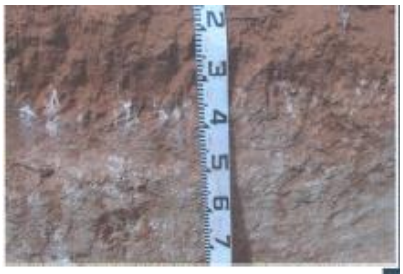

WESTERN AREAS LTD

NEW MORNING NICKEL PROJECT

CLEARING PERMIT SUPPORTING DOCUMENT

Prepared for: **Western Areas Ltd**

Prepared by: Clark Lindbeck and Associates Pty Ltd
PO Box 144
BULLCREEK WA 6149
Telephone: 08 9332 0671
Mobile: 0409 109 360
E-mail: belinda@clarklindbeck.com.au
ABN: 36 166 369 526

Document number	Version	Date of Submission
WSA-NM CPS-2022	**1**	**15/3/22**

TABLE OF CONTENTS

Page No

FIGURES

TABLES

APPENDICES (attached separately)

Table of Acronyms

AHD	Australian Height Datum
ARI	Average Recurrence Interval
BAM Act	*Biosecurity and Agriculture Management Act 2007*
BC Act	*Biodiversity Conservation Act 2016*
bgs	Below ground surface
BOM	Bureau of Meteorology
CALM Act	*Conservation and Land Management Act 1984*
DAFWA	Department of Agriculture and Food WA
DCBA	Department of Biodiversity Conservation and Attractions
DEC	Department of Environment and Conservation
DMA	Decision Making Authorities
DMIRS	Department Mines, Industry Regulation and Safety
DoEE	Department of Environment and Energy
DoW	Department of Water
DPLH	Department of Planning, Lands and Heritage
DPIRD	Department of Primary Industries and Regional Development
DRF	Declared Rare Flora
DSEWPC	Department of Sustainability, Environment Water, Population and Communities
DWER	Department of Water and Environmental Regulation
EPA	Environmental Protection Authority
EPAS	Environmental Protection Authority Services
EPBC Act	*Environmental Protection and Biodiversity and Conservation Act 1999*
EPS	Environmental Protection Statement
ERD	Environmental Review Document
ESA	Environmentally Sensitive Area
FGB	Forrestania Green Belt
FNO	Forrestania Nickel Operations
GCL	Geosynthetic clay liner
GPLA	General Purpose Lease Application
GWW	Greater Western Woodland
HDPE	High-density polyethylene
IBRA	Interim Biogeographic Regionalisation for Australia
MCP	Mine Closure Plan
MNES	Matters of National Environmental Significance
NVIS	National Vegetation Information System
PEC	Priority Ecological Community
ROM	Run of Mine Pad
SRE	Short-range endemics
TEC	Threatened Ecological Community
WAHERB	Western Australian Herbarium
WRD	Waste Rock Dump
WSA	Western Areas Limited

1 INTRODUCTION

1.1 BACKGROUND

Western Areas Limited (WSA) are proposing to develop the New Morning Underground Nickel Project (the 'Project') to extract nickel ore for concentration at the Cosmic Boy concentrator and export of the concentrate through Esperance Port.

The Project forms part of WSA's Forrestania Nickel Operations (FNO), which are located in the Forrestania region approximately 420 kilometres east south-east from Perth and 160 kilometres south of Southern Cross in Western Australia (Figure 1).

Historically at FNO, the Flying Fox, Cosmic Boy and Digger Rocks deposits were mined by Outokumpu Mining Australia Pty Ltd (Outokumpu) during the 1990's producing approximately 3.8 million tonnes of ore at 1.9% nickel. In 1999, Outokumpu operations ceased and WSA purchased the operations in 2002, recommencing mining at Flying Fox (underground) in late 2004. Ore was toll-treated at the nearby Lake Johnson operations, until the commissioning of the Cosmic Boy Concentrator and Tailings Storage Facility (TSF) in 2009 (at the former plant site).

The Spotted Quoll deposit was formally assessed by the EPA in 2009 and approved by the Minister for the Environment on 17 September 2009 under Ministerial Statement (MS) 808. The key environmental factors considered by the EPA were: Flora and Vegetation, Terrestrial Fauna and Subterranean Fauna. Open pit mining commenced in October 2009, with underground development following in April 2011.

In order to maintain their current nickel production to meet the ongoing global demand for nickel, WSA proposes to develop the New Morning deposit to replace the current supply of ore from the Flying Fox underground deposit which is anticipated to be mined out and decommissioned in mid-2022.

The FNO includes the following existing infrastructure (Figure 2):

- Flying Fox mine – 3 km north of New Morning;
- Spotted Quoll mine – 1.5 km south of New Morning;
- Spotted Quoll pit – Cosmic Boy Haul Road – commences 2km south of New Morning;
- Cosmic Boy nickel sulphide concentrator, TSF and accommodation camp – 15 km south of New Morning;
- A network of haul and access roads linking the project components:
- Digger Rocks and Digger South deposits – 31 km south of New Morning;
- Mossco Farm dewatering infrastructure (located on cleared agricultural land) – 37 km south of New Morning.

The proposed Project includes development of an underground nickel deposit, waste rock dump (WRD), ROM, dewatering infrastructure, paste fill plant and associated underground mine infrastructure. With completion of mining at Flying Fox anticipated for mid-2022, the development of the New Morning deposit will maintain the current production rate and supply of nickel ore.

The Project was referred to the Environmental Protection Authority (EPA) in August 2021 for a decision on any requirement for the Project to be assessed under Part IV of the *Environmental Protection Act 1986*. The EPA decision on 23 September 2021 was that the Project was 'Not Assessed – No advice given'.

The Project was referred to the Federal Department of Agriculture, Water and Environment (DAWE) in June 2021 (EPBC 2021/8971) and on 14 July 2021 WSA received advice that the Project was

considered a 'Controlled Action' and requires formal assessment under the *Environmental Protection and Biodiversity Conservation (EPBC) Act 1999.*

WSA are now submitting this clearing permit application to enable native vegetation clearing to support the Project. WSA proposed to use the bilateral agreement between the DAWE and WA government (in this instance the Department of Mines and Industry Regulation and Safety, DMIRS) for assessment of this clearing permit to fulfil both Clearing regulations (*Environmental Protection (Clearing of Native Vegetation) Regulations 2004* (the "Clearing Regulations") and the EPBC Act.

1.2 OBJECTIVE

The objective of this document is to support the application to clear 29 ha of native vegetation for the Project for approval under the Clearing Regulations and EPBC Act through the bilateral agreement between DMIRS and DAWE.

As required by the DMIRS, assessment of the ten clearing principles and background (supporting) information has been provided in this document relating to the site location, ownership, hydrology, vegetation, fauna and land degradation issues.

To assist in the DMIRS's assessment of this clearing permit application, a summary of the relevant environmental information for the Project area has been included in this document in addition to the biological survey reports.

To support assessment by DAWE under the bilateral agreement, information relating to the proposed clearing action and details on impact assessment included in Annex C7 has also been included.

1.3 PROPONENT

The proponent for the Project is Western Areas Limited (WSA).

The key contact details for WSA are provided below:

Contact:	Bryan Williams – Group Environmental Manager
Address:	Level 2, 2 Kings Park Road WEST PERTH WA 6005
Telephone:	08 9334 7722
Facsimile:	08 9486 7866
Mobile:	0458 303 654
Email:	bwilliams@westernareas.com.au
ACN:	119 599 323

1.4 TENURE

The Project is located on Mining Lease 77/583 which is owned by WSA (Figure 3).

