inland hairstreak	-	-	P1	Open woodland with mature *Senna artemisioides* ssp. *filifolia* as well as mixed flowering shrubs with open areas of well drained exposed ground adjoining the hostplants (Eastwood *et al,* 2023).	Possible.
Leipoa ocellata Malleefowl	VU	VU	-	Scrublands and woodlands dominated by mallee and wattle species (DCCEEW, 2024b).	Possible.
Macrotis lagotis Bilby	VU	VU	-	Lives in the desert. It occurs in several disjunct locations between south-west Queensland and the Pilbara (DCCEEW, 2024b).	Would not occur. Considered to be regionally extinct.
Myrmecobius fasciatus Numbat	EN	EN	-	Numbats were previously widespread before European settlement; they now occupy just a few reserves in the south-west of WA and translocated populations in other parts of Australia (ALA, 2024).	Would not occur. Considered to be regionally extinct.
Nyctophilus major tor Central long-eared bat	-	-	P3	Woodlands, including old mallee trees with abundant hollows, sheoaks and wattle thickets.	Unlikely. No habitat in survey area.
Ogyris subterrestris petrina Arid Bronze Azure	CE	-	-	The arid bronze azure is only known to be extant at two locations within the Wheatbelt Region and is presumed extinct at another location within the Goldfields Region (DBCA, 2020).	Unlikely. Considered to be regionally extinct.
Oxyura australis Blue Billed duck	-	-	P4	Endemic to wetlands of Australia's temperate regions (ALA, 2024).	Would not occur. No habitat in survey area.
Pezoporus occidentalis Night Parrot	EN	CR	-	At the landscape scale, night parrots require two distinct habitats: 1. patches of low, dense vegetation in which they roost during the day; and 2. nearby floodplains or other low-lying areas supporting diverse assemblages of native grasses and herbs in which to feed at night. (DBCA, 2024e).	Would not occur in the area. PMST records state that the species or species habitat may be in the area. Considered to be locally extinct. Suitable habitat not present.

Species	Conservation Status			Habitat Description	Assessment and likelihood
	EPBC	BC Act	DBCA		
Phascogla calura Red-tailed phascogale	VU	CD	-	It is found in dense and tall climax vegetation, and appears to prefer those containing the Wandoo (*Eucalyptus wandoo*) and the rock sheoak (*Allocasuarina huegeliana*). Restricted to southern Western Australian wheatbelt (ALA 2024).	Unlikely, out of habitat range.
Polytelis alexandrae Princess Parrot	VU	-	P4	Inhabits sand dunes and sand flats in the arid zone of western and central Australia. It occurs in open savanna woodlands and shrublands that usually consist of scattered stands of Eucalyptus (including *E. gongylocarpa, E. chippendalei* and mallee species), Casuarina or Allocasuarina trees; an understorey of shrubs such as Acacia (especially *A. aneura*), Cassia, Eremophila, Grevillea, Hakea and Senna; and a ground cover dominated by Triodia species (DCCEEW, 2024b)	Would not occur. Known to occur further east in the Great Victoria Desert.
Various wading/shorebird species	MI	MI	-	Inhabit muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. This includes lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, saltpans and hypersaline salt lakes inland (DCCEEW, 2024b).	Would not occur in the area. No habitat in the survey area.

4.2 Field Assessment

4.2.1 Flora

The field survey identified 77 vascular flora taxa within the survey area. These taxa represented 36 genera across 19 families, with the most diverse families being Chenopodiaceae (18 species), Myrtaceae (12 species) and Fabaceae (10 species). Dominant genera include Eucalyptus (10 species) and Eremophila (9 species). Five annual species was observed during the survey. The full field species inventory is listed in Appendix C.

4.2.1.1 Introduced Flora

Three introduced flora (weeds) species were observed within the survey area during the survey. None of these species are listed as a Declared Pest on the Western Australian Organism List (WAOL) under the Biosecurity and Agriculture Management (BAM) Act 2007 or as a Weed of National Significance.

Table -4-4: Introduced flora species within the survey area

Family	Taxon	Common Name
Asteraceae	*Dittrichia graveolens*	Stinkwort
Asteraceae	*Carthamus lanatus*	Saffron thistle
Lamiaceae	*Salvia verbenaca*	Wild sage

4.2.1.2 Significant Flora

According to the EPA *Environmental Factor Guideline for Flora and Vegetation* (EPA, 2016b) significant flora includes:

- flora being identified as threatened or priority species;
- locally endemic flora or flora associated with a restricted habitat type (e.g. surface water or groundwater dependent ecosystems);
- new species or anomalous features that indicate a potential new species;
- flora representative of the range of a species (particularly, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range);
- unusual species, including restricted subspecies, varieties or naturally occurring hybrids; and
- flora with relictual status, being representative of taxonomic groups that no longer occur widely in the broader landscape.

No Threatened Flora taxa are previously known to occur or were identified within the survey area.

No Priority Flora taxa are previously known to occur or were identified within the survey area.

4.2.2 Vegetation Communities

A total of three broad-scale vegetation communities were identified within the survey area. These communities were identified within two landform types and comprised of one major vegetation group according to the NVIS Major Vegetation Group (MVG) definition. Vegetation community descriptions and extent are listed below in Table 4-5 and illustrated spatially Figure 4-2. Vegetation community descriptions and extents were determined from field survey results, aerial imagery interpretation and extrapolation of the communities.

The survey found CLP-EW1 was the most widespread community in the survey area, occupying 65.75 ha (62.8%), while DD-EW1 was the most restricted with 10 ha (9.5%). The diversity of species across the vegetation types was consistent. The most diverse vegetation type was CLP-EW2, with 44 species (57%), while the least diverse was CLP-EW1 with 41 species (53%).

Table 4-5: Summary of vegetation types within the survey area

Vegetation Community	Broad Floristic Formation (NVIS VI)	Vegetation Description	Landform	Image
CLP-EW1 Area: 65.75 ha	Eucalypt Woodlands (MVG 5)	Mid woodland of *Eucalyptus salmonophloia* over mid open shrubland of *Acacia hemiteles*/ *Eremophila scoparia* and low open shrubland of *Ptilotus obovatus* on clay-loam plain.	Clay-Loam Plain	
CLP-EW2 Area: 24 ha	Eucalypt Woodlands (MVG 5)	Mid woodland of *Eucalyptus clelandiorum/E lesouefii* over mid open shrubland of *Acacia hemiteles* and low open chenopod shrubland of *Atriplex vesicaria* on clay-loam plain.		

Vegetation Community	Broad Floristic Formation (NVIS VI)	Vegetation Description	Landform	Image
DD-EW1 Area: 10ha	Eucalypt Woodlands (MVG 5)	Mid woodland of *Eucalyptus salmonophloia* over mid open shrubland of *Acacia hemiteles/ Eremophila scoparia* and low open shrubland of *Ptilotus obovatus* in drainage depression.	Drainage depression	
N/A	CV	Mining disturbance, cleared areas	NA	

Figure 4-2: Vegetation types within the survey area

4.2.3 Vegetation Condition

Based on the vegetation condition rating scale adapted from Keighery (1994) and Trudgen, (1988), native vegetation within the survey area was categorized as 'completely degraded' to 'good'. (Figure 4-3, Table 4-6). Areas that had a vegetation rating of degraded and completed degraded include roads, open pit mines, dam, and other mine operations. Vegetation condition rating descriptions are listed in Appendix D.

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Table 4-6: Vegetation condition rating within the survey area

Condition rating	Description	Area (ha)	Area (%)
Good	More obvious signs of damage caused by human activity since European settlement, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or slightly aggressive weeds.	61.55	58.2%
Degraded	Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management.	38.15	36.1%
Completely degraded	Cleared vegetation	5.91	5.59%
Total		**105.64**	**100%**

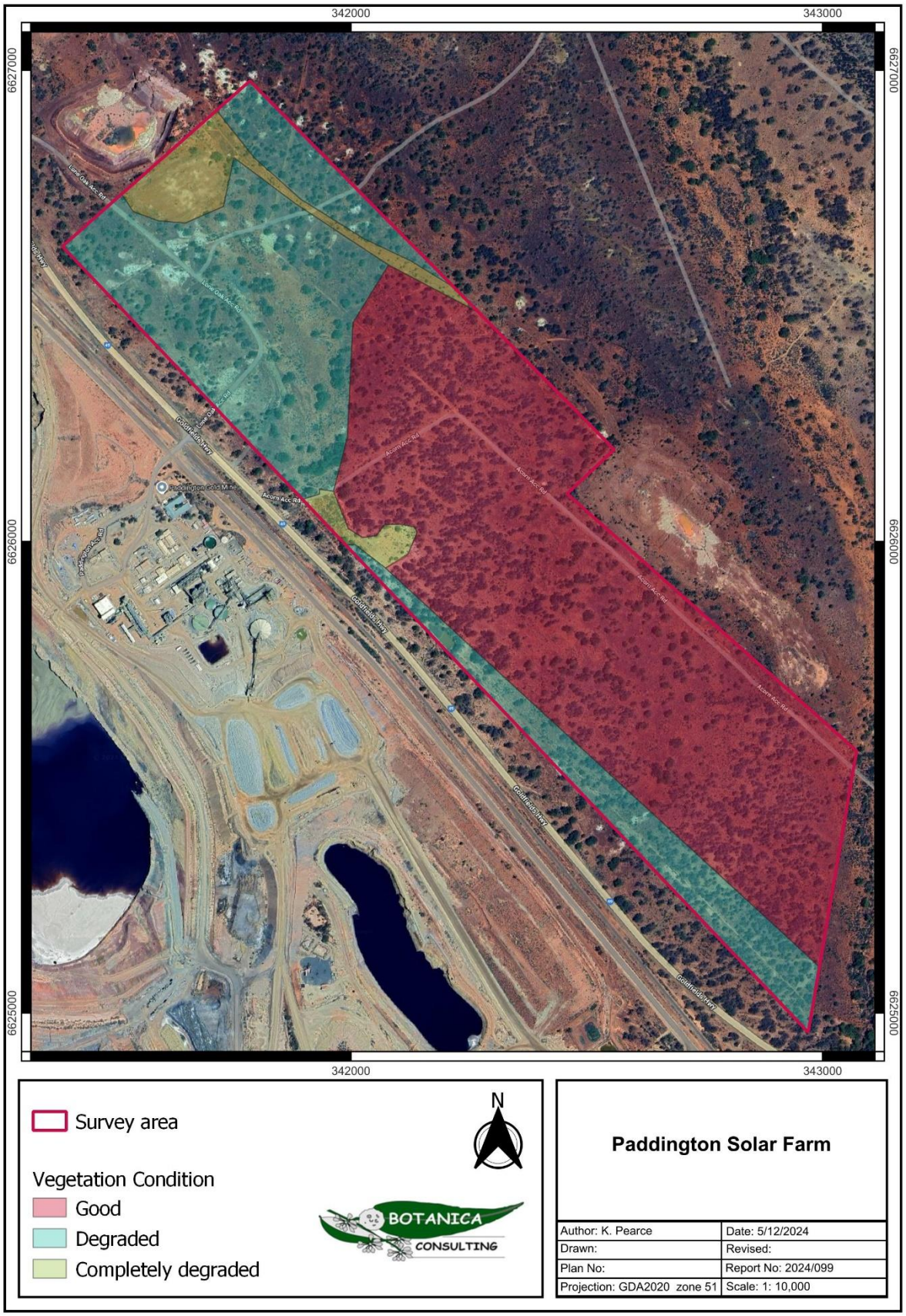

Figure 4-3: Vegetation condition within the survey area

4.2.4 Significant Vegetation

According to the EPA *Environmental Factor Guideline for Flora and Vegetation* (EPA, 2016b) significant vegetation includes:

- vegetation being identified as threatened or priority ecological communities;
- vegetation with restricted distribution;
- vegetation subject to a high degree of historical impact from threatening processes;
- vegetation which provides a role as a refuge; and
- vegetation providing an important function required to maintain ecological integrity of a significant ecosystem.

No Threatened, Priority or otherwise significant ecological communities were identified within the survey area.

4.2.5 Fauna

4.2.5.1 Fauna Habitat

Based on vegetation and associated landforms identified during the flora and vegetation assessment, two broad scale terrestrial fauna habitats were identified as occurring within the survey area. Based on the proximity to the Goldfields highway, it is unlikely to support a high level of fauna numbers and diversity. Table 4-8 provides the area and a visual representation of fauna habitat types, and the extent of fauna habitats is shown spatially in Figure 4-4.

Table 4-7 provides a list of opportunistic observations of fauna species that was made during the field survey with a total of nine fauna species observed.