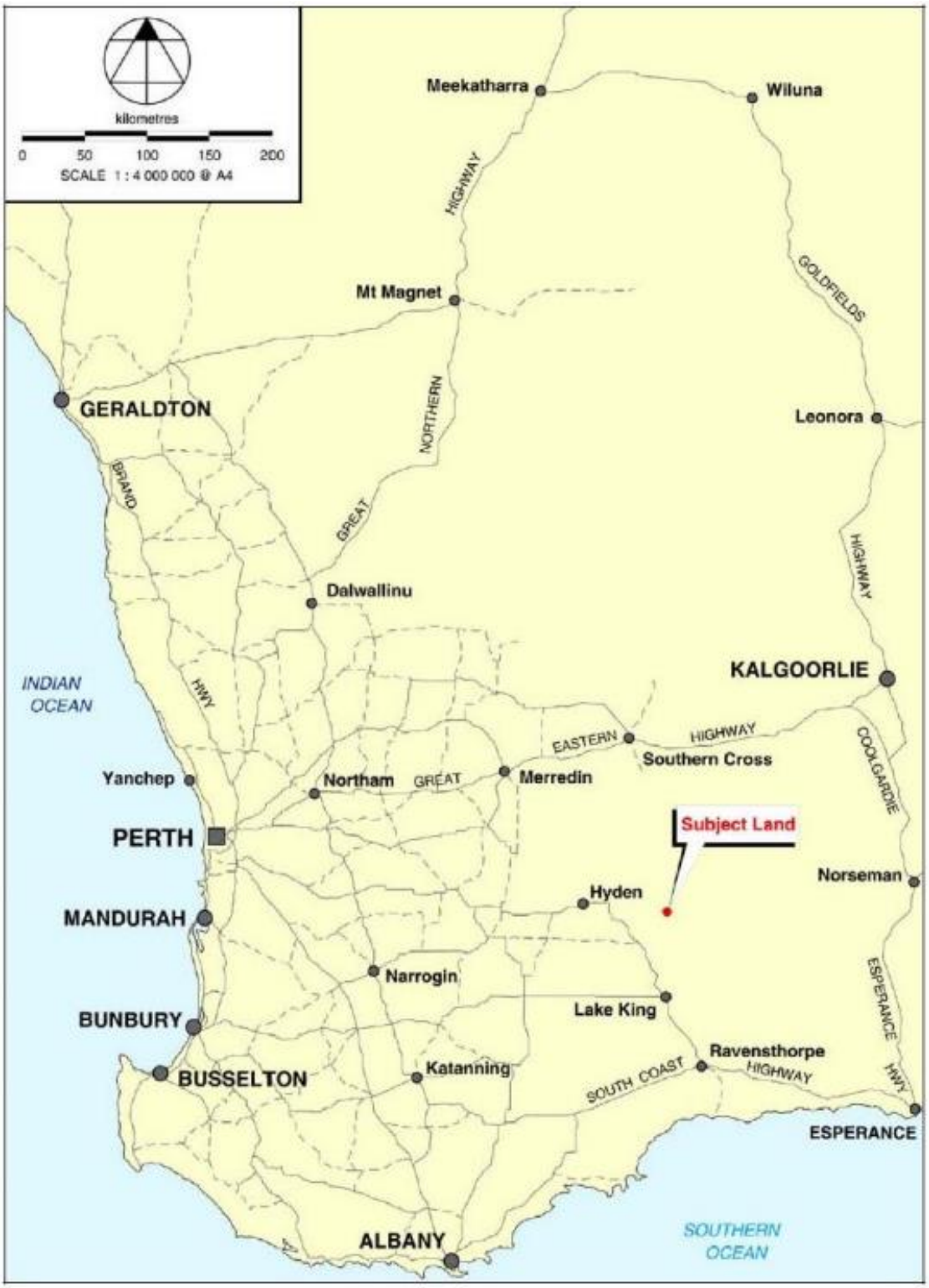

Figure 1: Regional Location – New Morning Project

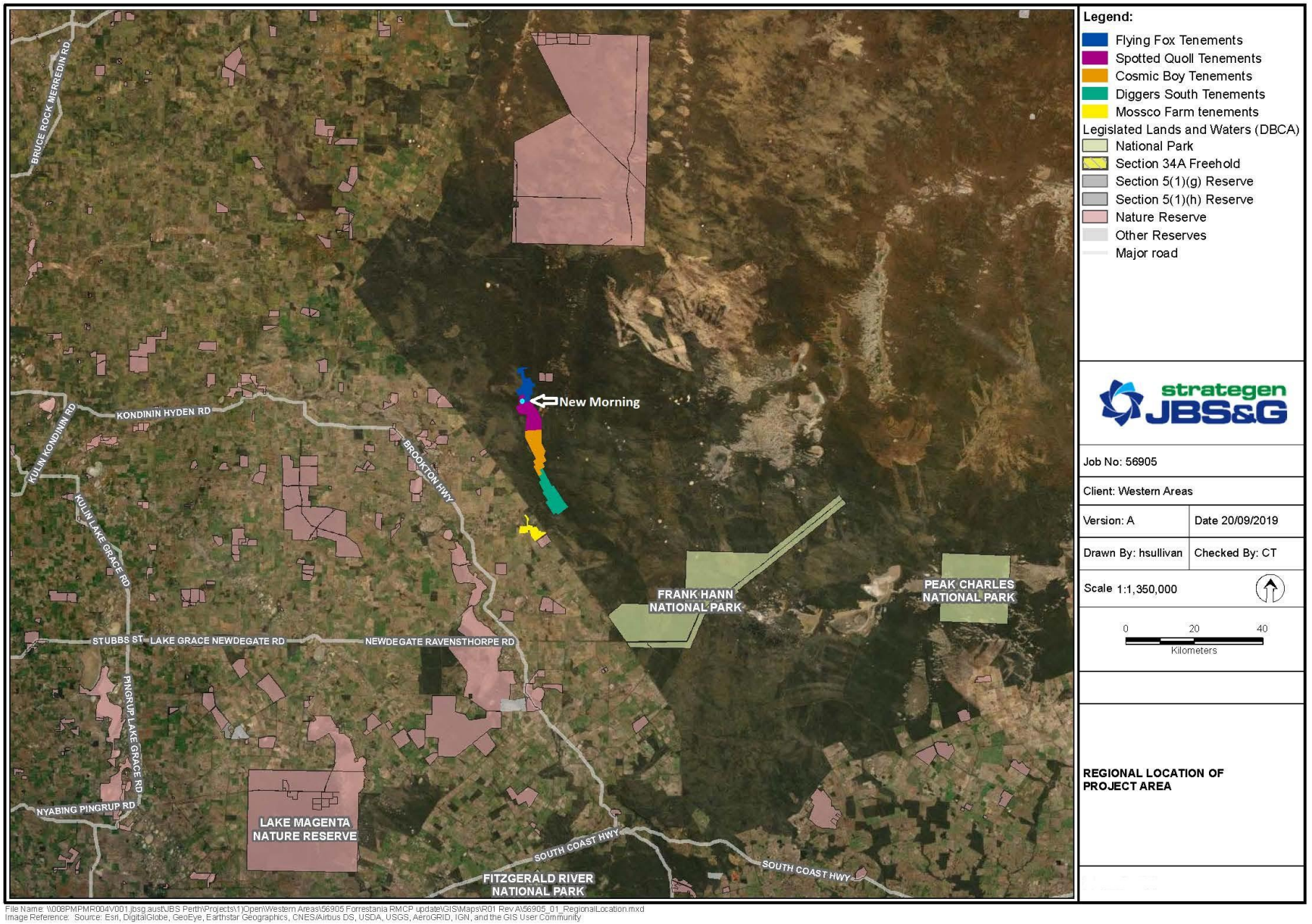

Figure 2: Regional FNO tenement location (base map from Strategen 2020)

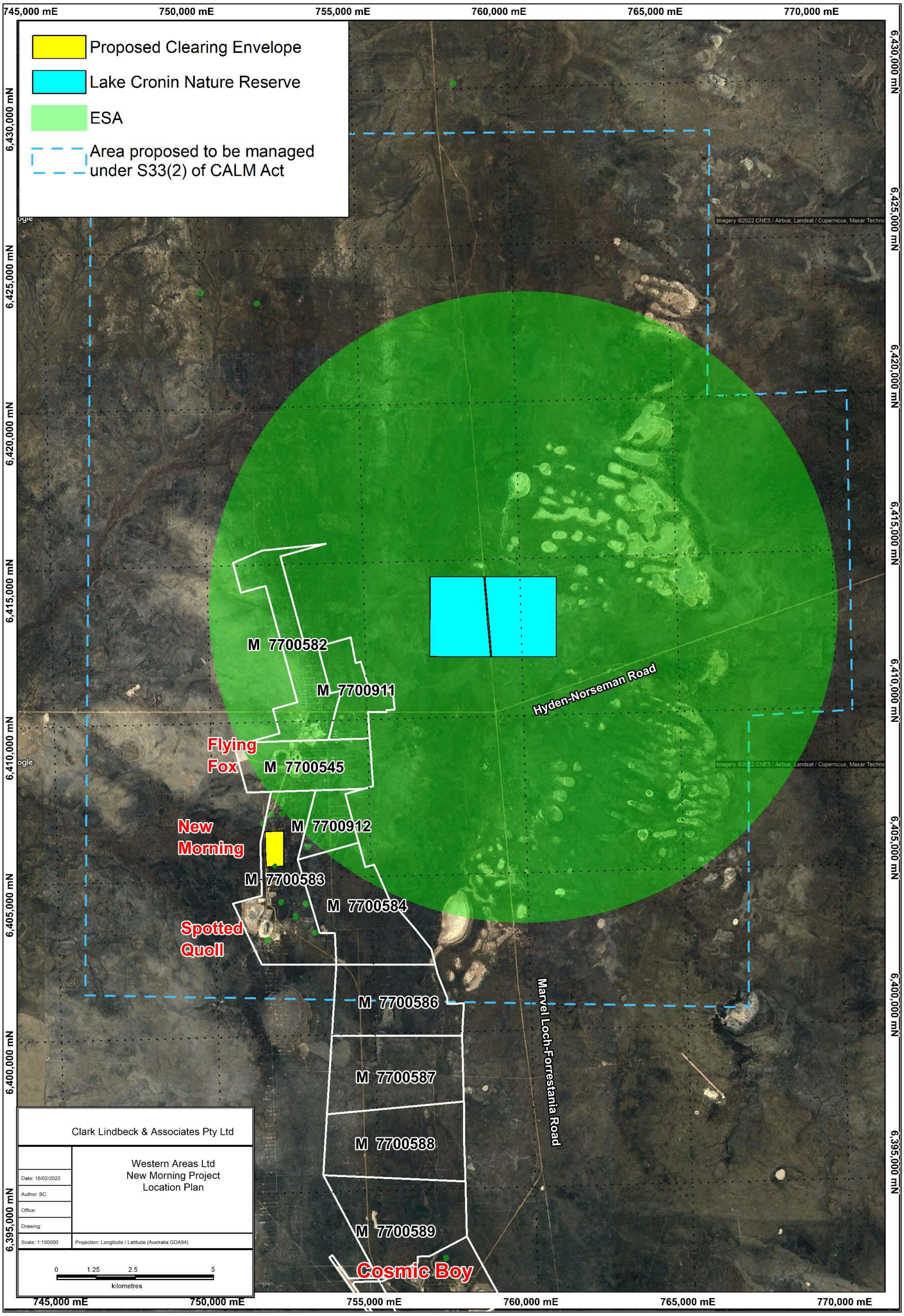

Figure 3: Project Tenure

2 PROPOSED CLEARING

2.1 CLEARING AREA

The Project is for development of mine infrastructure at the New Morning deposit and will consist of:

- Clearing of up to 29 ha of native vegetation (disturbance footprint of 33.4 ha).
- Within a Clearing Envelope of 64 ha (Figure 4).