Table 4-7: Fauna species observed during the field survey

Taxon	Common Name	Comments
Avifauna		
Barnardius zonarius	Ringneck parrot	Observed
Cacatua roseicapilla	Galah	Observed
Coracina novaehollandiae	Black-faced cuckoo-shrike	Observed
Corvus coronoides	Australian raven	Observed
Grallina cyanoleuca	Magpie lark	Observed
Lichmera indistincta	Brown honey eater	Observed
Mammals		
Felis catus	Cat	Tracks observed
Oryctolagus cuniculus	Rabbit	Scats Observed
Macropus fuliginosus melanops	Western grey kangaroo	Scats Observed

Table 4-8: Main terrestrial fauna habitats within the survey area

Fauna Habitat Description	Representative Fauna Attributes	Possibly Occurring Conservation Significant Species	Example Image
Eucalypt woodland in drainage line Area= 10.01 ha (9.4%)	• Ground moderately suited to burrowing species. • Low to moderate diversity vegetation strata supporting avifauna assemblage. • Low to moderate vegetation density and leaf litter, providing some refuge for reptiles.	Malleefowl *Leipoa ocellata* Southern Whiteface *Aphelocephala leucopsis*	
Eucalypt woodland on clay loam plain Area = 89.79 (84.99%)	• Ground moderately suited to burrowing species. • Low to Moderate diversity vegetation strata supporting avifauna assemblage. • Moderate vegetation density and leaf litter, providing some refuge for reptiles.	Malleefowl *Leipoa ocellata* Southern Whiteface *Aphelocephala leucopsis*	
Cleared areas Area= 5.9 (5.5%)	• Ground not particularly suited to burrowing species. • Very low diversity vegetation strata supporting minimal avifauna assemblage. • Very low vegetation density and very low leaf litter.	N/A	

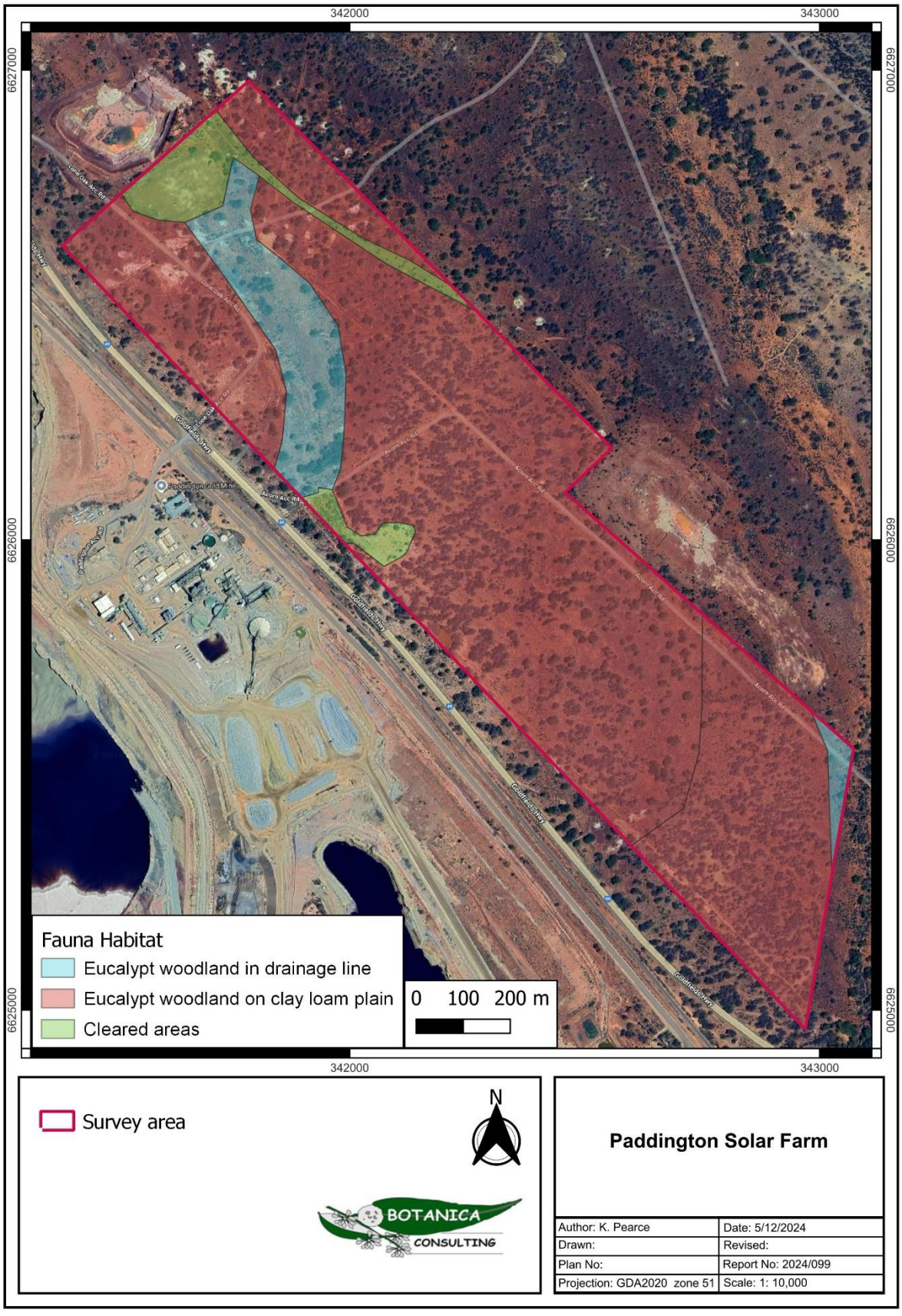

Figure 4-4: Fauna habitats within the survey area

4.2.5.2 Significant Fauna

According to the EPA *Environmental Factor Guideline for Terrestrial Fauna* (EPA, 2016c) significant fauna includes:

- Fauna being identified as a Threatened or Priority species;
- Fauna species with restricted distribution;
- Fauna subject to a high degree of historical impact from threatening processes; and
- Fauna providing an important function required to maintain the ecological integrity of a significant ecosystem.

No evidence of significant fauna species was observed during the survey, including no evidence of Malleefowl nesting mounds or other activity.

The current status of some species on site and/or in the general area is difficult to determine, however, based on the habitats present and, in some cases, direct observations or recent nearby records, the following species of conservation significance can be regarded as possibly utilising the survey area for some purpose at times, these being:

- **Malleefowl (*Leipoa ocellata)* - Vulnerable (EPBC Act and BC Act)**

  This species is occasionally recorded in the Eastern Murchison subregion. Habitat appears unsuitable for breeding due to the open canopy and low levels of leaf litter present; however occasional transients could potentially occur. No evidence of malleefowl activity (inactive or active mounds, tracks, feathers or bird observations etc.) were observed within the survey area. Significant impact unlikely.

- **Southern Whiteface (*Aphelocephala leucopsis*)- Vulnerable (EPBC Act)**

  This species is sparsely recorded throughout inland Australia. The survey area likely represents the southern extreme of the range of this species. Suitable habitat may be present but is unlikely to represent critical habitat. Significant impact unlikely.

It should be noted that while habitats onsite for one or more of the species listed above are considered possibly suitable, some or all may be marginal in extent/quality and therefore the fauna species considered as possibly occurring may in fact only visit the area for short periods as infrequent vagrants.

4.3 Matters of National Environmental Significance

4.3.1 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act protects matters of national environmental significance and is used by the Commonwealth DCCEEW to list threatened taxa and ecological communities into categories based on the criteria set out in the Act (www.environment.gov.au/epbc/index.html). The Act provides a national environmental assessment and approval system for proposed developments and enforces strict penalties for unauthorised actions that may affect matters of national environmental

significance. Matters of national environmental significance as defined by the Commonwealth EPBC Act include:

- Nationally threatened flora and fauna species;
- World heritage properties;
- National heritage places;
- Wetlands of international importance (often called 'Ramsar' wetlands after the international treaty under which such wetlands are listed);
- Nationally threatened ecological communities;
- Commonwealth marine area;
- The Great Barrier Reef Marine Park; and
- Nuclear actions (including uranium mining) a water resource, in relation to coal seam gas development and large coal mining development.

No Matters of National Environmental Significance were identified within the survey area.

4.4 Matters of State Environmental Significance

4.4.1 *Environmental Protection Act WA 1986*

The EP Act provides for the prevention, control and abatement of pollution and environmental harm, for the conservation, preservation, protection, enhancement and management of the environment. The Act is administered by The Department of Water and Environment Regulation (DWER), which is the State Government's environmental regulatory agency.

Under Section 51C of the EP Act and the *Environmental Protection (Clearing of Native Vegetation) Regulations (Regulations) WA 2004* any clearing of native vegetation in Western Australia that is not eligible for exemption under Schedule 6 of the *EP Act 1986* or under the Regulations 2004 requires a clearing permit from the DWER or DEMIRS. Under Section 51A of the *EP Act 1986* native vegetation includes aquatic and terrestrial vegetation indigenous to Western Australia, and intentionally planted vegetation declared by regulation to be native vegetation, but not vegetation planted in a plantation or planted with commercial intent. Section 51A of the *EP Act 1986* defines clearing as "the killing or destruction of; the removal of; the severing or ringbarking of trunks or stems of; or the doing of substantial damage to some or all of the native vegetation in an area, including the flooding of land, the burning of vegetation, the grazing of stock or an act or activity that results in the above". Exemptions under Schedule 6 of the EP Act and the EP Regulations do not apply in ESAs as declared under Section 51B of the EP Act or TEC listed under State and Commonwealth legislation.

No Matters of State Environmental Significance were identified within the survey area. No Environmentally Sensitive Areas were identified within the survey area.

4.4.2 *Biodiversity Conservation Act 2016*

This Act is used by the Western Australian DBCA for the conservation and protection of biodiversity and biodiversity components in Western Australia and to promote the ecologically sustainable use of biodiversity components in the State. Taxa are classified as 'Threatened" when their populations are geographically restricted or are threatened by local processes (see following sections for Threatened definitions). Under this Act all native flora and fauna are protected throughout the State. Financial penalties are enforced under this Act if threatened species are collected without an appropriate license.

Under Section 54(1) of the BC Act, habitat is eligible for listing as critical habitat if:

a) it is critical to the survival of a threatened species or a threatened ecological community; and
b) its listing is otherwise in accordance with the ministerial guidelines.

No threatened species or critical habitat listed under the BC Act were recorded within the survey area.

4.5 Other Areas of Conservation Significance

The DBCA lists 'Priority' species and communities which are under consideration for declaration as 'Threatened' under the BC Act. These Priority species/ communities have no formal legal protection until they are endorsed by the Minister as being Threatened. No PEC's as listed by DBCA were identified within the survey area.

There are no wetlands of international importance (Ramsar Wetlands) or national importance (Australian Nature Conservation Agency Wetlands) within the survey area.

There are no gazetted or proposed conservation reserves within the survey area. The closest gazetted reserve is the Kalgoorlie Arboretum (R42657) approximately 28km southeast of the survey area (Figure 2-5).

4.6 Native Vegetation Clearing Principles

Based on the outcomes from the survey undertaken, Botanica assessed the results of the desktop and field survey with regards to the native vegetation clearing principles listed under Schedule 5 of the EP Act (Table 4-9Table 4-9). The assessment found that the proposed vegetation clearing activities are unlikely to be at variance with any clearing principle.

Table 4-9: Assessment against native vegetation clearing principles

Letter	Principle Native vegetation should not be cleared if it:	Assessment	Outcome
(a)	comprises a high level of biological diversity.	Vegetation within the survey area is considered to be of low biological diversity and is well represented outside the survey area.	Clearing is unlikely to be at variance with this principle
(b)	comprises the whole or part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to WA.	The basic fauna search did not record any evidence for the presence of significant fauna or habitat within the survey area.	Clearing is unlikely to be at variance with this principle
(c)	includes, or is necessary for the continued existence of rare flora.	No Threatened Flora taxa, pursuant to the BC Act and the EPBC Act were identified within the survey area.	Clearing is unlikely to be at variance with this principle
(d)	comprises the whole or part of or is necessary for the maintenance of a threatened ecological community (TEC).	No Threatened Ecological Communities were identified as potentially occurring within the survey area.	Clearing is unlikely to be at variance with this principle
(e)	is significant as a remnant of native vegetation in an area that has been extensively cleared	Both vegetation associations retain over 89% of their Pre-European extent.	Clearing is unlikely to be at variance with this principle
(f)	is growing, in, or in association with, an environment associated with a watercourse or wetland	One minor ephemeral drainage line was identified within the survey area.	Clearing is unlikely to be at variance with this principle
(g)	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	The survey area and surrounding region has not been extensively cleared. Clearing within the survey area is not considered likely to lead to land degradation issues such as salinity, water logging or acidic soils.	Clearing is unlikely to be at variance with this principle
(h)	Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.	Clearing within the survey area is unlikely to impact any conservation reserves.	Clearing is unlikely to be at variance with this principle
(i)	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.	One minor ephemeral drainage line was identified within the survey area. Clearing activities are unlikely to impact hydrological systems.	Clearing is unlikely to be at variance with this principle
(j)	Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding	Rainfall in the Eastern Murchison subregion has an average rainfall of 200mm. Rainfall events are unlikely to result in localised flooding. Clearing within the survey area is not likely to increase the incidence or intensity of flooding within the survey area or surrounds.	Clearing is unlikely to be at variance with this principle

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APPENDIX A: CONSERVATION RATINGS BC ACT AND EPBC ACT

Definitions of Conservation Significant Species

Code	Category
State categories of Threatened and Priority species	
Threatened Species (T) Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as Threatened species under section 26(2) of the Biodiversity Conservation Act 2016 (BC Act).	
CR	**Critically Endangered** Threatened species considered to be "facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines. Published under schedule 1 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for critically endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for critically endangered flora.
EN	**Endangered** Threatened species considered to be "facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. Published under schedule 2 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for endangered flora.
VU	**Vulnerable** Threatened species considered to be "facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines. Published under schedule 3 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for vulnerable fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for vulnerable flora.
Extinct species Listed by order of the Minister as extinct under section 23(1) of the BC Act as extinct or extinct in the wild.	
EX	**Extinct** Species where "*there is no reasonable doubt that the last member of the species has died*", and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act). Published as presumed extinct under schedule 4 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for extinct fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for extinct flora.
EW	**Extinct in the Wild** Species that *"is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form*", and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act). Currently there are no Threatened fauna or Threatened flora species listed as extinct in the wild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice.
Specially protected species Listed by order of the Minister as specially protected under section 13(1) of the BC Act. Meeting one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection. Species that are listed as Threatened species (critically endangered, endangered or vulnerable) or extinct species under the BC Act cannot also be listed as Specially Protected species.	
IA	**International Agreement/ Migratory** Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act). Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the *Convention on the Conservation of Migratory Species of Wild Animals* (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals, that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species. Published as migratory birds protected under an international agreement under schedule 5 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

Code	Category
CD	**Species of special conservation interest** Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as Threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act). Published as conservation dependent fauna under schedule 6 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.
OS	**Other specially protected species** Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act). Published as other specially protected fauna under schedule 7 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.
Priority species Possibly Threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of Priority for survey and evaluation of conservation status so that consideration can be given to their declaration as Threatened Fauna or Flora. Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring. Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.	
P1	**Priority 1: Poorly-known species** Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.
P2	**Priority 2: Poorly-known species** Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.
P3	**Priority 3: Poorly-known species** Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.
P4	**Priority 4: Rare, Near Threatened and other species in need of monitoring** (a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands. (b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent. (c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.
Commonwealth categories of Threatened species	
EX	**Extinct** Taxa where there is no reasonable doubt that the last member of the species has died.
EW	**Extinct in the Wild** Taxa where it is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
CR	**Critically Endangered** Taxa that are facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
EN	**Endangered** Taxa which are not critically endangered and is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.
VU	**Vulnerable**

Code	Category
	Taxa which are not critically endangered or endangered and is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
CD	**Conservation Dependent** Taxa which are the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered or critically endangered; or (b) the following subparagraphs are satisfied: (i) the species is a species of fish; (ii) the species is the focus of a plan of management that provides for actions necessary to stop the decline of, and support the recovery of, the species so that its chances of long term survival in nature are maximised; (iii) the plan of management is in force under a law of the Commonwealth or of a State or Territory; (iv) cessation of the plan of management would adversely affect the conservation status of the species.

Definitions of conservation significant communities

Category Code	Category
State categories of Threatened Ecological Communities (TEC)	
PD	**Presumed Totally Destroyed**
	An ecological community will be listed as Presumed Totally Destroyed if there are no recent records of the community being extant and either of the following applies:
	• records within the last 50 years have not been confirmed despite thorough searches or known likely habitats or;
	• all occurrences recorded within the last 50 years have since been destroyed.
CR	**Critically Endangered**
	An ecological community will be listed as Critically Endangered when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future, meeting any one of the following criteria:
	The estimated geographic range and distribution has been reduced by at least 90% and is either continuing to decline with total destruction imminent, or is unlikely to be substantially rehabilitated in the immediate future due to modification;
	The current distribution is limited i.e. highly restricted, having very few small or isolated occurrences, or covering a small area;
	The ecological community is highly modified with potential of being rehabilitated in the immediate future.
EN	**Endangered**
	An ecological community will be listed as Endangered when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future. The ecological community must meet any one of the following criteria:
	The estimated geographic range and distribution has been reduced by at least 70% and is either continuing to decline with total destruction imminent in the short-term future, or is unlikely to be substantially rehabilitated in the short-term future due to modification;
	The current distribution is limited i.e. highly restricted, having very few small or isolated occurrences, or covering a small area;
	The ecological community is highly modified with potential of being rehabilitated in the short-term future.
VU	**Vulnerable**
	An ecological community will be listed as Vulnerable when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing high risk of total destruction in the medium to long term future. The ecological community must meet any one of the following criteria:
	The ecological community exists largely as modified occurrences that are likely to be able to be substantially restored or rehabilitated;
	The ecological community may already be modified and would be vulnerable to threatening process, and restricted in range or distribution;

Category Code	Category
	The ecological community may be widespread but has potential to move to a higher threat category due to existing or impending threatening processes.
Commonwealth categories of Threatened Ecological Communities (TEC)	
CE	**Critically Endangered** If, at that time, an ecological community is facing an extremely high risk of extinction in the wild in the immediate future (indicative timeframe being the next 10 years).
EN	**Endangered** If, at that time, an ecological community is not critically endangered but is facing a very high risk of extinction in the wild in the near future (indicative timeframe being the next 20 years).
VU	**Vulnerable** If, at that time, an ecological community is not critically endangered or endangered but is facing a high risk of extinction in the wild in the medium–term future (indicative timeframe being the next 50 years).
Priority Ecological Communities	
P1	**Poorly-known ecological communities**
	Ecological communities with apparently few, small occurrences, all or most not actively managed for conservation (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) and for which current threats exist.
P2	**Poorly-known ecological communities**
	Communities that are known from few small occurrences, all or most of which are actively managed for conservation (e.g. within national parks, conservation parks, nature reserves, State forest, un-allocated Crown land, water reserves, etc.) and not under imminent threat of destruction or degradation.
P3	**Poorly known ecological communities**
	Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or:
	Communities known from a few widespread occurrences, which are either large or within significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or;
	Communities made up of large, and/or widespread occurrences, that may or not be represented in the reserve system but are under threat of modification across much of their range from processes such as grazing and inappropriate fire regimes.
P4	**Ecological communities that are adequately known, rare but not threatened** or meet criteria for near threatened, or that have been recently removed from the threatened list. These communities require regular monitoring.
P5	**Conservation Dependent ecological communities**
	Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

APPENDIX B: NATUREMAP SEARCH (40KM)

Animalia
AMPHI
Litoria moorei
Neobatrachus kunapalari
Neobatrachus sutor
Neobatrachus wilsmorei
Pseudophryne occidentalis
BIRD
Acanthagenys rufogularis
Acanthiza apicalis
Acanthiza chrysorrhoa
Acanthiza uropygialis
Accipiter cirrocephalus
Accipiter fasciatus
Aegotheles cristatus
Anas gracilis
Anas rhynchotis
Anas superciliosa
Anhinga melanogaster subsp. novaehollandiae
Anhinga novaehollandiae
Anthochaera carunculata
Anthus australis
Aphelocephala leucopsis
Aquila audax
Ardea pacifica
Ardeotis australis
Artamus cinereus
Artamus cyanopterus
Artamus personatus
Aythya australis
Barnardius zonarius
Biziura lobata
Cacatua roseicapilla
Cacatua sanguinea
Cacomantis pallidus
Calidris acuminata
Calidris ferruginea
Calidris ruficollis
Certhionyx variegatus
Charadrius ruficapillus
Chenonetta jubata
Cheramoeca leucosterna
Cheramoeca leucosternus
Chroicocephalus novaehollandiae
Chrysococcyx basalis
Cincloramphus cruralis
Cincloramphus mathewsi
Cinclosoma castanotus
Circus assimilis
Cladorhynchus leucocephalus
Climacteris affinis
Colluricincla harmonica
Columba livia
Coracina maxima
Coracina novaehollandiae
Coracina novaehollandiae subsp. novaehollandiae
Corvus bennetti
Corvus coronoides
Corvus orru
Cracticus nigrogularis
Cracticus tibicen
Cracticus torquatus
Cuculus pallidus
Cygnus atratus
Daphoenositta chrysoptera
Dicaeum hirundinaceum
Dromaius novaehollandiae
Egretta novaehollandiae
Elanus axillaris
Elanus caeruleus
Elanus caeruleus subsp. axillaris
Elseyornis melanops
Eolophus roseicapillus
Epthianura albifrons
Epthianura tricolor
Erythrogonys cinctus
Eurostopodus argus
Falco berigora
Falco berigora subsp. berigora
Falco cenchroides
Falco longipennis
Fulica atra
Gavicalis virescens
Geopelia cuneata
Gerygone fusca
Glossopsitta porphyrocephala
Grallina cyanoleuca
Haliastur sphenurus
Himantopus himantopus
Himantopus himantopus subsp. leucocephalus
Hirundo neoxena
Hirundo nigricans
Lalage tricolor
Leipoa ocellata

Lichenostomus leucotis
Lichenostomus leucotis subsp. novaenorciae
Lichenostomus ornatus
Lichenostomus plumulus
Lichenostomus virescens
Lichmera indistincta
Malacorhynchus membranaceus
Malurus leucopterus
Malurus splendens
Manorina flavigula
Megalurus gramineus
Melanodryas cucullata
Melithreptus brevirostris
Melopsittacus undulatus
Merops ornatus
Microcarbo melanoleucos
Microeca fascinans
Ninox novaeseelandiae
Nymphicus hollandicus
Ocyphaps lophotes
Oreoica gutturalis
Pachycephala inornata
Pachycephala rufiventris
Pardalotus striatus
Pardalotus striatus subsp. westraliensis
Pelecanus conspicillatus
Petrochelidon nigricans
Petroica goodenovii
Phalacrocorax carbo
Phalacrocorax sulcirostris
Phaps chalcoptera
Phylidonyris albifrons
Platalea flavipes
Platycercus icterotis
Platycercus varius
Platycercus zonarius
Platycercus zonarius subsp. zonarius
Podargus strigoides
Poliocephalus poliocephalus
Pomatostomus superciliosus
Porzana fluminea
Ptilotula plumulus
Purnella albifrons
Pyrrholaemus brunneus
Recurvirostra novaehollandiae
Rhipidura albiscapa
Rhipidura leucophrys
Smicrornis brevirostris
Stictonetta naevosa
Strepera versicolor
Streptopelia senegalensis
Sugomel niger
Tachybaptus novaehollandiae
Tadorna tadornoides
Taeniopygia guttata
Thinornis rubricollis
Todiramphus pyrrhopygia
Todiramphus pyrrhopygius
Tribonyx ventralis
Tringa nebularia
Tyto alba subsp. delicatula
Vanellus tricolor
Zanda latirostris
Zosterops lateralis
FISH
Carassius auratus
MAMMAL
Antechinomys laniger
Camelus dromedarius
Canis lupus subsp. dingo
Capra hircus
Cercartetus concinnus
Chalinolobus gouldii
Chalinolobus morio
Felis catus
Macropus fuliginosus
Macropus robustus subsp. erubescens
Macropus rufus
Macrotis lagotis
Mormopterus planiceps
Mus musculus
Myrmecobius fasciatus
Ningaui ridei
Ningaui yvonneae
Nyctophilus geoffroyi
Oryctolagus cuniculus
Ovis aries
Pseudantechinus woolleyae
Pseudomys albocinereus
Pseudomys bolami
Pseudomys hermannsburgensis
Scotorepens balstoni
Sminthopsis crassicaudata
Sminthopsis dolichura
Sminthopsis gilberti
Sminthopsis ooldea
Sminthopsis sp.
Tachyglossus aculeatus

Tadarida australis
Taphozous hilli
Vespadelus baverstocki
Vespadelus finlaysoni
Vespadelus regulus
Vulpes vulpes
REPTILE
Acanthophis pyrrhus
Anilios bicolor
Anilios bituberculatus
Brachyurophis fasciolata
Brachyurophis fasciolatus subsp. fasciolatus
Brachyurophis semifasciatus
Caimanops amphiboluroides
Chelodina colliei
Cryptoblepharus buchananii
Cryptoblepharus plagiocephalus
Ctenophorus cristatus
Ctenophorus fordi
Ctenophorus reticulatus
Ctenophorus salinarum
Ctenophorus scutulatus
Ctenotus atlas
Ctenotus leonhardii
Ctenotus pantherinus subsp. ocellifer
Ctenotus schomburgkii
Ctenotus uber
Ctenotus uber subsp. uber
Cyclodomorphus melanops subsp. elongatus
Delma australis
Delma butleri
Demansia psammophis
Demansia psammophis subsp. psammophis
Diplodactylus granariensis
Diplodactylus granariensis subsp. granariensis
Diplodactylus maini
Diplodactylus pulcher
Egernia depressa
Egernia formosa
Eremiascincus richardsonii
Furina ornata
Gehyra purpurascens
Gehyra variegata
Hemidactylus frenatus
Hemiergis initialis subsp. initialis
Hesperoedura reticulata
Heteronotia binoei
Lerista kingi
Lerista kingi subsp.

Lerista picturata
Lerista sp.
Lerista stictopleura
Lerista timida
Lialis burtonis
Liopholis inornata
Liopholis striata
Lucasium maini
Menetia greyii
Moloch horridus
Morelia spilota subsp. imbricata
Morethia adelaidensis
Morethia butleri
Neelaps bimaculatus
Nephrurus laevissimus
Nephrurus milii
Nephrurus vertebralis
Oedura reticulata
Parasuta gouldii
Parasuta monachus
Pogona minor subsp. minor
Pseudechis australis
Pseudonaja mengdeni
Pseudonaja modesta
Pseudonaja nuchalis
Pygopus lepidopodus
Pygopus nigriceps
Ramphotyphlops australis
Ramphotyphlops bicolor
Ramphotyphlops bituberculatus
Ramphotyphlops hamatus
Ramphotyphlops waitii
Rhynchoedura ornata
Simoselaps bertholdi
Simoselaps semifasciata
Strophurus assimilis
Strophurus elderi
Strophurus strophurus
Suta fasciata
Tiliqua occipitalis
Tiliqua rugosa
Tiliqua rugosa subsp. aspera
Tiliqua rugosa subsp. rugosa
Tympanocryptis cephalus
Underwoodisaurus milii
Varanus caudolineatus
Varanus gouldii
Varanus tristis
Varanus tristis subsp. tristis