The development envelope contains approximately 10.44 ha of existing disturbance resulting from previous exploration activities or other site disturbance, of which 4.62 ha is located within the proposed development footprint (Figure 4).

As such WSA has allowed provision for approximately 29 ha of new disturbance/native vegetation clearing.

2.2 PROPOSAL DESCRIPTION

The Project will involve the mining of 1.02 Mt of ore and 3.5 Mt of waste rock material (comprising 2.94 Mt of waste from the excavation of the boxcut and 0.56 Mt of waste from the underground operations) and will involve establishment of the following infrastructure (Figure 5):

- Boxcut with underground portal at base and associated access decline;
- Waste Rock Dump and topsoil stockpiles ;
- Run-of-mine Pad;
- Paste-fill plant;
- Dewatering bores and dewatering pipeline (to tie into the existing mine dewatering management system);
- Associated mining infrastructure;
- Haul and access roads.

The Project has a mine life of 2-3 years.

Waste material from the boxcut and underground will be transported to the WRD located east of the boxcut (Figure 5).

Ore will be transported from underground to the ROM pad on the surface and then, via the existing haul road, to the Cosmic Boy concentrator for processing.

Mine dewatering from the underground workings will occur via dewatering bores, with excess mine dewater managed by linking the New Morning dewatering bores to the existing FNO dewatering network with ultimate discharge to the existing approved Mossco Farm evaporation ponds (37 km south).

With cessation of mining (and associated dewatering activities) at Flying Fox in mid-2022, there is not anticipated to be any change to the cumulative dewatering rates of discharge at the overall FNO Project.

2.3 ORIGINAL PROJECT DESIGN

The original Project design developed by WSA in 2017 involved development of the New Morning deposit as an open pit, with a waste dump, heap leach, associated infrastructure and a haul road diversion with total clearing of native vegetation of approximately 140 ha (Figure 6). The biological surveys completed (and attached to this submission) were for this larger area.

To reduce the amount of clearing required for the Project, WSA revised the Project design to a boxcut and underground operation, thus significantly reducing the native vegetation clearing required. This has also removed the requirement for the 7.5 km haul road diversion which was originally proposed to replace that currently in place between Flying Fox and Spotted Quoll which would have been encompassed within the formerly proposed New Morning open pit.

Consequently, this modified proposal contains 110 ha less native vegetation clearing than that required by the original Project design (Figure 4, Figure 5).

This project has been optimised to reduce environmental impacts, particularly with a significantly reduced clearing footprint since the original 2017 design (Figure 5, Figure 6).

Further detail on the 'Avoid' and 'Mitigation' measures, specifically in relation to flora and fauna, are provided in the following Sections.