Plantae
DICOT
Abutilon cryptopetalum
Acacia acuminata
Acacia aneura
Acacia aneura group
Acacia burkittii
Acacia collegialis
Acacia colletioides
Acacia coolgardiensis
Acacia duriuscula
Acacia effusifolia
Acacia epedunculata
Acacia eremophila var. eremophila
Acacia erinacea
Acacia hemiteles
Acacia inceana subsp. inceana
Acacia jennerae
Acacia jensenii
Acacia kalgoorliensis
Acacia ligulata
Acacia masliniana
Acacia merrallii
Acacia mulganeura
Acacia murrayana
Acacia nyssophylla
Acacia oswaldii
Acacia oswaldii (Narrow phyllode variant)
Acacia papyrocarpa
Acacia prainii
Acacia quadrimarginea
Acacia ramulosa var. ramulosa
Acacia resinistipulea
Acacia sclerosperma subsp. sclerosperma
Acacia sibirica
Acacia sp.
Acacia sp. Mt Jackson (B. Ryan 176)
Acacia stowardii
Acacia tetragonophylla
Acacia xerophila var. xerophila
Actinobole uliginosum
Aizoon pubescens
Alectryon oleifolius subsp. canescens
Alhagi camelorum
Alhagi maurorum
Allocasuarina eriochlamys subsp. eriochlamys
Allocasuarina helmsii
Allocasuarina spinosissima subsp. Short spine (D.L. Serventy & A.R. Main s.n. 25/8/1960)
Alyxia buxifolia
Alyxia tetanifolia
Amaranthus viridis
Amyema fitzgeraldii
Amyema gibberula var. gibberula
Amyema linophylla subsp. linophylla
Amyema miquelii
Amyema nestor
Amyema preissii
Androcalva aphrix
Angianthus prostratus
Angianthus tomentosus
Arabidella trisecta
Arctotheca calendula
Asclepias curassavica
Asteridea athrixioides
Asteridea chaetopoda
Atriplex acutibractea subsp. karoniensis
Atriplex codonocarpa
Atriplex eardleyae
Atriplex lindleyi subsp. inflata
Atriplex nana
Atriplex nummularia
Atriplex nummularia subsp. spathulata
Atriplex pumilio
Atriplex quadrivalvata var. quadrivalvata
Atriplex sp.
Atriplex stipitata
Atriplex vesicaria
Baeckea elderiana
Beyeria sulcata var. brevipes
Boerhavia coccinea
Bossiaea walkeri
Brachyscome ciliaris
Brachyscome iberidifolia
Brachyscome lineariloba
Brachyscome perpusilla
Brassica tournefortii
Brunonia australis
Buglossoides arvensis
Calandrinia eremaea
Calandrinia polyandra
Calandrinia quartzitica
Calandrinia translucens
Calotis breviradiata
Calotis hispidula
Calotis multicaulis
Calotis sp.
Calytrix watsonii
Capsella bursa-pastoris

Carrichtera annua
Carthamus lanatus
Cassia artemisioides subsp. filifolia
Casuarina obesa
Casuarina pauper
Centaurea melitensis
Centipeda pleiocephala
Cephalipterum drummondii
Chenopodium murale
Chenopodium nitrariaceum
Chorizema racemosum
Chrysocephalum puteale
Cichorium intybus
Comesperma scoparium
Comesperma volubile
Commersonia craurophylla
Convolvulus remotus
Conyza bonariensis
Coopernookia strophiolata
Cotula australis
Craspedia haplorrhiza
Cratystylis conocephala
Cratystylis microphylla
Cratystylis subspinescens
Crenidium spinescens
Cryptandra aridicola
Cryptandra connata
Cucumis myriocarpus subsp. myriocarpus
Cullen leucanthum
Cyathostemon verrucosus
Cylindropuntia fulgida var. mamillata
Cylindropuntia imbricata
Cylindropuntia kleiniae
Dampiera eriocephala
Dampiera latealata
Dampiera luteiflora
Dampiera stenostachya
Datura ferox
Datura inoxia
Daucus glochidiatus
Dicrastylis flexuosa
Dillwynia sp.
Dillwynia sp. Coolgardie (V.E. Sands 637.3.1)
Disphyma crassifolium subsp. clavellatum
Dodonaea adenophora
Dodonaea lobulata
Dodonaea rigida
Dodonaea stenozyga
Dodonaea viscosa subsp. angustissima

Duma florulenta
Dysphania cristata
Dysphania kalpari
Dysphania pumilio
Echium plantagineum
Einadia nutans subsp. eremaea
Elachanthus pusillus
Enchylaena tomentosa var. tomentosa
Eremophila alternifolia
Eremophila caerulea subsp. caerulea
Eremophila caperata
Eremophila clarkei
Eremophila decipiens
Eremophila decipiens subsp. decipiens
Eremophila dempsteri
Eremophila deserti
Eremophila eriocalyx
Eremophila gibbosa
Eremophila gibsonii
Eremophila glabra subsp. glabra
Eremophila granitica
Eremophila interstans subsp. interstans
Eremophila interstans subsp. virgata
Eremophila ionantha
Eremophila ionantha x scoparia
Eremophila longifolia
Eremophila maculata subsp. brevifolia
Eremophila miniata
Eremophila oblonga
Eremophila oldfieldii subsp. angustifolia
Eremophila oppositifolia subsp. angustifolia
Eremophila pantonii
Eremophila parvifolia subsp. auricampa
Eremophila parvifolia x scoparia
Eremophila platythamnos subsp. platythamnos
Eremophila praecox
Eremophila pustulata
Eremophila scoparia
Eremophila serrulata
Eremophila sp.
Eremophila sp. Mt Jackson (G.J. Keighery 4372)
Eremophila weldii
Eriochiton sclerolaenoides
Erodiophyllum acanthocephalum
Erodium aureum
Erodium cicutarium
Erodium cygnorum
Erymophyllum ramosum

Erymophyllum ramosum subsp. ramosum
Erythrostemon gilliesii
Eucalyptus calycogona subsp. calycogona
Eucalyptus campaspe
Eucalyptus celastroides
Eucalyptus celastroides subsp. celastroides
Eucalyptus clelandiorum
Eucalyptus comitae-vallis
Eucalyptus concinna
Eucalyptus cylindrocarpa subsp. semilaevis
Eucalyptus ebbanoensis subsp. ebbanoensis
Eucalyptus ebbanoensis subsp. glauciramula
Eucalyptus eremicola
Eucalyptus flavida
Eucalyptus griffithsii
Eucalyptus horistes
Eucalyptus hypolaena
Eucalyptus incrassata
Eucalyptus jutsonii subsp. jutsonii
Eucalyptus leptopoda subsp. subluta
Eucalyptus lesouefii
Eucalyptus longissima
Eucalyptus loxophleba subsp. lissophloia
Eucalyptus moderata
Eucalyptus oldfieldii
Eucalyptus oleosa
Eucalyptus oleosa subsp. oleosa
Eucalyptus oleosa var. obtusa
Eucalyptus petraea
Eucalyptus ravida
Eucalyptus rigidula
Eucalyptus salmonophloia
Eucalyptus salubris
Eucalyptus sp. Mulga Rock (K.D. Hill & L.A.S. Johnson KH 2668)
Eucalyptus transcontinentalis
Eucalyptus trichopoda
Eucalyptus x brachyphylla
Eucalyptus yilgarnensis
Euphorbia multifaria
Euphorbia philochalix
Euphorbia porcata
Euryomyrtus maidenii
Exocarpos aphyllus
Frankenia cinerea
Frankenia glomerata
Frankenia interioris
Frankenia interioris var. interioris
Frankenia laxiflora
Frankenia pauciflora var. pauciflora

Frankenia setosa
Frankenia sp.
Frankenia tetrapetala
Gazania linearis
Glischrocaryon aureum
Glycyrrhiza acanthocarpa
Gnephosis macrocephala
Gnephosis tenuissima
Goodenia dyeri
Goodenia elderi
Goodenia havilandii
Goodenia mimuloides
Goodenia occidentalis
Goodenia pusilliflora
Grevillea acuaria
Grevillea juncifolia subsp. temulenta
Grevillea nematophylla subsp. nematophylla
Grevillea nematophylla subsp. supraplana
Grevillea oligomera
Grevillea pterosperma
Grevillea sarissa subsp. bicolor
Grevillea sarissa subsp. sarissa
Gunniopsis propinqua
Gunniopsis quadrifida
Hakea francisiana
Halgania andromedifolia
Halgania cyanea var. Allambi Stn (B.W. Strong 676)
Haloragis maierae
Haloragis trigonocarpa
Halosarcia chartacea
Hannafordia bissillii subsp. latifolia
Helianthus annuus
Heliotropium curassavicum
Helipterum craspedioides
Hemiphora elderi
Hibbertia ancistrophylla
Hibbertia pungens
Homalocalyx thryptomenoides
Hovea acanthoclada
Hyalosperma glutinosum subsp. glutinosum
Hybanthus floribundus subsp. curvifolius
Ipomoea calobra
Isoetopsis graminifolia
Isotoma petraea
Ixiochlamys nana
Kippistia suaedifolia
Lachnostachys coolgardiensis
Lactuca serriola forma serriola
Lawrencella rosea

Lawrencia glomerata
Lawrencia helmsii
Lawrencia repens
Lawrencia squamata
Lechenaultia brevifolia
Leiocarpa semicalva subsp. semicalva
Leiocarpa websteri
Lemooria burkittii
Lepidium fasciculatum
Lepidium phlebopetalum
Lepidium platypetalum
Lotus cruentus
Lycium australe
Lycium ferocissimum
Lysiana casuarinae
Lysimachia arvensis
Maireana amoena
Maireana appressa
Maireana atkinsiana
Maireana brevifolia
Maireana carnosa
Maireana erioclada
Maireana georgei
Maireana glomerifolia
Maireana integra
Maireana lanosa
Maireana pentatropis
Maireana pyramidata
Maireana sedifolia
Maireana sp.
Maireana suaedifolia
Maireana tomentosa subsp. tomentosa
Maireana trichoptera
Maireana triptera
Maireana turbinata
Malacocera tricornis
Malleostemon tuberculatus
Malva parviflora
Marsdenia australis
Medicago laciniata
Medicago minima
Medicago polymorpha
Melaleuca fulgens subsp. fulgens
Melaleuca halmaturorum
Melaleuca halmaturorum subsp. cymbifolia
Melaleuca lateriflora
Melaleuca phoidophylla
Melaleuca sheathiana
Melaleuca subalaris

Melaleuca zeteticorum
Melia azedarach
Millotia myosotidifolia
Millotia perpusilla
Minuria cunninghamii
Minuria gardneri
Minuria leptophylla
Monotaxis luteiflora
Myoporum montanum
Myosurus australis
Myriophyllum decussatum
Nicotiana glauca
Nicotiana occidentalis subsp. obliqua
Nicotiana rotundifolia
Nicotiana simulans
Nitraria billardierei
Notisia intonsa
Olearia exiguifolia
Olearia muelleri
Olearia pimeleoides
Olearia subspicata
Oligocarpus calendulaceus
Oligocarpus sp.
Omphalolappula concava
Oncosiphon suffruticosum
Opuntia elata
Opuntia ficus-indica
Opuntia sp.
Oxalis bowiei
Oxalis pes-caprae
Oxalis sp.
Peplidium sp.
Phebalium canaliculatum
Philotheca brucei subsp. brucei
Philotheca tomentella
Phyla canescens
Physopsis viscida
Pimelea angustifolia
Pimelea microcephala subsp. microcephala
Pittosporum angustifolium
Plantago drummondii
Plantago sp. Mt Magnet (A.S. George 6793)
Podolepis aristata subsp. affinis
Podolepis capillaris
Pogonolepis muelleriana
Pogonolepis stricta
Polygonum aviculare
Pomaderris forrestiana
Prostanthera althoferi subsp. althoferi

Prostanthera campbellii
Prostanthera grylloana
Ptilotus aervoides
Ptilotus carlsonii
Ptilotus chortophytus
Ptilotus drummondii
Ptilotus exaltatus
Ptilotus helichrysoides
Ptilotus helipteroides
Ptilotus holosericeus
Ptilotus obovatus
Ptilotus polystachyus
Ptilotus rigidus
Ranunculus pentandrus var. platycarpus
Ranunculus sp.
Rhagodia drummondii
Rhagodia sp.
Rhodanthe charsleyae
Rhodanthe chlorocephala subsp. rosea
Rhodanthe chlorocephala subsp. splendida
Rhodanthe floribunda
Rhodanthe haigii
Rhodanthe nullarborensis
Rhodanthe oppositifolia subsp. oppositifolia
Rhodanthe pygmaea
Rhodanthe rubella
Rhodanthe stricta
Rhodanthe uniflora
Ricinocarpos sp. Eastern Goldfields (A. Williams 3)
Roepera aurantiaca subsp. aurantiaca
Roepera eremaea
Roepera glauca
Roepera ovata
Roepera tetraptera
Roycea divaricata
Salsola australis
Salvia reflexa
Salvia verbenaca
Salvia verbenaca (cleistogamous form)
Salvia verbenaca (typical form)
Santalum acuminatum
Santalum lanceolatum
Santalum spicatum
Scaevola spinescens
Schenkia clementii
Schinus molle var. areira
Schoenia cassiniana
Sclerolaena diacantha
Sclerolaena drummondii

Sclerolaena eriacantha
Sclerolaena fusiformis
Sclerolaena gardneri
Sclerolaena obliquicuspis
Senecio dolichocephalus
Senecio glossanthus
Senecio lacustrinus
Senecio magnificus
Senecio pinnatifolius
Senna artemisioides
Senna artemisioides subsp. filifolia
Senna cardiosperma
Senna pleurocarpa
Senna pleurocarpa var. angustifolia
Senna stowardii
Seringia velutina
Sida fibulifera
Sisymbrium irio
Sisymbrium orientale
Solanum cleistogamum
Solanum esuriale
Solanum hoplopetalum
Solanum lasiophyllum
Solanum nigrum
Solanum nummularium
Solanum orbiculatum
Solanum orbiculatum subsp. orbiculatum
Solanum petrophilum
Solanum plicatile
Solanum terraneum
Sonchus oleraceus
Spergularia diandra
Stackhousia muricata subsp. annual (W.R. Barker 2172)
Stackhousia sp. Mt Keith (G. Cockerton & G. O'Keefe 11017)
Streptoglossa cylindriceps
Streptoglossa liatroides
Swainsona canescens
Swainsona gracilis
Swainsona halophila
Swainsona incei
Swainsona kingii
Swainsona leeana
Swainsona paradoxa
Swainsona purpurea
Swainsona rostellata
Tamarix chinensis
Tecticornia chartacea
Tecticornia disarticulata

Tecticornia doliiformis
Tecticornia halocnemoides
Tecticornia indica subsp. bidens
Tecticornia pergranulata subsp. elongata
Tecticornia pergranulata subsp. pergranulata
Tecticornia sp. Burnerbinmah (D. Edinger et al. 101)
Tecticornia sp. Dennys Crossing (K.A. Shepherd & J. English KS 552)
Tecticornia triandra
Tecticornia undulata
Templetonia incrassata
Tetragonia eremaea
Teucrium disjunctum
Teucrium sessiliflorum
Thryptomene urceolaris
Tribulus terrestris
Trichanthodium skirrophorum
Trymalium myrtillus subsp. myrtillus
Urtica urens
Velleia cycnopotamica
Velleia rosea
Verticordia chrysantha
Vincetoxicum lineare
Vittadinia cervicularis var. cervicularis
Vittadinia eremaea
Vittadinia humerata
Vittadinia sp.
Vittadinia sulcata
Wahlenbergia tumidifructa
Waitzia acuminata var. acuminata
Waitzia fitzgibbonii
Waitzia nitida
Westringia cephalantha
Westringia cephalantha var. cephalantha
Westringia rigida
Xanthium spinosum
Zygophyllum apiculatum
Zygophyllum aurantiacum
Zygophyllum compressum
Zygophyllum eremaeum
Zygophyllum fruticulosum
Zygophyllum glaucum
Zygophyllum ovatum
Zygophyllum reticulatum
FERN
Cheilanthes lasiophylla
Isoetes muelleri
Marsilea drummondii
GYMNO

Callitris columellaris
Callitris columellaris x preissii
Callitris preissii
Callitris sp.
LIVERWORT
Riccia bifurca
Riccia limbata
MONOCOT
Agave americana
Aristida contorta
Arthropodium sp. Goldfields (H. Pringle 2188)
Austrostipa elegantissima
Austrostipa nitida
Austrostipa platychaeta
Austrostipa scabra
Bromus arenarius
Bromus catharticus
Bulbine semibarbata
Caladenia footeana
Caladenia nobilis
Caladenia roei
Cenchrus ciliaris
Chrysitrix distigmatosa
Conostylis lepidospermoides
Dactyloctenium radulans
Dichanthium sericeum subsp. humilius
Dichanthium sericeum subsp. sericeum
Digitaria ammophila
Digitaria brownii
Ehrharta villosa
Eleocharis acuta
Eleocharis papillosa
Eleocharis sp.
Elymus scaber
Enneapogon avenaceus
Enneapogon caerulescens
Enneapogon cylindricus
Enteropogon acicularis
Enteropogon ramosus
Eragrostis australasica
Eragrostis dielsii
Eragrostis falcata
Eragrostis setifolia
Eragrostis xerophila
Eriachne flaccida
Fimbristylis dichotoma
Gahnia deusta
Hordeum leporinum
Lachnagrostis filiformis

Panicum decompositum
Paspalidium constrictum
Paspalidium reflexum
Pennisetum villosum
Pterostylis sp. inland (A.C. Beauglehole 11880)
Ruppia polycarpa
Rytidosperma caespitosum
Schismus arabicus
Schismus barbatus
Setaria dielsii
Setaria sp.
Sorghum halepense
Thysanotus manglesianus
Thysanotus patersonii
Triodia scariosa
Xanthorrhoea thorntonii

APPENDIX C: LIST OF SPECIES IDENTIFIED WITHIN THE SURVEY AREA

(W) denotes introduced (weed) species

Family	Taxon		CLP-EW1	CLP-EW2	DD-EW1
Fabaceae	*Acacia*	*acuminata*	*		
Fabaceae	*Acacia*	*colletioides*		*	
Fabaceae	*Acacia*	*erinacea*	*		
Fabaceae	*Acacia*	*hemiteles*	*	*	*
Fabaceae	*Acacia*	*jennerae*			*
Fabaceae	*Acacia*	*tetragonophylla*		*	*
Sapindaceae	*Alectryon*	*oleifolius*		*	*
Apocynaceae	*Alyxia*	*buxifolia*		*	*
Chenopodiaceae	*Atriplex*	*bunburyana*		*	*
Chenopodiaceae	*Atriplex*	*codonocarpa (A)*	*		
Chenopodiaceae	*Atriplex*	*nummularia* subsp. *spathulata*	*	*	*
Chenopodiaceae	*Atriplex*	*vesicaria*		*	
Poaceae	*Austrostipa*	*elegantissima*	*	*	*
Poaceae	*Austrostipa*	*nitida*	*	*	*
Asteraceae	*Carthamus*	*lanatus* (W)			*
Casuarinaceae	*Casuarina*	*pauper*	*	*	*
Asteraceae	*Cratystylis*	*conocephala*	*		
Asteraceae	*Cratystylis*	*subspinescens*	*		
Apiaceae	*Daucus*	*glochidiatus* (A)			*
Asteraceae	*Dittrichia*	*graveolens (W)*		*	*
Sapindaceae	*Dodonaea*	*lobulata*		*	
Chenopodiaceae	*Enchylaena*	*tomentosa*		*	*
Poaceae	*Enneapogon*	*caerulescens*			*
Scrophulariaceae	*Eremophila*	*alternifolia*	*		
Scrophulariaceae	*Eremophila*	*decipiens*	*		
Scrophulariaceae	*Eremophila*	*glabra*		*	
Scrophulariaceae	*Eremophila*	*interstans* subsp. *interstans*		*	*
Scrophulariaceae	*Eremophila*	*ionantha*		*	*
Scrophulariaceae	*Eremophila*	*oldfieldii* subsp. *angustifolia*	*	*	*
Scrophulariaceae	*Eremophila*	*parvifolia subsp. auricampi*	*		
Scrophulariaceae	*Eremophila*	*scoparia*	*		
Scrophulariaceae	*Eremophila*	*sp.* Mt Jackson (G.J. Keighery 4372)	*		
Myrtaceae	*Eucalyptus*	*celastroides*	*	*	*
Myrtaceae	*Eucalyptus*	*clelandiorum*		*	*
Myrtaceae	*Eucalyptus*	*griffithsii*	*		
Myrtaceae	*Eucalyptus*	*lesouefii*		*	
Myrtaceae	*Eucalyptus*	*oleosa*	*		
Myrtaceae	*Eucalyptus*	*ravida*	*		
Myrtaceae	*Eucalyptus*	*salmonophloia*	*	*	*
Myrtaceae	*Eucalyptus*	*salubris*		*	*
Myrtaceae	*Eucalyptus*	*transcontinentalis*	*	*	*
Myrtaceae	*Eucalyptus*	*yilgarnensis*	*		
Santalaceae	*Exocarpos*	*aphyllus*	*	*	*
Boraginaceae	*Halgania*	*andromedifolia*	*	*	*
Apocynaceae	*Leichhardtia*	*australis*	*		
Asteraceae	*Lemooria*	*burkittii (A)*			*
Solanaceae	*Lycium*	*australe*	*		
Chenopodiaceae	*Maireana*	*georgei*		*	*
Chenopodiaceae	*Maireana*	*glomerifolia*			*

Family	Taxon		CLP-EW1	CLP-EW2	DD-EW1
Chenopodiaceae	*Maireana*	*oppositifolia*	*		
Chenopodiaceae	*Maireana*	*pentatropis*	*		
Chenopodiaceae	*Maireana*	*pyramidata*		*	*
Chenopodiaceae	*Maireana*	*sedifolia*	*	*	*
Chenopodiaceae	*Maireana*	*trichoptera*	*	*	
Chenopodiaceae	*Maireana*	*triptera*		*	*
Asteraceae	*Olearia*	*muelleri*	*	*	*
Pittosporaceae	*Pittosporum*	*angustifolium*	*		
Amaranthaceae	*Ptilotus*	*exaltatus (A)*	*		
Amaranthaceae	*Ptilotus*	*obovatus*	*	*	*
Amaranthaceae	*Ptilotus*	*helichrysoides*		*	
Chenopodiaceae	*Rhagodia*	*drummondii*			*
Zygophyllaceae	*Roepera*	*eremaeum (A)*	*		
Lamiaceae	*Salvia*	*verbenaca (W)*		*	*
Santalaceae	*Santalum*	*acuminatum*		*	*
Goodeniaceae	*Scaevola*	*spinescens*	*		
Chenopodiaceae	*Sclerolaena*	*diacantha*		*	*
Chenopodiaceae	*Sclerolaena*	*drummondii*	*		
Chenopodiaceae	*Sclerolaena*	*parviflora*		*	*
Fabaceae	*Senna*	*artemisioides* subsp. *filifolia*		*	*
Fabaceae	*Senna*	*artemisioides* subsp. *artemisioides*			
Malvaceae	*Sida*	sp. Golden calyces glabrous (H.N. Foote 32)	*		
Malvaceae	*Sida*	*calyxhymenia*	*		
Solanaceae	Solanum	*hoplopetalum*		*	*
Solanaceae	*Solanum*	*lasiophyllum*	*		
Solanaceae	*Solanum*	*nummularium*		*	*
Fabaceae	*Swainsona*	*canescens*		*	*
Chenopodiaceae	*Tecticornia*	*disarticulata*		*	
Fabaceae	*Templetonia*	*egena*		*	

APPENDIX D: VEGETATION CONDITION RATING

Vegetation Condition Rating	Southwest and Interzone Botanical Provinces	Eremaean and Northern Botanical Provinces
Pristine	Pristine or nearly so, no obvious signs of disturbance or damage caused by human activities since European settlement.	
Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species. Damage to trees caused by fire, the presence of non-aggressive weeds and occasional vehicle tracks.	Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement.
Very Good	Vegetation structure altered, obvious signs of disturbance. Disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.	Some relatively slight signs of damage caused by human activities since European settlement. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds, or occasional vehicle tracks.
Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.	More obvious signs of damage caused by human activity since European settlement, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or slightly aggressive weeds.
Poor		Still retains basic vegetation structure or ability to regenerate it after very obvious impacts of human activities since European settlement, such as grazing, partial clearing, frequent fires or aggressive weeds.
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds at high density, partial clearing, dieback and grazing.	Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management. Usually with a number of weed species present including very aggressive species.
Completely Degraded	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees and shrubs.	Areas that are completely or almost completely without native species in the structure of their vegetation; i.e., areas that are cleared or ‘parkland cleared’ with their flora comprising weed or crop species with isolated native trees or shrubs.

APPENDIX E: EPBC PROTECTED MATTERS SEARCH (40KM BUFFER)

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 27-Nov-2024

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	1
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	12
Listed Migratory Species:	7

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	78
Commonwealth Heritage Places:	None
Listed Marine Species:	11
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	6
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	5
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

National Heritage Places			[Resource Information]
Name	State	Legal Status	Buffer Status
Historic			
Goldfields Water Supply Scheme, Western Australia	WA	Listed place	In buffer area only

Listed Threatened Species			[Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Aphelocephala leucopsis			
Southern Whiteface [529]	Vulnerable	Species or species habitat known to occur within area	In feature area
Calidris acuminata			
Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area	In feature area
Calidris ferruginea			
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Falco hypoleucos			
Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area	In feature area
Leipoa ocellata			
Malleefowl [934]	Vulnerable	Species or species habitat known to occur within area	In feature area
Pezoporus occidentalis			
Night Parrot [59350]	Endangered	Species or species habitat may occur within area	In feature area
Polytelis alexandrae			
Princess Parrot, Alexandra's Parrot [758]	Vulnerable	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Tringa nebularia			
Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area	In buffer area only
INSECT			
Ogyris subterrestris petrina			
Arid Bronze Azure [77743]	Critically Endangered	Species or species habitat may occur within area	In feature area
MAMMAL			
Dasyurus geoffroii			
Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat likely to occur within area	In feature area
PLANT			
Gastrolobium graniticum			
Granite Poison [14872]	Endangered	Species or species habitat may occur within area	In buffer area only
Thelymitra stellata			
Star Sun-orchid [7060]	Endangered	Species or species habitat may occur within area	In buffer area only

Listed Migratory Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Apus pacificus			
Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Migratory Terrestrial Species			
Motacilla cinerea			
Grey Wagtail [642]		Species or species habitat may occur within area	In feature area
Migratory Wetlands Species			
Actitis hypoleucos			
Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Calidris acuminata			
Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris ferruginea			
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Calidris melanotos			
Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area
Tringa nebularia			
Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area	In buffer area only

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land Name	State	Buffer Status
Defence		
Defence - AIRTC KALGOORLIE [50110]	WA	In buffer area only
Defence - AIRTC KALGOORLIE [50111]	WA	In buffer area only
Defence - KALGOORLIE RIFLE RANGE [50156]	WA	In buffer area only
Defence - KALGOORLIE TRAINING DEPOT [50199]	WA	In buffer area only
Defence - KALGOORLIE TRAINING DEPOT [50198]	WA	In buffer area only
Unknown		
Commonwealth Land - [51063]	WA	In buffer area only
Commonwealth Land - [51958]	WA	In buffer area only
Commonwealth Land - [51779]	WA	In buffer area only
Commonwealth Land - [51062]	WA	In buffer area only
Commonwealth Land - [51759]	WA	In buffer area only
Commonwealth Land - [51959]	WA	In buffer area only
Commonwealth Land - [51758]	WA	In buffer area only
Commonwealth Land - [51957]	WA	In buffer area only
Commonwealth Land - [51772]	WA	In buffer area only