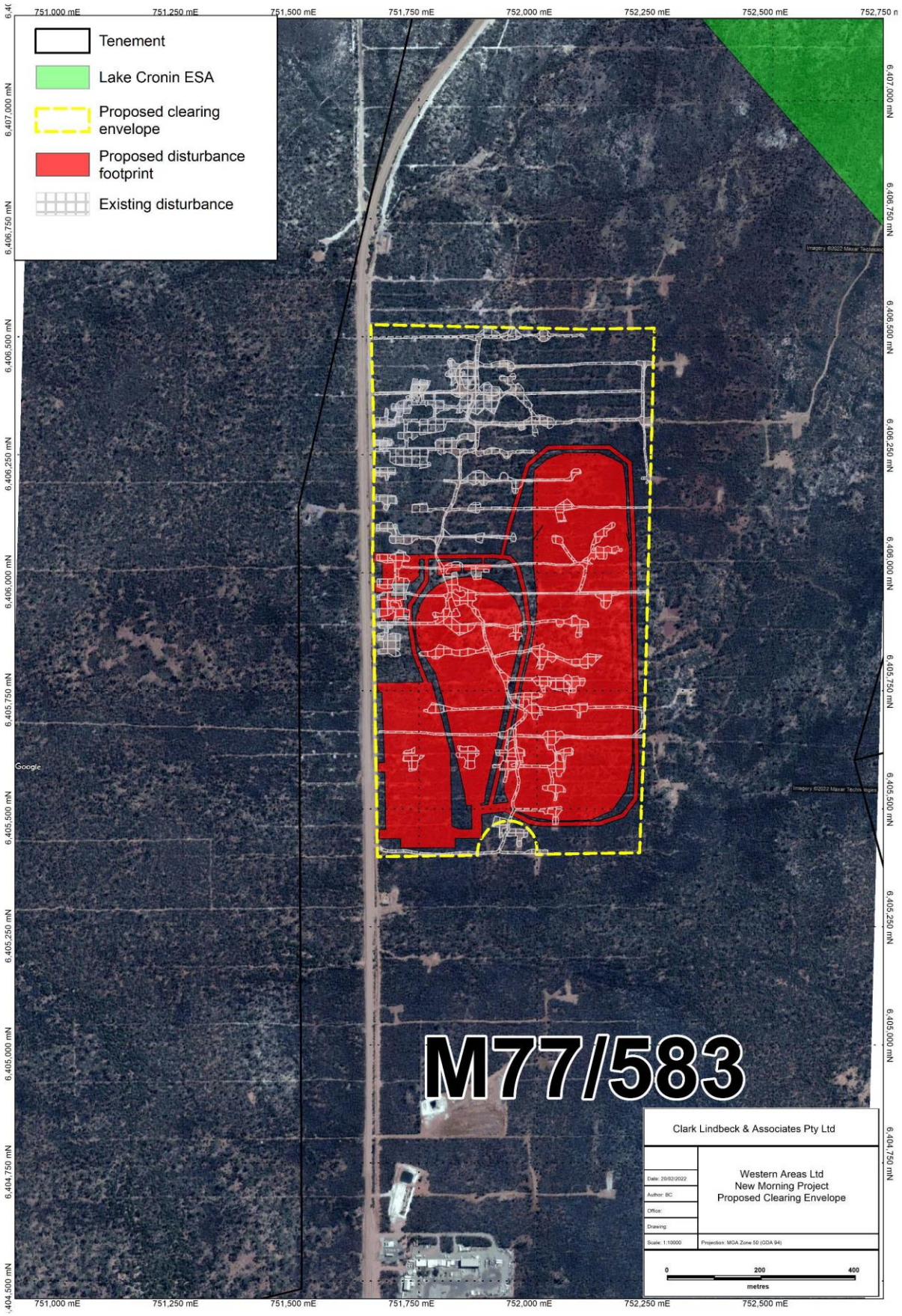

Figure 4: New Morning proposed clearing envelope

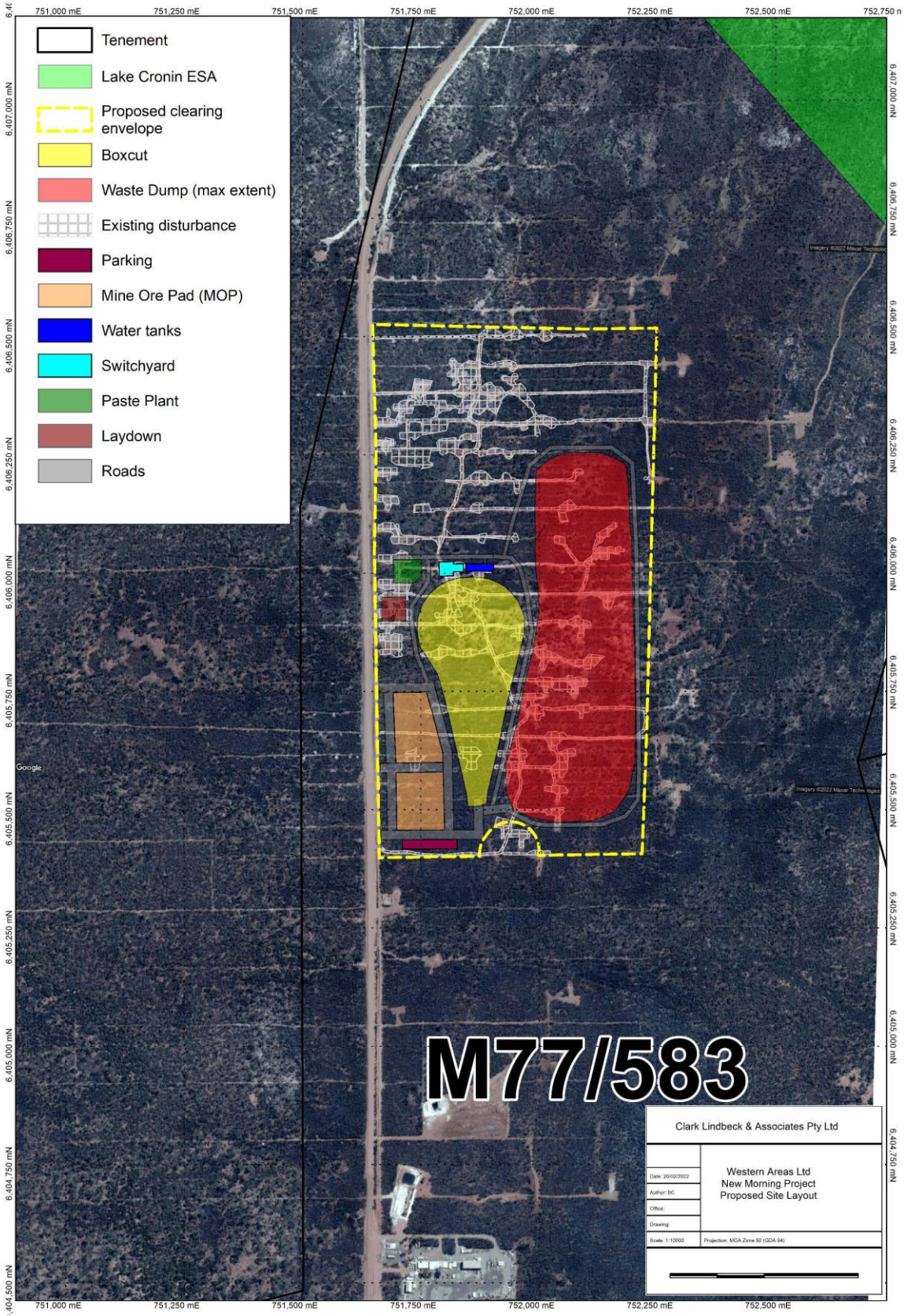

Figure 5: New Morning indicative site plan

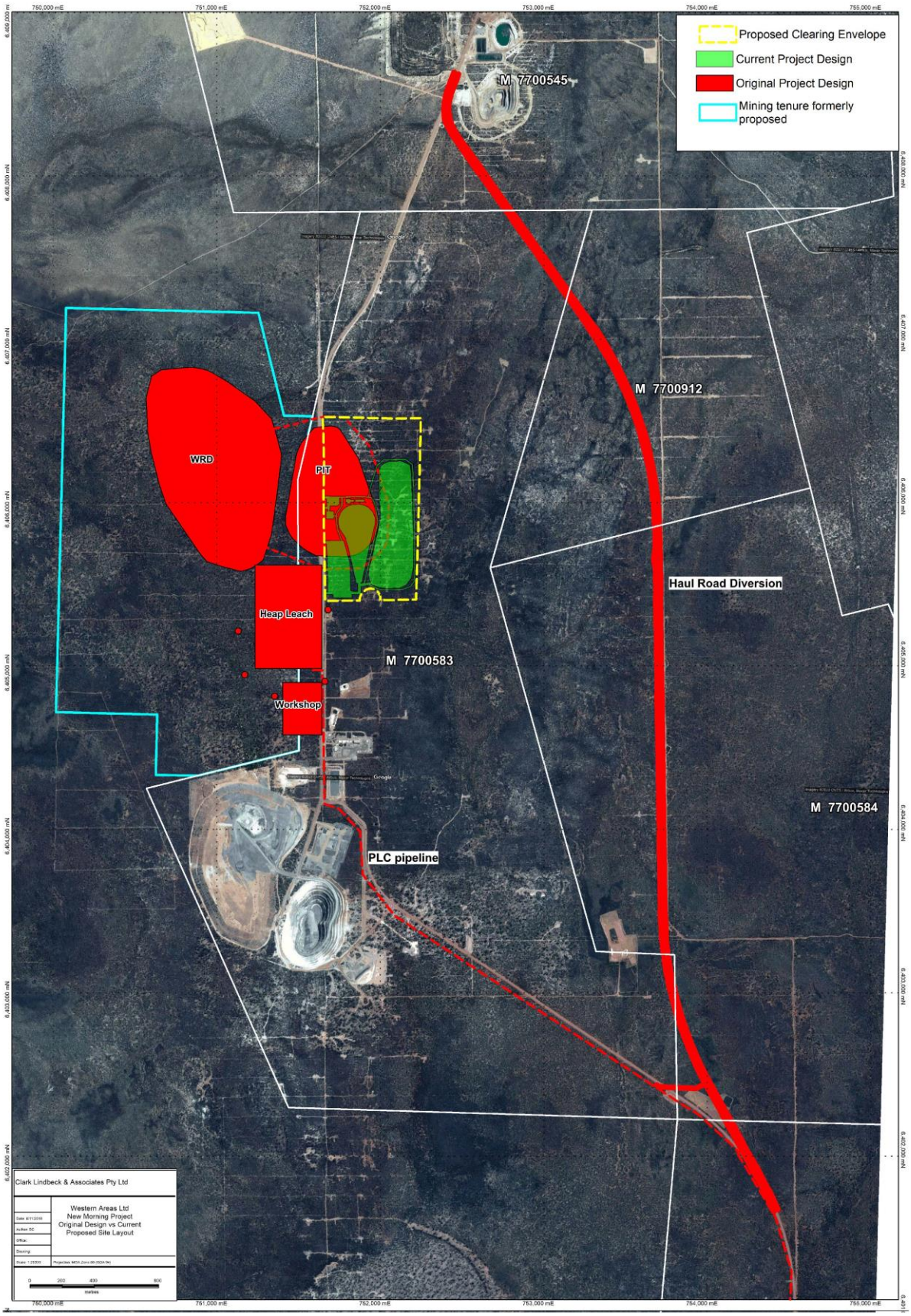

Figure 6: Original New Morning design with open pit, WRD, heap leach and haul road diversion

3 EXISTING ENVIRONMENT

3.1 CLIMATE

The climate in the general area is semi-arid to arid and can be characterised by its relatively low annual rainfall and large temperature range. The Hyden Bureau of Meteorology (BOM) Station is the closest station to the Project and is located 72 km to the west.

3.1.1 Temperature

Mean annual maximum temperature is 25.1°C and mean annual minimum 9.9°C. Daily maxima above 40°C are usual from November to March. The coldest month is July and diurnal temperature variations are commonly high throughout the year (BoM 2022).

3.1.2 Rainfall

The area is semi-arid and the annual average rainfall at Hyden is 340.2 mm. Most of the rain falls between May and August and this amount varies greatly both seasonally and annually (BoM 2022).

3.1.3 Wind

The average wind speeds at Hyden vary throughout the year from 5.6-9.9 km/h in the morning to 7.3 -10.1 km/h in the afternoon.

During the warmer part of the year (from October to March) the prevailing wind direction is generally from the southeast but can commonly swing around to the north and northeast with the passage of summer high pressure systems. Throughout the cooler part of the year (from April to September) the wind directions can vary considerably with westerly, northwesterly and southerly wind directions more common (BoM 2022).

3.2 GEOLOGY

3.2.1 Project Geology

The project lies in the Forrestania Greenstone Belt (FGB), a southern extension of the Southern Cross Greenstone Belt. The greenstone belts of the Yilgarn craton are major sequences of basic to ultramafic rocks with varying levels of entrained sedimentary rocks laid down semi-contemporaneously.

The FGB is constrained by granitoid rocks that developed during the late Archaean / Proterozoic and form the western and eastern boundaries to the FGB. During the period of granite emplacement significant alteration, folding and faulting occurred within the FGB. The most significant alteration to the greenstone “stack” of mafics, ultramafics and sediments was the formation of a major synclinal structure. This feature dominates the structural geology of the region.

3.3 LANDSCAPE AND SOILS

3.3.1 Landscape

The project area lies within the Avon Province and the South-Eastern Zone. Based on geographic information provided by DPIRD (2010), the survey area is located within the South-eastern Zone of Ancient Drainage (250) of the Avon Province (25) and just west of the Southern Cross Zone (261) of the Kalgoorlie Province (26).

The Avon Province is characterised as a laterised plateau (dissected at fringes and with saline drainage lines inland) on deeply weathered mantle and alluvium over granitic rocks of the Yilgarn Craton (and Albany-Fraser Orogen). Soils are comprised of sandy duplex soils and ironstone gravelly soils with loamy earths, loamy duplexes, sandy earths, deep sands and wet soils. Vegetation is dominated by York gum-wandoo-salmon gum-morrel gimlet woodland and jarrah-marri-karri-

wandoo woodlands/forests (with some mallee scrub, tammar-wodjil thickets and scrub-heath). This Province is located in the south-west, between Nannup, Denmark, Jerramungup, Southern Cross, Lake Moore, Carnamah and the Perth Hills (Tille, 2006).

The South-western Zone of Ancient Drainage (250) is characterised by gently undulating terrain (with some salt lake chains and areas of prominent granitic outcrops) on deeply weathered mantle and alluvium over granitic rocks of the Yilgarn Craton. Soils include sandy duplexes (often alkaline) with ironstone gravelly soils and loamy earths (often calcareous) and some loamy duplexes, sandy earths, deep sands and saline wet soils. Mallee scrub and salmon gum-gimlet-morrel woodlands (and some scrub-heath). This zone is located in the southern Wheatbelt between Kondinin, Lake Grace, Gnowangerup, Frank Hann National Park and Mt Holland (Tille, 2006).

3.3.2 Project Soils

Surface soil samples were collected by WAL in the Spotted Quoll area, located approximately 1.2 km south of New Morning, in April 2008.

The soils comprised the following characteristics:

- Many varied in texture with most being classed between loams and clays by the Australian soil texture classification system.
- Many of the soils had a high clay content with a relatively small number of sands present in the samples.
- The salinity of the soil was highly variable - approximately 15% of the samples had EC values >80 (mS/m) which are moderately saline and may cause growth problems for plants that do not have a high tolerance to salinity.
- Soils suitable for testing exhibited minor to low dispersion. Most of the soils are moderately sodic and are unlikely to be strongly dispersive. These clay soils should have reasonable properties in terms of water holding capacity and resistance to compaction.
- Nutrient properties are unlikely to restrict the growth of Western Australian native plants that are adapted to these soil types and climatic conditions.

Topsoil samples have been collected from the proposed New Morning boxcut footprint show that all of the surface soils are relatively neutral (pH), are all non-saline and are consistent with the soils at Spotted Quoll.

3.4 SURFACE WATER HYDROLOGY

3.4.1 Regional

Surface water in the Forrestania region partly drains northwards to a saline palaeodrainage system on the eastern side of the greenstone belts. The greenstone belts form a topographical divide, with ridges up to 100 m higher than the palaeodrainage lakes. On the western side of the divide, surface water drainage is predominantly westwards to a palaeodrainage about 30 kilometres to the west Figure 7).

Locally, there is internal drainage to saline claypans/lakes. One such topographic feature, known as Boojum Swamp, occurs approximately three kilometres to the south of the New Morning Project. Boojum Swamp lies at 386 m Australian Height Datum (AHD) and is fed by a drainage system which extends from near Cosmic Boy, approximately 10 kilometres to the south-southwest.

During the assessment of the Spotted Quoll deposit, identification of natural groundwater levels near Boojum Swamp were lower than 375 m AHD; in the range of 11 to 27 m below ground surface with salinity values of approximately 25,000 mg/L TDS, indicating that the groundwater and surface water in Boojum Swamp do not appear to be significantly hydraulically connected.

3.4.2 Local catchments

Local surface water drainage in the Project is generally from the northeast and flows southwest (Figure 8). There are no significant drainage lines or bodies of surface water in the New Morning Project area.

A summary of the local catchments area presented in Table 1. The Project area is located within Catchments C, D and E (Figure 8).

The eastern boundary of the proposed clearing area (specifically the WRD) is impacted by Catchment D which has an area of only 0.44 km^2.

Given the size of the proposed clearing and size of the catchments, maintenance of surface water flows will not be significantly impacted, and diversions will be constructed as necessary to maintain surface water flow.

At all the other boundaries of the proposed disturbance footprint, the ground surface naturally slopes away from the pit, and therefore flood protection measures are not required.

The populations of the Declared Rare Flora (DRF) species, *Eucalyptus steedmanii*, are located upstream of the Project (Figure 8).

Table 1: Summary of catchment areas and estimated peak flows for surface water catchments (from Rockwater 2018)

Catchment	Area (km^2)	Length (km)	Slope (m/km)	Average Annual Rainfall (mm)
A	0.61	1.00	18.13	343
B	1.09	1.10	24.00	343
C*	0.90	1.20	21.82	343
D*	0.44	0.90	23.33	343
E*	2.34	3.50	14.07	343
F	2.91	2.60	11.36	343
G	0.11	0.50	20.00	343

***** In Project area

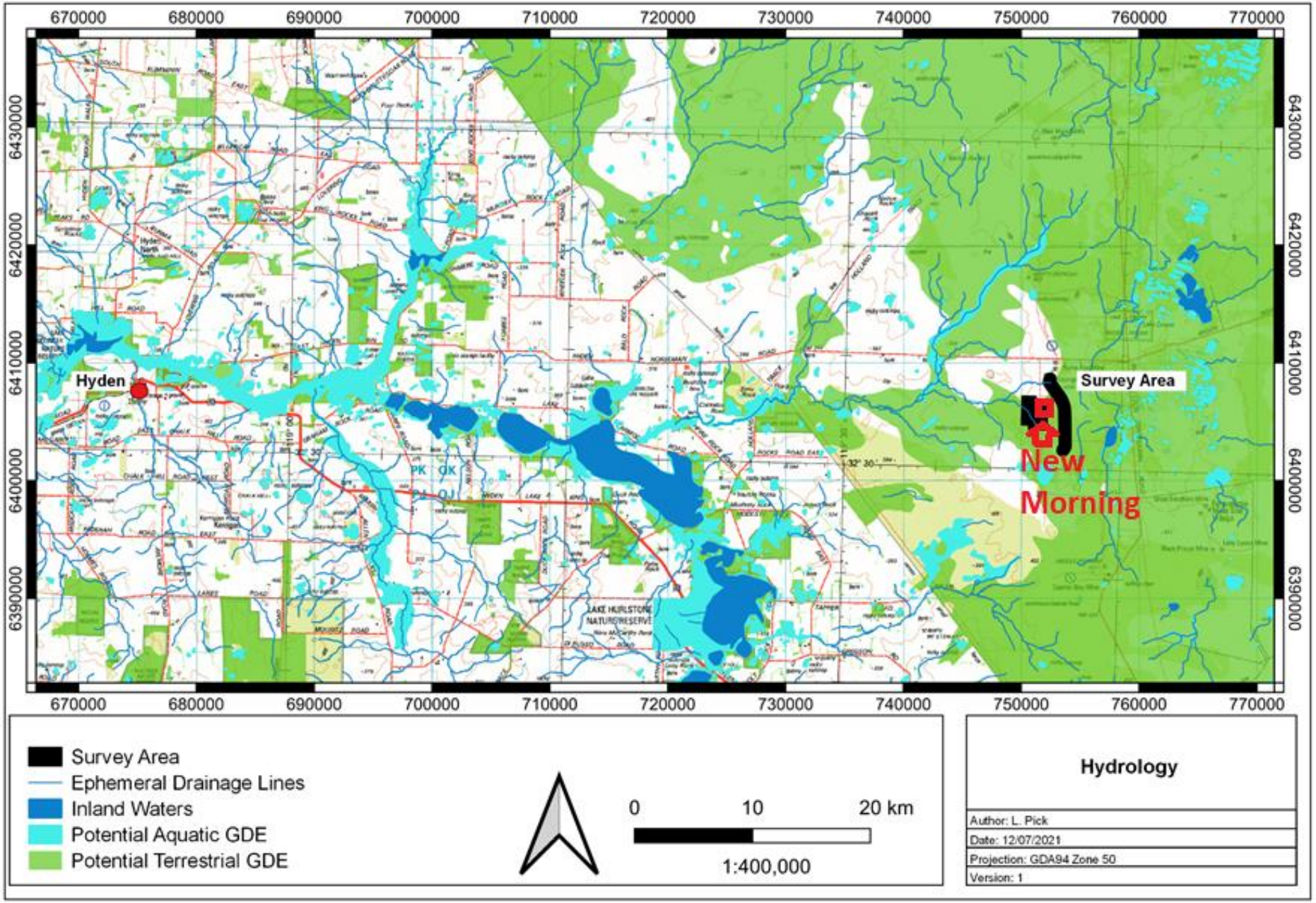

Figure 7: Regional surface hydrology (from Botanica 2021a)