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - [51955]	WA	In buffer area only
Commonwealth Land - [51954]	WA	In buffer area only
Commonwealth Land - [51060]	WA	In buffer area only
Commonwealth Land - [51764]	WA	In buffer area only
Commonwealth Land - [51762]	WA	In buffer area only
Commonwealth Land - [50329]	WA	In buffer area only
Commonwealth Land - [51430]	WA	In buffer area only
Commonwealth Land - [51985]	WA	In buffer area only
Commonwealth Land - [51782]	WA	In buffer area only
Commonwealth Land - [51795]	WA	In buffer area only
Commonwealth Land - [51794]	WA	In buffer area only
Commonwealth Land - [51790]	WA	In buffer area only
Commonwealth Land - [51783]	WA	In buffer area only
Commonwealth Land - [51791]	WA	In buffer area only
Commonwealth Land - [51793]	WA	In buffer area only
Commonwealth Land - [51792]	WA	In buffer area only
Commonwealth Land - [51780]	WA	In buffer area only
Commonwealth Land - [51773]	WA	In buffer area only
Commonwealth Land - [51777]	WA	In buffer area only
Commonwealth Land - [51949]	WA	In buffer area only
Commonwealth Land - [51952]	WA	In buffer area only
Commonwealth Land - [51784]	WA	In buffer area only
Commonwealth Land - [51766]	WA	In buffer area only
Commonwealth Land - [51765]	WA	In buffer area only
Commonwealth Land - [51961]	WA	In buffer area only
Commonwealth Land - [52211]	WA	In buffer area only
Commonwealth Land - [52184]	WA	In buffer area only

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - [51763]	WA	In buffer area only
Commonwealth Land - [51960]	WA	In buffer area only
Commonwealth Land - [51963]	WA	In buffer area only
Commonwealth Land - [51760]	WA	In buffer area only
Commonwealth Land - [52230]	WA	In buffer area only
Commonwealth Land - [51950]	WA	In buffer area only
Commonwealth Land - [51761]	WA	In buffer area only
Commonwealth Land - [50331]	WA	In buffer area only
Commonwealth Land - [50332]	WA	In buffer area only
Commonwealth Land - [50337]	WA	In buffer area only
Commonwealth Land - [51769]	WA	In buffer area only
Commonwealth Land - [50336]	WA	In buffer area only
Commonwealth Land - [50335]	WA	In buffer area only
Commonwealth Land - [50334]	WA	In buffer area only
Commonwealth Land - [51770]	WA	In buffer area only
Commonwealth Land - [51956]	WA	In buffer area only
Commonwealth Land - [51061]	WA	In buffer area only
Commonwealth Land - [51785]	WA	In buffer area only
Commonwealth Land - [51781]	WA	In buffer area only
Commonwealth Land - [51786]	WA	In buffer area only
Commonwealth Land - [51787]	WA	In buffer area only
Commonwealth Land - [51788]	WA	In buffer area only
Commonwealth Land - [51059]	WA	In buffer area only
Commonwealth Land - [51962]	WA	In buffer area only
Commonwealth Land - [51789]	WA	In buffer area only
Commonwealth Land - [50310]	WA	In buffer area only
Commonwealth Land - [51778]	WA	In buffer area only

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - [51767]	WA	In buffer area only
Commonwealth Land - [51951]	WA	In buffer area only
Commonwealth Land - [51774]	WA	In buffer area only
Commonwealth Land - [51953]	WA	In buffer area only
Commonwealth Land - [51776]	WA	In buffer area only
Commonwealth Land - [51775]	WA	In buffer area only
Commonwealth Land - [51406]	WA	In buffer area only
Commonwealth Land - [51771]	WA	In buffer area only
Commonwealth Land - [50333]	WA	In buffer area only
Commonwealth Land - [51768]	WA	In buffer area only

Listed Marine Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos			
Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Apus pacificus			
Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Bubulcus ibis as Ardea ibis			
Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
Calidris acuminata			
Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area	In feature area
Calidris ferruginea			
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area	In feature area
[Chalcites osculans as Chrysococcyx osculans](#) Black-eared Cuckoo [83425]		Species or species habitat known to occur within area overfly marine area	In feature area
[Merops ornatus](#) Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
[Motacilla cinerea](#) Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area	In feature area
[Thinornis cucullatus as Thinornis rubricollis](#) Hooded Plover, Hooded Dotterel [87735]		Species or species habitat may occur within area overfly marine area	In feature area
[Tringa nebularia](#) Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area overfly marine area	In buffer area only

Extra Information

State and Territory Reserves			[Resource Information]
Protected Area Name	Reserve Type	State	Buffer Status
Bullock Holes Timber Reserve	5(1)(g) Reserve	WA	In buffer area only
Credo	NRS Addition - Gazettal in Progress	WA	In buffer area only
Goongarrie	National Park	WA	In buffer area only
Kalgoorlie Arboretum	5(1)(h) Reserve	WA	In buffer area only
Kurrawang	Nature Reserve	WA	In buffer area only
Lakeside Timber Reserve	5(1)(g) Reserve	WA	In buffer area only

EPBC Act Referrals				[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Controlled action				
Goldfields Water Supply Scheme Project	2019/8547	Controlled Action	Post-Approval	In buffer area only
Nava-1 Cable System	2001/510	Controlled Action	Completed	In buffer area only
Not controlled action				
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
Lynas Kalgoorlie Rare Earths Processing Facility	2020/8719	Not Controlled Action	Completed	In buffer area only
Sale of Post Office, Hannan Street	2006/3084	Not Controlled Action	Completed	In buffer area only

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data is available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance on the contents of this report.

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions when time permits.

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded breeding sites; and
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact us page.

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Appendix 4 – Targeted fauna survey

Appendix 4A – Targeted Surveys for the Arid Bronze Azure Butterfly and Inland Hairstreak Butterfly

BINDULI, MT JEWELL, RACETRACK, ROSE DAM SOUTH, SOLAR FARM AND WATTLEBIRD

Targeted Surveys for the Arid Bronze Azure Butterfly and Inland Hairstreak Butterfly

Prepared for Norton Gold Fields Pty Ltd.
December 2025

Prepared by
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Date: 04 December 2025
Version: Final

Disclaimer

Quality Assurance

An internal quality review process has been implemented to each project task undertaken by BC. Each document and its contents is carefully reviewed by core members of the Consultancy team and signed off at Director Level prior to issue to the client. Draft documents are submitted to the client for comment and acceptance prior to final production.

Cover Photo: Eucalypt Woodland within the survey area – 16th September 2025

Prepared by: Jennifer Jackson
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Botanica Consulting

Approved by: Jim Williams
Director
Botanica Consulting

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1 INTRODUCTION

Botanica Consulting Pty Ltd (Botanica) was commissioned by Norton Gold Fields Pty Ltd (Norton) to undertake a targeted field survey of seven areas within the Paddington Gold operation centre and the Binduli Gold mining operation centre (referred to as the 'survey area') (Figure 1-1). The purpose of the survey was to assess for the presence of suitable habitat of two conservation significant butterfly species, the Arid Bronze Azure Butterfly (*Ogyris subterrestris petrina*) and the Inland Hairstreak (*Jalmenus aridus*), within these survey areas. If suitable habitat was identified, then surveys for the butterfly would be done in accordance with recommended guidelines.

The Paddington Gold operation centre is located approximately 35 km northwest of Kalgoorlie-Boulder, the Binduli Gold mining operation centre is approximately 10 km west of Kalgoorlie-Boulder, Western Australia.

The survey will support Norton's application(s) for a Native Vegetation Clearing Permit (NVCP).

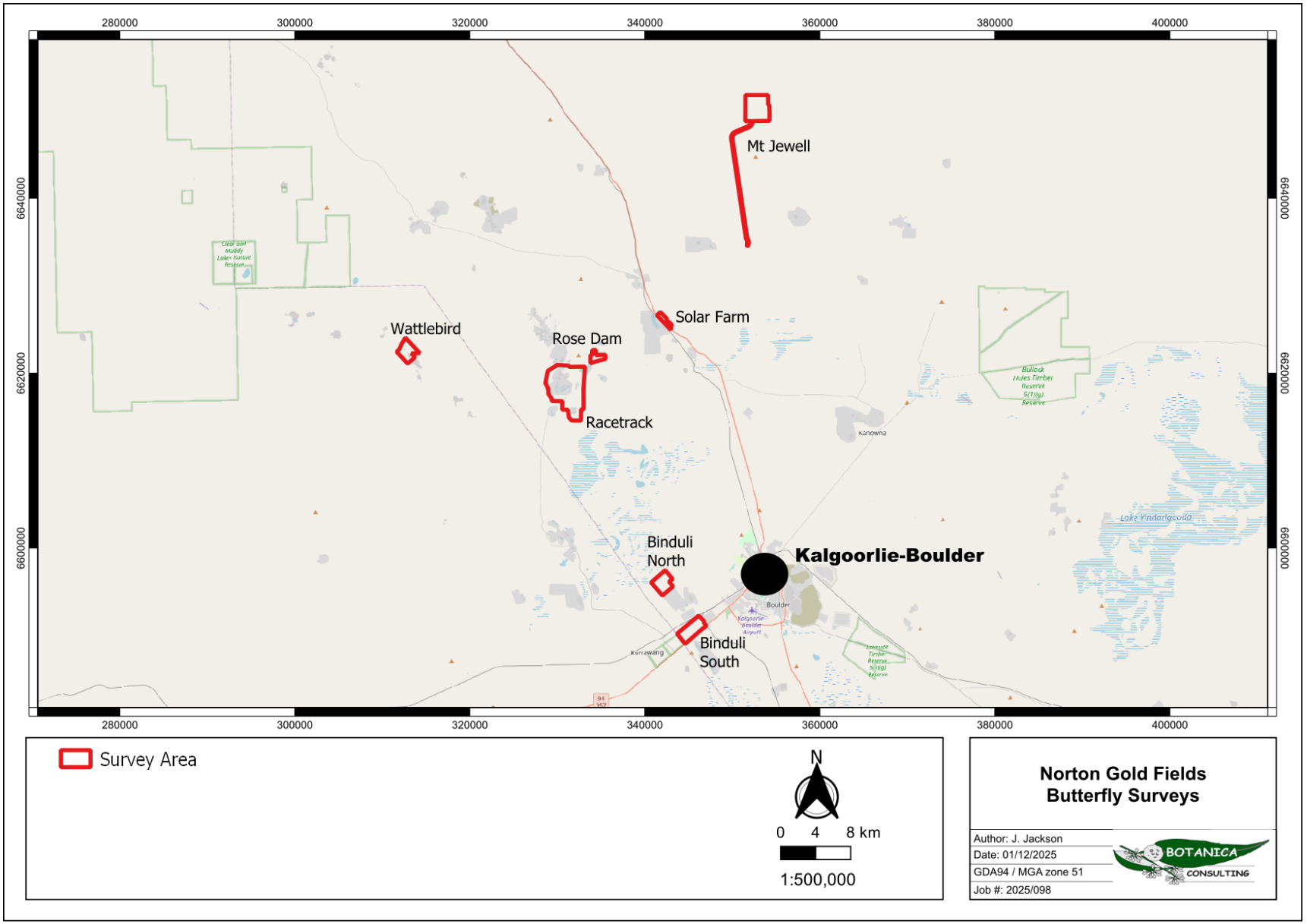

Figure 1-1: Regional location of the survey area

2 BUTTERFLY AND HOST ANT OVERVIEW

2.1 Arid Bronze Azure Butterfly

The Arid Bronze Azure Butterfly (ABAB) (*Ogyris subterrestris petrina*) is a threatened species that is listed as Critically Endangered under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 and the WA Biodiversity Conservation Act 2016. The ABAB is listed due to its severely fragmented distribution with only four (4) extant subpopulations being recorded in WA. Two subpopulations are in the Wheatbelt at Barbalin Nature Reserve west of Mukinbudin and at a second site ~100 km from Barbalin. Two subpopulations are known in the Goldfields Region within 100 km north of Kalgoorlie. The type locality of ABAB (first discovered in the 1980s) near Lake Douglas, 12 km southwest of Kalgoorlie is now locally extinct and no ABAB have been recorded there since 1993 (DBCA, 2020a). Due to the sensitive nature of these records, the locations and reference details are withheld.

The ABAB has an obligate association with a sugar ant *Camponotus* sp. nr. *terebrans*. The ABAB's larvae live entirely within the ant's nest during their development, where they predate on the ants' brood (myrmecophagous) or steal food from the ants (kleptoparasite). The most critical factor for habitat occupancy by the butterfly is the presence of large colonies of the host ant; only large colonies can support the ABAB because, being a parasitic species, it requires large numbers of hosts.

Camponotus sp. nr. *terebrans*, also known as the pale form of *C. terebrans*, is relatively distinctive in that it has a brown head with an orange thorax and gaster, although there is some colour variation. The ant is approximately 8mm long with some size variation between minor workers (smaller) and major workers (larger) (Harewood, 2020). *Camponotus* sp. nr. *terebrans* is one of the most common ants in sandy soils of southern Australia and is one of the first ant species to colonise disturbed sites (McArthur *et al.,* 1997).

ABAB and their host ants are known to prefer open eucalypt woodlands dominated by smooth barked eucalypts including *Eucalyptus salubris* (Gimlet), *E. salmonophloia* (Salmon Gum), *E. capillosa* (Wheatbelt Wandoo), and *E. loxophleba* (York Gum). Eucalypts of all ages are utilised by the ants as well as trees with rough bark; and in dense ant colonies, overflow nests may be found under shrubs and even old stumps or in windrows. The ABAB butterflies and ants also require a mixed understorey of flowering shrubs such as *Eremophila, Cratystylis, Senna,* and *Scaevola*, etc. The habitat at the locally extinct Lake Douglas site differs from the other sites but is also dominated by mature smooth-barked eucalypt woodland, particularly *E. concinna* (Victoria Desert Mallee) (DBCA, 2020a).