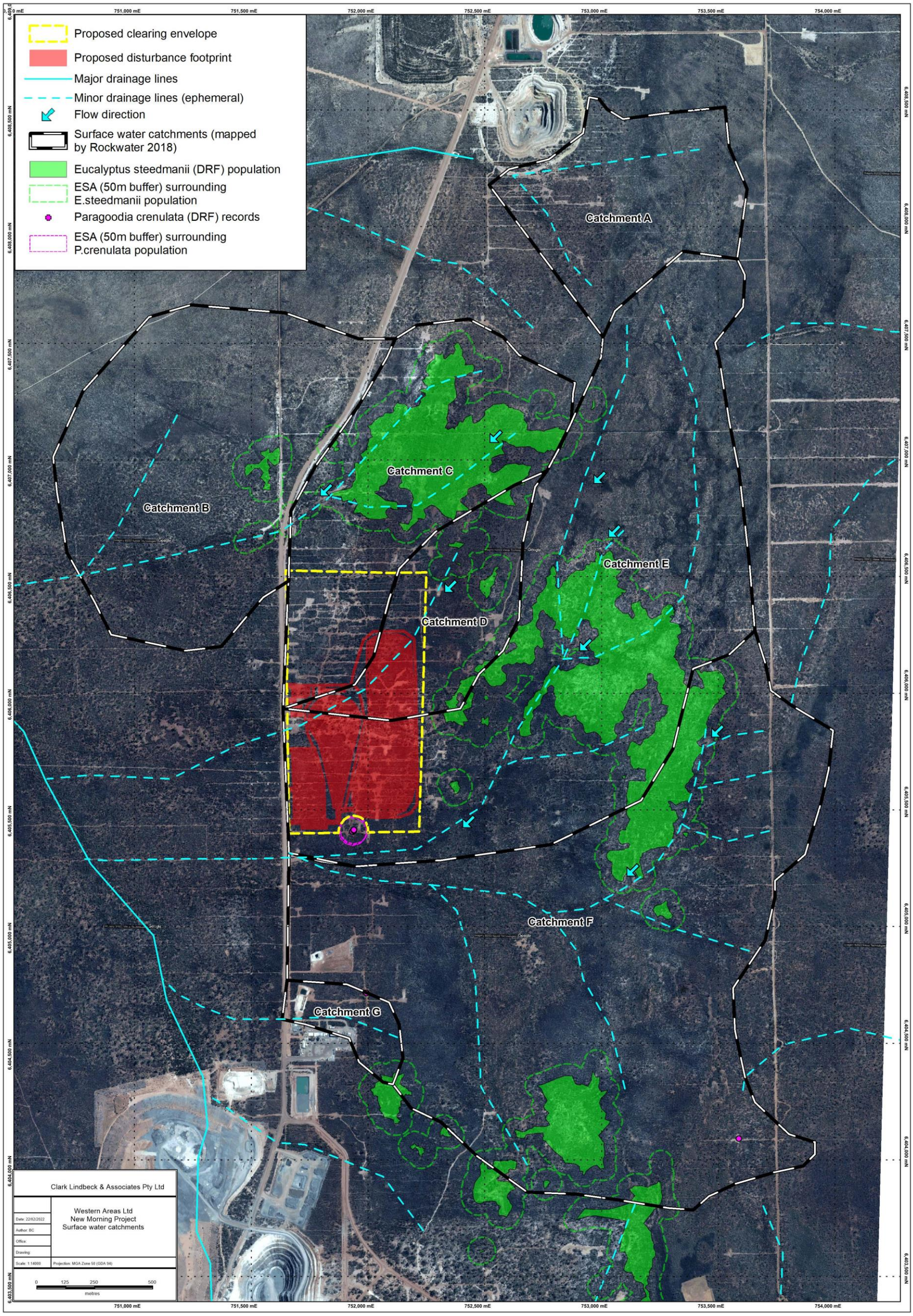

Figure 8: Local surface water catchments (based on data from Rockwater 2018)

3.5 GROUNDWATER HYDROLOGY

3.5.1 Regional Hydrology

Groundwater in the Forrestania area is sourced from weathered and fractured bedrock aquifers, and siliceous caprock, with salinities ranging from fresh to hypersaline, but mainly the latter. Movement of groundwater is generally from higher parts of the landscape, generally coinciding with greenstone belts, to discharge at salt lakes (mainly within palaeochannel systems). Recharge is mostly by infiltration of rainfall through the soil, likely to be at low rates as indicated by the high prevailing groundwater salinities.

The Sibelius injection borefield is located approximately 2 km east of New Morning, located at the northern end of the pipeline road running between Flying Fox and Cosmic Boy. The siliceous caprock aquifer at this site is fractured, vuggy, and highly permeable, with depth to water recorded as between 35 and 50 m prior to mining of Spotted Quoll in 2008, with depth to water deepening to the south.

The aquifer at Sibelius is an elongated linear feature, bounded by impermeable clays. The top of the aquifer lies between 42 and 48 m depth, deepening to the south; the maximum aquifer thickness of about 30 m occurs centrally.

Groundwater initially occupied aquifers in both weathered and fractured bedrock at Flying Fox, both being laterally extensive, and in siliceous caprock that occurs above some ultramafic rocks. The caprock can be highly transmissive, but near the mining operations it now lies above groundwater-level (Rockwater 2018).

At Spotted Quoll the strata of metasedimentary rocks and mafic/ultramafic rocks dip to the east at about 55 degrees. Productive aquifers were found in fractured bedrock associated with cross-cutting structures, particularly in the southern sector of the deposit. Prior to dewatering, the groundwater levels lay at about 30–55 m below ground surface (bgs) (350–375 m AHD). In the monitoring bores adjacent to the mine they have now been lowered by as much as 90 m and are presently at 260 to 350 m AHD; now at lower elevations within the underground workings of the mine.

WSA has a DWER Groundwater Licence (GWL 156549) and Operating Strategy for all groundwater abstraction activities at the FNO. Part of the monitoring associated with this includes assessment of vegetation as a result of groundwater abstraction activities. No evidence of adverse impact has been recorded to date.

3.5.2 Groundwater Levels

Flying Fox and surrounds

Adjacent to the Flying Fox deposit (3 km north of New Morning), the water table lies at about 70 m bgs. Locally at the Flying Fox mine, water levels are as deep as 170 to 260 m bgs, reflecting the effects of mine dewatering with underground mining. Groundwater initially occupied aquifers in both weathered and fractured bedrock at Flying Fox, both being laterally extensive and in siliceous caprock that occurs above some ultramafic rocks. The caprock can be highly transmissive, but near the mining operations it now lies above groundwater-level (Rockwater 2018).

WSA has regional monitoring bores which have generally shown slight declining trends between FNO and Lake Cronin with minor fluctuation.

Spotted Quoll

Groundwater levels adjacent to the Spotted Quoll pit (1.5km to the south of New Morning) slope downwards in a south-easterly direction, from about 350 m AHD in the northwest to about 230 m AHD to the southeast.

Water level changes are attributed to the locations of the water draw points underground, and to strong variations in aquifer permeability as a result of geological structures.

3.5.3 Groundwater Quality

Groundwater at FNO is generally acidic to alkaline, hypersaline, dominated by sodium and chloride, with high proportions of sulphate and magnesium. Salinity values ranged from 39,000 to 120,000 mg/L TDS over the review period across most of the Forrestania operation, and pH ranged between 3.4 and 8.0.

At Flying Fox, there are strong variations in salinity values locally and extending to the Lake Cronin Reserve. The water sampled was generally strongly acidic to slightly alkaline, with pH values ranging from 4.5 to 6.0 in the monitoring bores and 7.5 from the rising main in 2018. FFMB25, nearest to Lake Cronin, historically has acidic water while those closer to Flying Fox are more neutral. There are no long-term trends discernible at most sites, and only minor fluctuations.

3.5.4 Groundwater Dependent Ecosystems

As reported in Botanica (2021a), according to the Bureau of Meteorology (2021) *Groundwater Dependent Ecosystem Atlas,* there are no aquatic or terrestrial ecosystems within the assessment area.

One terrestrial GDE has moderate potential to occur within the survey area; *Undulating plains with some sandplains, ferruginous breakaways; ridges of metamorphic rocks and granitic hills and rises; calcretes, large salt lakes and dunes along valleys (*Botanica 2021a). This is not representative of the Project area.

3.6 VEGETATION AND FLORA

3.6.1 Regional and remnant vegetation context

The Project is located in the Southern Cross subregion in the Coolgardie Botanical District with vegetation predominantly Eucalypt woodlands, Mallees, *Acacia* thickets and scrub-heaths on sandplains. Diverse *Eucalyptus* woodlands occur around salt lakes, on the low greenstone hills, valley alluvials and broad plains of calcareous earths. Salt lakes support dwarf shrublands of samphire. The area is rich in endemic *Acacias* (Cowan, 2001). The Western Mallee subregion vegetation commonly includes Mallee over myrtaceous-proteaceous heaths, *Melaleuca* shrublands, Samphire low shrublands on saline depressions and mixed Eucalypt woodlands. Mallee communities of the Western Mallee subregion occur on a variety of surfaces; *Eucalyptus* woodlands occur mainly on fine textured soils, with scrub-heath on sands and laterite (Beecham & Danks 2001).

The Project area is located on the western edge of the Great Western Woodlands. The Great Western Woodlands 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 species. 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 Project development envelope is located within one Beard Vegetation Association: Forrestania 511 (COO2) (Figure 9).

Native vegetation has been heavily cleared in the southwest of Western Australia (WA). Remnant vegetation is important in helping preserve native vegetation and fauna habitat. Areas with less than 30% of their pre-European extent generally experience exponentially accelerated species loss and areas with less than 10% are considered “endangered” (Shepherd *et al,* 2001). Of the original extent of vegetation association 511, >99% of the pre-European extent remains (Table 2).