2.2 Inland Hairstreak

The Inland Hairstreak, (*Jalmenus aridus*) is a Priority 2 listed butterfly under the WA Biodiversity Conservation Act 2016. *Jalmenus aridus* was previously only known from its type locality near Lake Douglas, but recent surveys have found numerous more populations (Eastwood *et al,* 2023). Eastwood *et al* (2023) summarised their preferred habitat as open woodland with mature *Senna artemisioides* ssp. *filifolia* as well as mixed flowering shrubs with open areas of well drained exposed ground adjoining the hostplants. The ant *Froggattella kirbii* must be present.

3 BACKGROUND INFORMATION

The survey areas range from approximately 10 km southwest of Kalgoorlie-Boulder to approximately 55 km north of Kalgoorlie-Boulder, Western Australia on mining tenements held by Norton.

The survey areas lie across two IBRA subregions, the Eastern Goldfields (COO03) subregion of the Coolgardie Bioregion, and the Eastern Murchison (MUR01) subregion of the Murchison Bioregion as defined by the Interim Biogeographic Regionalisation of Australia (IBRA).

A survey by Botanica in September 2022 at the Binduli North survey area found a nest of the ABAB host ant (Botanica, 2022). No evidence of these host ants has been found during any of the other surveys done for Norton.

Table 3-1 presents the size of each survey area, the IBRA subregion that each survey area is located in and the associated flora/fauna report for each area surveyed.

Table 3-1: Details of Survey areas and Associated Flora/Fauna report

Survey Area	Area size (ha)	IBRA subregion	Associated Flora/Fauna report
Binduli North	385	Eastern Goldfields (COO03)	Botanica (2022). *Binduli North Operations: Reconnaissance Flora/Vegetation and Basic Fauna Assessment.* Unpublished report prepared for Norton Gold Fields, November 2022.
Binduli South	475	Eastern Goldfields (COO03)	*Botanica (2025 in prep). Binduli South: Reconnaissance Flora and Basic Fauna Survey.* Unpublished report prepared for Norton Gold Fields, in prep.
Mt Jewell	707	Eastern Murchison (MUR01)	Botanica (2024). *Mt Jewell Project: Detailed Flora/Vegetation Survey and Basic Fauna Assessment.* Unpublished report prepared for Norton Gold Fields, April 2024.
Racetrack	2038	Eastern Goldfields (COO03)	Botanica (2025 draft). *Racetrack Project: Detailed Flora/Vegetation Survey and Basic Fauna Survey.* Unpublished report prepared for Norton Gold Fields, November 2025.
Rose Dam	143	Eastern Goldfields (COO03)	Botanica (2020). *Rose Dam North: Reconnaissance Flora/Vegetation and Fauna Survey.* Unpublished report prepared for Norton Gold Fields, August 2020.
Solar Farm	106	Eastern Murchison (MUR01)	Botanica (2024). *Paddington Solar Farm Project: Reconnaissance Flora and Basic Fauna Assessment.* Unpublished report prepared for Norton Gold Fields, December 2024.
Wattlebird	360	Eastern Goldfields (COO03)	Botanica (2025). *Wattlebird Project: Reconnaissance Flora and Basic Fauna Survey.* Unpublished report prepared for Norton Gold Fields, August 2025.

4 FIELD ASSESSMENT

The targeted surveys were conducted in September, October and November 2025.

The targeted butterfly and ant surveys were led by Dr Rod Eastwood who has considerable experience with *Camponotus* sp. nr. *terebrans* and the adult ABAB butterflies. He has published extensively on the associations between butterflies and ants and is responsible for finding at least 30 new C. sp. nr. *terebrans* colonies in the Goldfields since 2021. Rod has also located numerous new breeding sites for *Jalmenus aridus* within a nominal 100 km radius from Kalgoorlie and at the present time there are now 33 known subpopulations of *J. aridus*. These are spread over an area measuring 172 km north to south and 180 km east to west, with an Extent of Occurrence (EOO) measuring 18,475 km2 (pers. comm. R. Eastwood 2025). He continues to provide advice to DBCA personnel and other consultants and is currently in negotiations with DBCA to help rewrite the ABAB survey guidelines. His Fauna-collecting Licence details are provided in Table 4-1.

Four Botanica staff assisted with the surveys.

Table 4-1: Scientific Licenses of Staff coordinating the survey

Licensed Staff	Permit Number	Date of Expiry
Jennifer Jackson	BA27001384 Fauna Taking (Biological Assessment) Licence	11/09/2026
Rod Eastwood	FO25000722 Fauna Taking (Biological Assessment) Licence	30/12/2028
Rod Eastwood	TFA-2526-0102 (Section 40 Authorisation to take or Disturb Threatened Species)	31/12/2028

4.1 Methods

4.1.1 Arid Bronze Azure Butterfly

The DBCA has published the following ABAB survey guidelines which outline the recommended survey techniques to determine the presence of the host ant:

- Guid*eline for the survey of arid bronze azure butterfly (ABAB) in Western Australia* (DBCA, 2020a).
- *Arid bronze azure butterfly survey guideline - additional information* (DBCA, 2020b).

The host ant colonies occur at the base of their nesting trees, and the nests have very distinctive features including the unique entrance holes. To determine if the host ant is present at a site, and in what numbers, we deviated from the DBCA published ABAB Survey Guidelines (DBCA, 2020b) by checking most trees in areas of suitable habitat rather than just one tree at each transect spacing point.

If a survey area was found to have a large colony of the host ant, then follow up surveys for the ABAB would then be done. These surveys should:

- only be done in fine weather with a forecast maximum temperature ≥ 23° C,
- Be done during the main flight period, between mid-September and late October,
- Follow a transect that samples the area around where the host ant was recorded in the ant survey and especially any roads or tracks adjacent to the ant colonies, and
- Consist of three repeat surveys at (at least) 2-week intervals.

4.1.2 Inland Hairstreak

Little is known about this butterfly, and no survey guidelines have been presented by DBCA for this butterfly. The Eastwood *et al* (2023) paper was used for guidance when searching for the *Jalmenus aridus.* Suitable habitat for the Inland Hairstreak is associated with known host plants of the attendant ant *Froggattella kirbii*, which are mature *Acacia tetragonophylla* and mature *Senna artemisioides* subsp. *filifolia*. The attendant ant *Froggattella kirbii,* must be present.

If a survey area was found to have suitable habitat and/or a colony of the attendant ant, then follow up surveys for the Inland Hairstreak would then be done. Surveys for *J. aridus* should be done In October when adult butterflies are flying.

5 RESULTS

5.1 Binduli North

A survey by Botanica in September 2022 found a nest of the ABAB host ant at the Binduli North survey area (Botanica, 2022).

This site was visited four times by Botanica in Spring 2025. In early October Kalgoorlie received 66 mm of rain and access to the site was not possible until late October.

On the 12th September, a large colony of the host ant was found with 65 nests found. On the 13th September the south eastern corner was searched, no ant nests were observed here. Follow-up surveys for the ABAB were planned. These were done in October and November as presented in Table 5-1. Part of the survey area was also considered suitable habitat for the *Jalmenus aridus,* although no attendant ants were observed, and this would be searched for during the ABAB surveys.

Table 5-1: Details of ABAB surveys at Binduli North

Date	Personnel	Details
24/10/2025	Dr Rod Eastwood Jennifer Jackson	Transect started at 11:50am, finished at 12:32pm. We then visited other areas in the survey area. Left the site at approximately 1:30pm. Weather was fine, forecast maximum of 29ºC.
10/11/2025	Dr Rod Eastwood Jennifer Jackson Ben Naim	Transect started at 11:40am, finished at 12:30pm. We then visited other areas in the survey area. Left the site at approximately 2:30pm. Weather was fine, forecast maximum of 27ºC.

No ABAB were observed at Binduli North. Although two targeted ABAB surveys were done, due to access restrictions, Dr Eastwood said that the surveys done during the September visits can count as one of the three surveys. Although the host ant is present, it is unlikely the ABAB is present here.

On the 10/11/2025 two *Jalmenus aridus* were observed in the north of the survey area. These were vouchered and will be sent to the WA Museum.

Figure 5-1 shows the survey area, the locations of ant nests, the survey transect for he ABAB survey, GPS tracklogs and the locations of where the *Jalmenus aridus* was found.

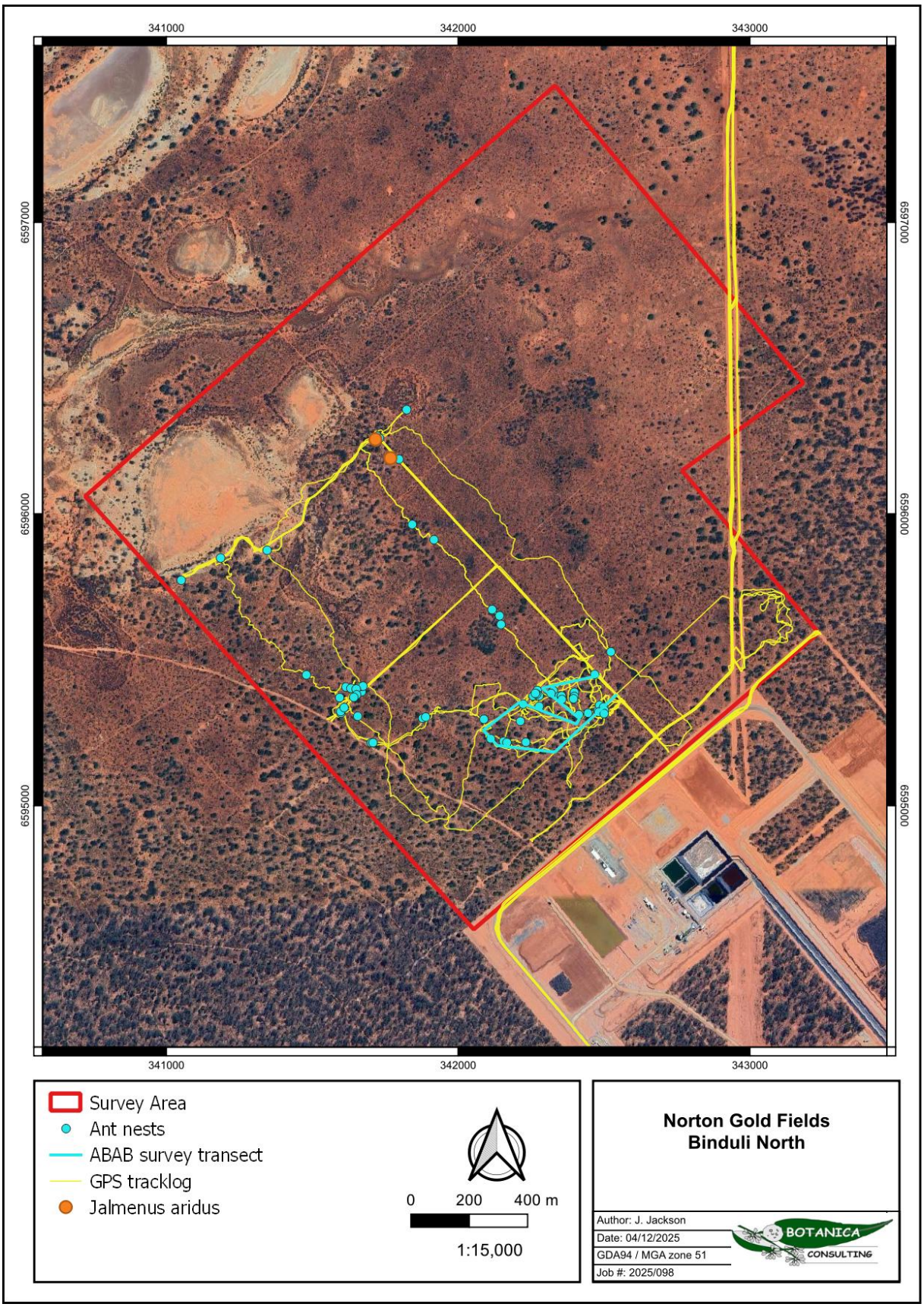

Figure 5-1: Binduli north: survey area, tracklog, ABAB transect, ant nests and locations of *Jalmenus aridus.*

5.2 Binduli South

This site was visited twice by Dr Eastwood and Botanica in September 2025, on the 12th and the 16th.

The site was not considered suitable to host the ABAB for the following reasons:

- Although there were many smooth barked Eucalypts in the survey area, the substrate was mostly a rocky plain, therefore this would not suit the host sugar ant *Camponotus* sp. nr. *terebrans*.
- The lower canopy consisted mainly of chenopod shrubs, and the ABAB prefers a mid-shrub layer with mixed shrubs, containing for example *Eremophila* species.

Several smooth-barked Eucalypt trees were searched for ants during the surveys, and none were found. It is unlikely that the ABAB would be present in this survey area.

The site was not considered suitable to host the Inland Hairstreak due to the lack of host plants. Only small patches of *Senna artemisioides* subsp. *filifolia* were observed in the survey area. It is unlikely that the Inland Hairstreak would be present in this survey area.

5.3 Mt Jewell

This site was visited over two days by Dr Eastwood and Botanica, on the 13th and the 14th September 2025.

The site was not considered suitable to host the ABAB for the following reasons:

- Although there were many smooth barked Eucalypts in the survey area, and in part of the area the substrate was a sandy clay-loam plain, numerous smooth-barked Eucalypt trees were searched for ants during the surveys, and none were found.
- The lower canopy consisted mainly of chenopod shrubs, and the ABAB prefers a mid-shrub layer with mixed shrubs, containing for example *Eremophila* species.

It is unlikely that the ABAB would be present in this survey area.

The site was not considered suitable to host the Inland Hairstreak due to the lack of host plants. Only small patches of *Senna artemisioides* subsp. *filifolia* were observed in the survey area. It is unlikely that the Inland Hairstreak would be present in this survey area.

5.4 Racetrack

This site was visited by Dr Eastwood and Botanica, on the 14th September 2025.