Table 2: Beard vegetation type (DBCA 2019)

IBRA Subregion	Vegetation Association	Current Extent (Ha)	Pre-European extent remaining (%)	% of Current extent within DBCA managed lands	Vegetation Description (Beard, 1990)
COO2	Forrestania 511*	153,002.24	99.58	9.72	Medium woodland; salmon gum & morrel

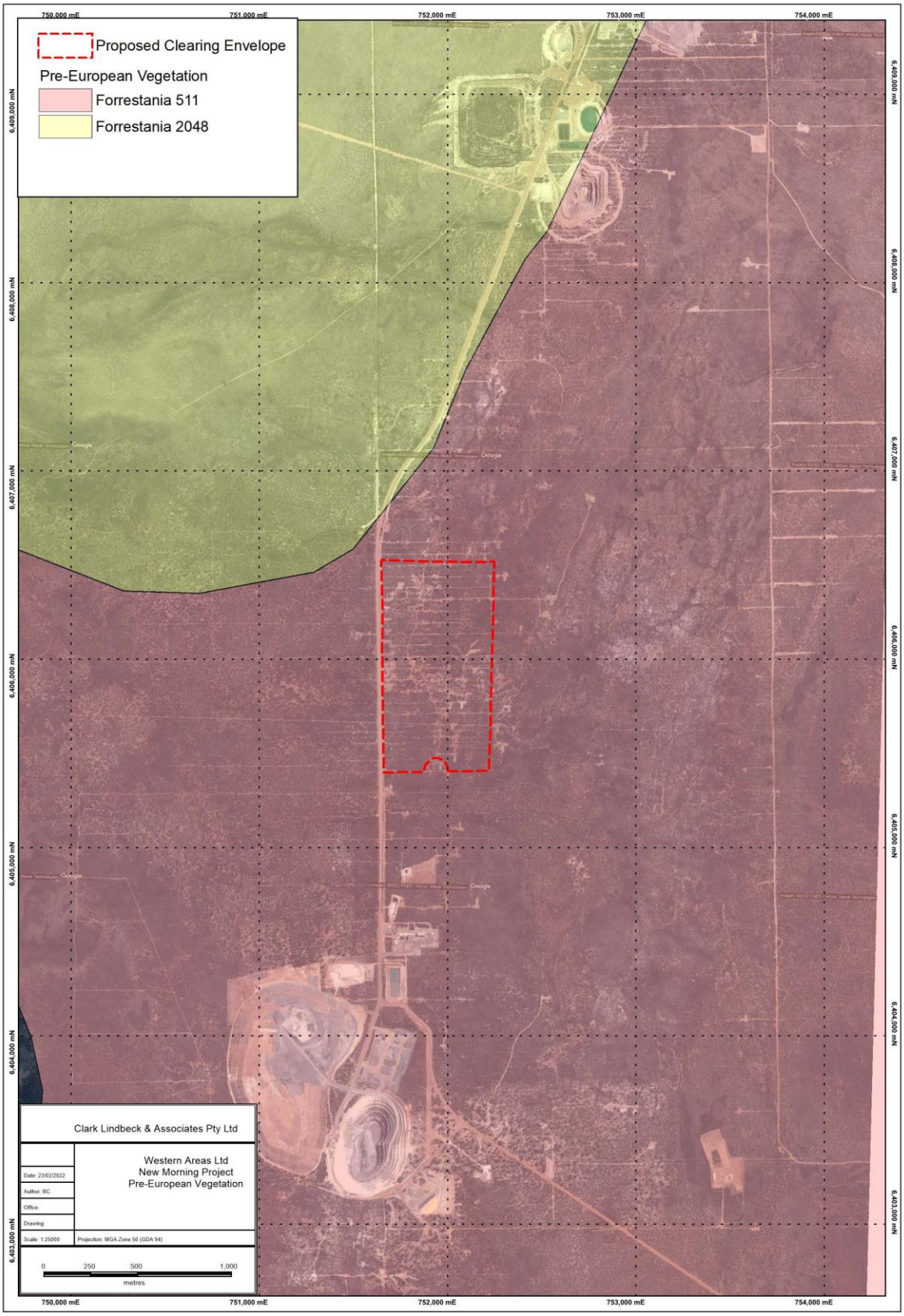

Figure 9: Pre-European Beard vegetation associations

3.6.2 Flora and Vegetation Surveys

Numerous ecological surveys have been completed since 2007 within the wider Forrestania Project Area to understand the local vegetation and flora (Table 3). The New Morning survey (Botanica 2021a – Appendix 1) provides further detail on the work completed in the region (Appendix 1, Table 4-1, pp 21-23).

A detailed survey of the New Morning area and targeted flora survey was undertaken over two seasons (Botanica 2021a):

- 27-29 August 2018;
- 23-24 May 2019.

The flora and vegetation survey was conducted in accordance with EPA Technical Guidance (EPA 2016c) and Environmental Guideline for Flora and Vegetation (EPA 2016b). The survey covered an area of approximately 1,298 ha and 36 quadrats (20 m x 20 m) were established during the survey to have at least three quadrats within each of the vegetation communities present (Figure 10). The Botanica (2021a) report is attached as Appendix 1.

A subsequent targeted Threatened/Priority flora survey was undertaken in August 2021 by Botanica (2021b) which included the proposed clearing area. This survey was focused on identifying the occurrence of *Paragoodia crenulata* and was undertaken during the flowering period of this species. The results are provided in Section 3.6.6.2.

3.6.3 Local Vegetation Communities

A total of nine vegetation types were identified within the area surveyed (Table 4), of which three (3) occur in the proposed development envelope (Figure 11):

- CLP-EW1: Low open forest of *Eucalyptus flocktoniae/ E. salubris/ E. urna* on clay-loam plain
- CLP-EW2: Mid open woodland of *Eucalyptus salmonophloia* on clay-loam plain
- R-MWS1: Mid mallee shrubland of *Eucalyptus tephroclada/ E. pileata* on stony rise.

Species composition assessments indicate there was minimal heterogeneity in species composition across the survey area, with the majority of vegetation associations (particularly the Eucalypt woodland associations) intermixed into floristic groups despite differences in dominant stratum taxa; however, two distinct supergroups were identified (Botanica 2021a).

The first supergroup comprised of a mix of vegetation associations identified in the field including quadrats from the clay-loam plain (Eucalypt Woodlands and sand-loam plain (Mallee Woodlands and Shrublands)). The second supergroup comprised a mix of quadrats from the sandplains (Mallee Woodlands and Shrublands/ Heathlands) and stony rise (Mallee Woodlands and Shrublands).

Table 3: Vegetation and flora surveys conducted within 20 kms of the Project

Survey consultant and date	Survey Title	Description and findings relating significant flora and vegetation
Botanica Consulting 2007	New Morning/Spotted Quoll Flora Survey	• A Flora and vegetation survey over 617 ha in the New Morning/Spotted Quoll area • A population of Declared Rare Flora (DRF) pursuant to the EPBC Act (*Eucalyptus steedmanii*) was recorded.
Botanica Consulting 2007	Cosmic Boy Flora and Vegetation Survey	• A Flora and vegetation survey over 109 ha in the Cosmic Boy area • No DRF or TECs, pursuant to the EPBC Act, were recorded within the project area.
Department of Environment and Conservation 2009	Flora of select areas of three greenstone belts in the Yilgarn Craton: Bullfinch, Forrestania and Ravensthorpe	• A flora survey of the Northern Forrestania region, 50 20x20m quadrats were established (approximately 15 kms from the northern boundary of the New Morning Project area). • Two species of DRF were recorded: ○ *Banksia sphaerocarpa var. dolichostyla* ○ *Eucalyptus steedmanii*
Botanica Consulting 2009	Flora and Vegetation Survey within the Greater Cosmic Boy Area	• A Flora and vegetation survey over 102 ha in the greater Cosmic Boy area • No DRF or TECs, pursuant to the EPBC Act, were recorded within the project area.
Botanica Consulting 2009	Spotted Quoll Expansion Area Flora and Vegetation Survey	• A Flora and vegetation survey in the Spotted Quoll exploration area. • *Eucalyptus steedmanii* (DRF pursuant to the EPBC Act) was recorded in three vegetation types. • No TEC's were recorded within the project area.
Botanica Consulting 2011	Spotted Quoll/Cosmic Boy Haul Road Flora and Vegetation Survey	• No DRF, pursuant to the EPBC Act, were recorded within the project area. • However, Population 2 of the DRF species *Eucalyptus steedmanii* was identified and located approximately 20 m north-east and 470 m west of the most northern region of the survey area. • There were no TECs as defined by the EPBC Act 1999 recorded within the survey area.
Botanica Consulting 2021a	Detailed Flora and Vegetation Survey and Targeted Flora Survey of the New Morning Project.	• A flora and vegetation survey and targeted flora survey over 1,298 ha which included the larger New Morning Project area. • Survey undertaken over two seasons in 2018 and 2019. • Two DRF species, *Eucalyptus steedmanii* and *Paragoodia crenulata,* pursuant to the EPBC Act, were recorded near the Project area. • Four Priority flora species recorded. • Four weed species identified. • There were no TEC's as defined by the EPBC Act 1999 recorded within the survey area.
Botanica Consulting 2021b	Memorandum: New Morning Project – Targeted Flora Survey	• Targeted survey of 64 ha in the proposed disturbance envelope planned to occur during the flowering period of DRF species *Paragoodia crenulata*. • No new Priority flora recorded from that recorded in 2018 & 2019 (Botanica 2021a). • A total of 1,000 plants of *Paragoodia crenulata* recorded with the survey area.

vegetation associations.