The site was not considered suitable to host the ABAB for the following reasons:

- Although there were many smooth barked Eucalypts in the survey area, many of these were in a low-lying area/drainage depression, therefore these would not suit the host sugar ant *Camponotus* sp. nr. *terebrans*.
- The lower canopy consisted mainly of chenopod shrubs, and the ABAB prefers a mid-shrub layer with mixed shrubs, containing for example *Eremophila* species.

Numerous smooth-barked Eucalypt trees were searched for ants during the surveys, and none were found. It is unlikely that the ABAB would be present in this survey area.

The site was not considered suitable to host the Inland Hairstreak due to the lack of host plants. Only small patches of *Senna artemisioides* subsp. *filifolia* were observed in the survey area. It is unlikely that the Inland Hairstreak would be present in this survey area.

5.5 Rose Dam South

This site was visited by Dr Eastwood and Botanica, on the 14th September 2025.

The site was not considered suitable to host the ABAB for the following reasons:

- Although there were many smooth barked Eucalypts in the survey area, and in part of the area the substrate was a clay-loam plain, numerous smooth-barked Eucalypt trees were searched for ants during the surveys, and none were found.
- The lower canopy consisted mainly of chenopod shrubs, and the ABAB prefers a mid-shrub layer with mixed shrubs, containing for example *Eremophila* species.

It is unlikely that the ABAB would be present in this survey area.

The site was not considered suitable to host the Inland Hairstreak due to the lack of host plants. Only small patches of *Senna artemisioides* subsp. *filifolia* were observed in the survey area. It is unlikely that the Inland Hairstreak would be present in this survey area.

5.6 Solar Farm

This site was visited by Dr Eastwood and Botanica, on the 14th September 2025.

The site was not considered suitable to host the ABAB for the following reasons:

- Although there were many smooth barked Eucalypts in the survey area, many of these were in a low-lying area/drainage depression, therefore these would not suit the host sugar ant *Camponotus* sp. nr. *terebrans*.
- The lower canopy consisted mainly of chenopod shrubs, and the ABAB prefers a mid-shrub layer with mixed shrubs, containing for example *Eremophila* species.

Several smooth-barked Eucalypt trees were searched for ants during the surveys, and none were found. It is unlikely that the ABAB would be present in this survey area.

The site was not considered suitable to host the Inland Hairstreak due to the lack of host plants. Very few *Senna artemisioides* subsp. *filifolia* were observed in the survey area. It is unlikely that the Inland Hairstreak would be present in this survey area.

5.7 Wattlebird

This site was visited by Dr Eastwood and Botanica, on the 14th September 2025.

The site was not considered suitable to host the ABAB for the following reasons:

- Although there were many smooth barked Eucalypts in the survey area, many of these were in a low-lying area/drainage depression, therefore these would not suit the host sugar ant *Camponotus* sp. nr. *terebrans*.
- The lower canopy consisted mainly of chenopod shrubs, and the ABAB prefers a mid-shrub layer with mixed shrubs, containing for example *Eremophila* species.

Numerous smooth-barked Eucalypt trees were searched for ants during the surveys, and none were found. It is unlikely that the ABAB would be present in this survey area.

The site was not considered suitable to host the Inland Hairstreak due to the lack of host plants. Very few *Senna artemisioides* subsp. *filifolia* were observed in the survey area. It is unlikely that the Inland Hairstreak would be present in this survey area.

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Appendix 4B – Targeted Avifauna Survey

Memo

Solar Farm Project – Targeted Avifauna Survey

Prepared For: Norton Goldfields Pty Ltd
Project Name: Solar Farm Project
Tenements: M24/20, L24/119
Job Number: 2025/098
Date: 05 December 2025

33 Brewer St PERTH WA 6000 | 0419 916 034

1. Introduction

Botanica Consulting Pty Ltd (Botanica) was commissioned by Norton Goldfields Ltd (Norton) to undertake a targeted search for the Southern Whiteface (*Aphelocephala leucopsis*) within the Solar Farm Project (referred to as the 'survey area'). The survey area is located approximately 30 km north of Kalgoorlie-Boulder, Western Australia (Figure 1-1). The survey encompassed an approximate area of 105 ha.

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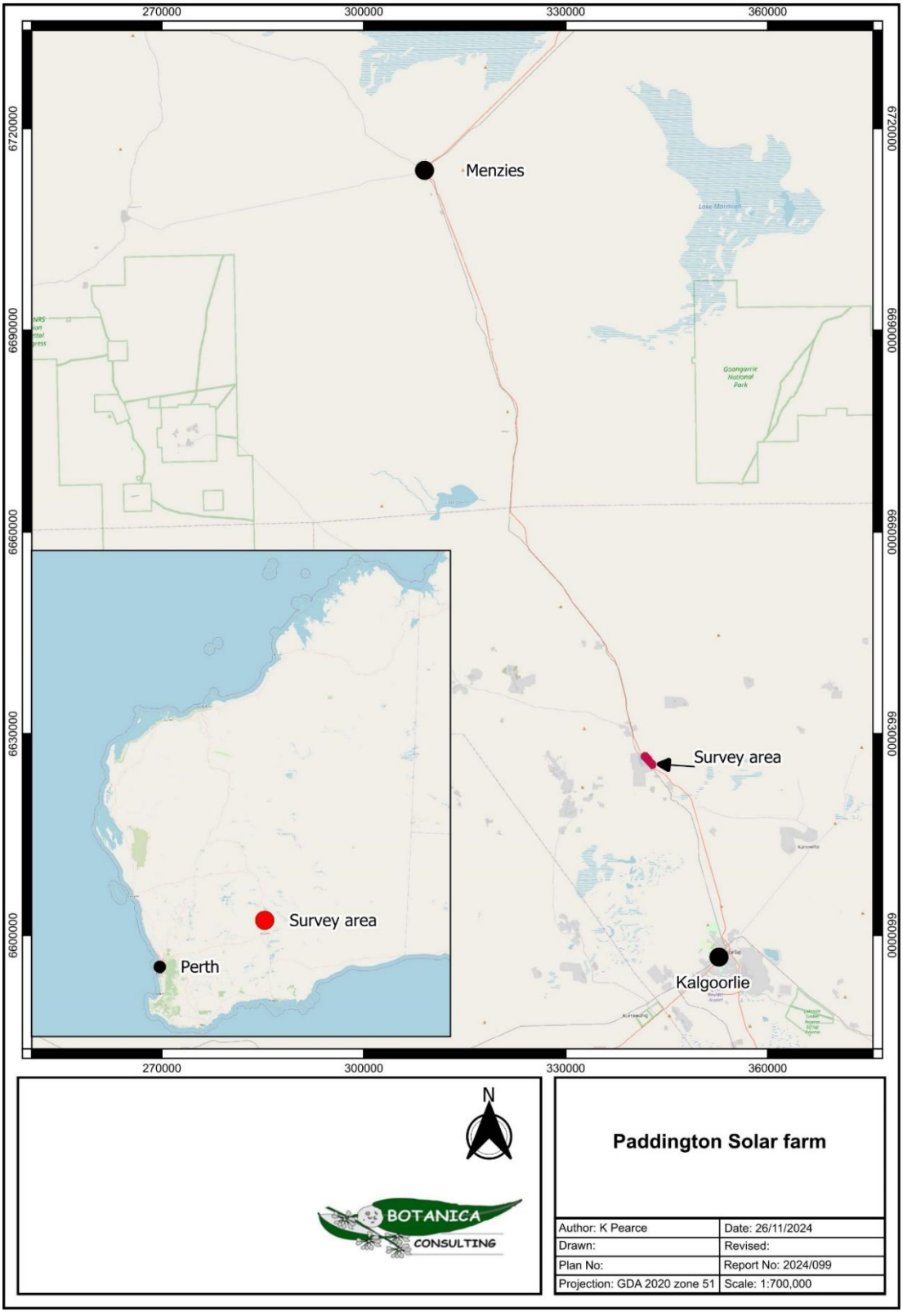

Figure 1-1: Solar Farm Project survey area in relation to Kalgoorlie-Boulder

2. Background

2.1. Southern Whiteface (*Aphelocephala leucopsis*)

The Southern Whiteface (*Aphelocephala leucopsis*) is a threatened species that is listed as Vulnerable under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 and the WA Biodiversity Conservation Act 2016.

The Southern Whiteface is a small stocky thornbill-like bird with a brown dorsum, white belly, dark brown wings and a black tail with narrow white tip (Schodde & Mason, 1999).

Southern Whiteface occur across most of mainland Australia south of the tropics, from the north-eastern edge of the Western Australian wheatbelt, east to the Great Dividing Range (Schodde & Mason, 1999). Southern Whitefaces live in 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 (Higgins & Peter, 2002).

3. Methods

3.1. Field Assessment

The targeted survey was conducted on the 13 September 2025 by Botanica staff members Jennifer Jackson (BSc Environmental Management, Honours) and Ben Naim (BSc Environmental Management). Jennifer has been conducting flora and fauna surveys in Western Australia for more than 20 years including surveys in the Coolgardie bioregion for more than 15 years. Ben has been doing bird surveys for Botanica for several months, after completing the Birdlife Australia Bird Course at Eyre Bird Observatory in December 2021.

The survey area was traversed by walking. A handheld GPS was used to record the tracks traversed and waypoints showing locations of any suitable or unsuitable habitat or trees sampled (recorded in GDA 2020 format) (Figure 3-1).

Botanica also surveyed this area in 2024 for a Reconnaissance flora and basic fauna survey (Botanica, 2024).

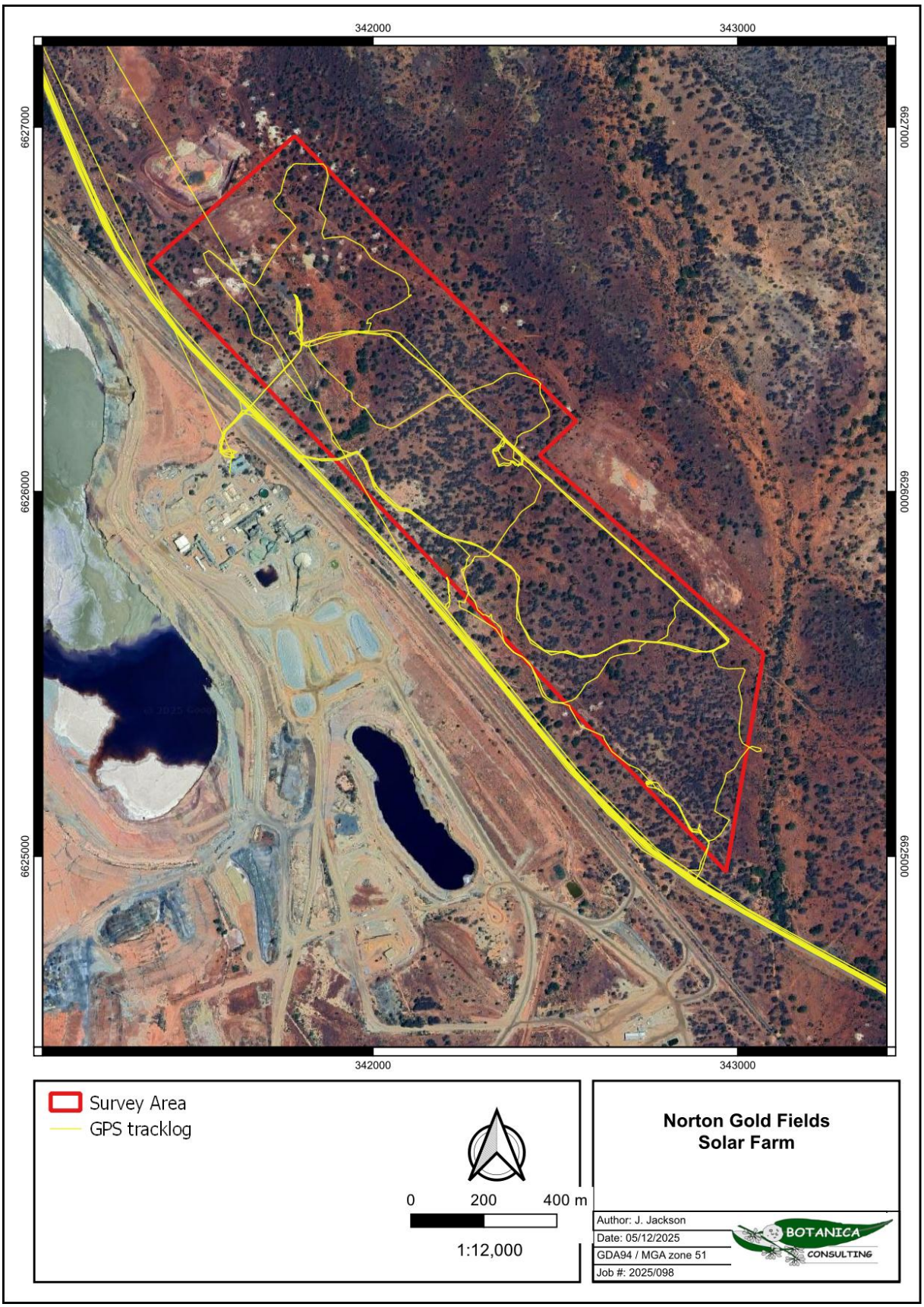

Figure 3-1: Survey area and GPS tracklog

4. Results

No evidence of the Southern Whiteface was seen in the survey area during this survey in 2025, or the previous survey in 2024.

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Disclaimer

Quality Assurance

An internal quality review process has been implemented to each project task undertaken by BC. Each document and its contents is carefully reviewed by core members of the Consultancy team and signed off at Director Level prior to issue to the client. Draft documents are submitted to the client for comment and acceptance prior to final production.

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Appendix 5 – Aboriginal Heritage Survey

Confidential - Report available on Request