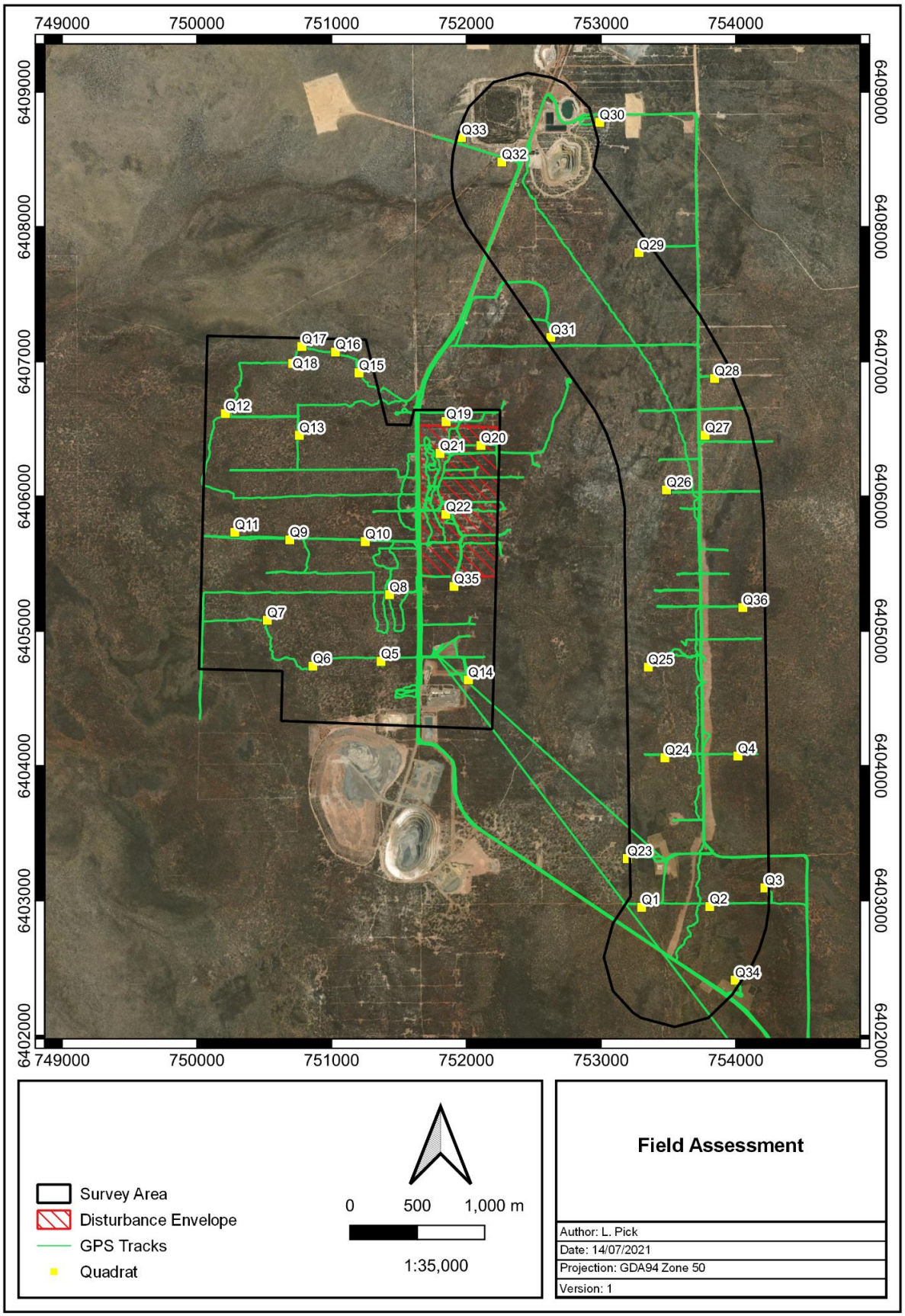

Figure 10: Location of Quadrats assessed by Botanica in the New Morning area (from Botanica 2021a)

Figure 11: Vegetation groups mapped by Botanica in the New Morning area (from Botanica 2021a)

Table 4: Vegetation groups identified in Botanica survey (2021a)

Vegetation Code	Landform	NVIS	Vegetation Association	Quadrat	Vegetation Condition	Veg Area surveyed (ha)	% Veg Assoc of overall Survey Area (%)	Survey Area in Development Envelope*	Estimated vegetation clearing required (ha)	% Veg Clearing in overall survey area
CLP-EW1**	Clay-Loam Plain	Eucalyptus Woodland (MVG 5)	Low open forest of *Eucalyptus flocktoniae/ E. salubris/ E. urna* on clay-loam plain	Q3, Q10, Q14, Q19, Q20, Q35	Good	322	24.8	22.37	14.2	4.4
CLP-EW2			Mid open woodland of *Eucalyptus salmonophloia* on clay-loam plain	Q5, Q13, Q22	Very Good	121	9.3	23.34	12.6	10.7
CLP-EW3**			Burnt open low woodland of Eucalyptus salmonophloia over mallee shrubland of *E. pileata/ E. tephroclada/ E. celastrioides* on clay-loam plain	Q1, Q4, Q8, Q9, Q24, Q36	Good	281	21.6	Nil	Nil	Nil
CLP-EW4			Mid woodland of *Eucalyptus longicormis* on clay-loam plain	Q6, Q7, Q11, Q12	Very Good	75	5.8	Nil	Nil	Nil
R-MWS1**	Stony rise	Mallee Woodland and Shrubland (MVG 14)	Mid mallee shrubland of *Eucalyptus tephroclada/ E. pileata* on stony rise	Q2, Q18, Q21	Very Good	36	2.8	13.28	2.2	6.0
SLP-MWS1	Sand-Loam Plain	Mallee Woodland and Shrubland (MVG 14)	Mid mallee shrubland of *Eucalyptus tephroclada/ E. pileata/ E. transcontinentalis* on sand-loam plain	Q15, Q27, Q28, Q30	Very Good	177	13.6	Nil	Nil	Nil
SLP-MWS2			Mid mallee shrubland of *Eucalyptus steedmanii* on sand-loam plain	Q23, Q25, Q26, Q31	Very Good	51	3.9	Nil	Nil	Nil
SP-H1	Sandplain	Heathlands (MVG 18)	Mid heathland of *Allocasuarina corniculata/ Acacia acuminata* on sandplain	Q16, Q29, Q34	Very Good	112	8.6	Nil	Nil	Nil
SP-MWS1		Mallee Woodland and Shrubland (MVG 14)	Low open mallee shrubland of *Eucalyptus platycorys/ E. horistes* on sandplain	Q17, Q32, Q33	Very Good	19	1.5	Nil	Nil	Nil
CV	N/A	N/A	Cleared Vegetation*		Completely Degraded	104	8	Nil	*	*
			TOTAL	**36**		**1298**	**100**	**64.0**	**29.0**	**N/A**

*this does not take into account the existing disturbance as mapped by WSA
**vegetation in clearing envelope

3.6.4 Vegetation Condition

Botanica (2021a) based the vegetation condition rating scale adapted from Keighery, 1994 and Trudgen, 1988 (ranging from 'pristine' to 'completely degraded'). The vegetation communities recorded in the development envelope were recorded in 'very good' and 'good' condition:

- CLP-EW1: Low open forest of *Eucalyptus flocktoniae/ E. salubris/ E. urna* on clay-loam plain – 'Good'.
- CLP-EW2: Mid open woodland of *Eucalyptus salmonophloia* on clay-loam plain – 'Very Good'.
- R-MWS1: Mid mallee shrubland of *Eucalyptus tephroclada/ E. pileata* on stony rise – 'Good'.

Historic disturbance, including that undertaken for exploration, is located within the development envelope and comprises 10.44 ha of the 64 ha development envelope.

The Project area was subject to a significant bushfire (caused by lightning strike) in 2019.

3.6.5 Significant Vegetation Communities

No Threatened Ecological Communities (TECs) or Groundwater Dependant Ecosystems were recorded within the development envelope (Botanica 2021a).

The Project is located within the buffer of the 'North Ironcap of the Ironcap Hills Vegetation Complexes' which is listed by the DBCA as a Priority 3 Ecological Community. Botanica (2021a) identified that this vegetation complex was not represented within the area surveyed.

3.6.6 Conservation Significant Flora

Botanica (2021a) identified a total of 38 Families, 98 Genera and 280 Species (including sub-species and variants) which included six flora species of conservation significance (Table 5).

Of the six species identified, three species are in the proposed clearing envelope (Figure 12):

- *Stylidium sejunctum* (P3).
- *Eremophila racemosa* (P4).
- *Microcorys* sp. Forrestania (V. English 2004) (P4).

Two Threatened Flora taxon pursuant to the BC Act and the EPBC Act were identified during the Botanica (2021) survey which are outside of the clearing envelope (Figure 12):

- *Eucalyptus steedmanii* – 170 m north of the clearing envelope (southern edge of Population 1) and ~100 m east of the clearing envelope (western edge of Population 8).
- *Paragoodia crenulata* (also considered endemic to the area) – located 50 m south of the clearing envelope.

E.steedmanii was identified in a 2008 survey of the overall New Morning Project area (Botanica 2008) and a summary of the work completed in relation to this species, in addition to *Paragoodia crenulata* and the three Priority flora species recorded in the clearing envelope is provided in Sections 3.6.6.1 to 3.6.6.5.

Table 5: Conservation significant flora recorded in the Botanica (2021a; 2021b) survey area

Taxon	No. plants within clearing envelope	No. plants in local area (within 50 km)^	Clearing Envelope % impact on local populations
Eucalyptus steedmanii (T)	0	2,236,688	0.0
Paragoodia crenulata (T)	0	4,596	0.0
Eremophila racemosa (P4)	666	17,740	3.8
Eutaxia acanthoclada (P3)	0	1,326	0.0
Microcorys sp. Forrestania (V. English 2004) (P4)	1	15,505	0.006
Stylidium sejunctum (P3)	563	2,264	24.9

^ Based on both Botanica records and DBCA records (Botanica 2021b)

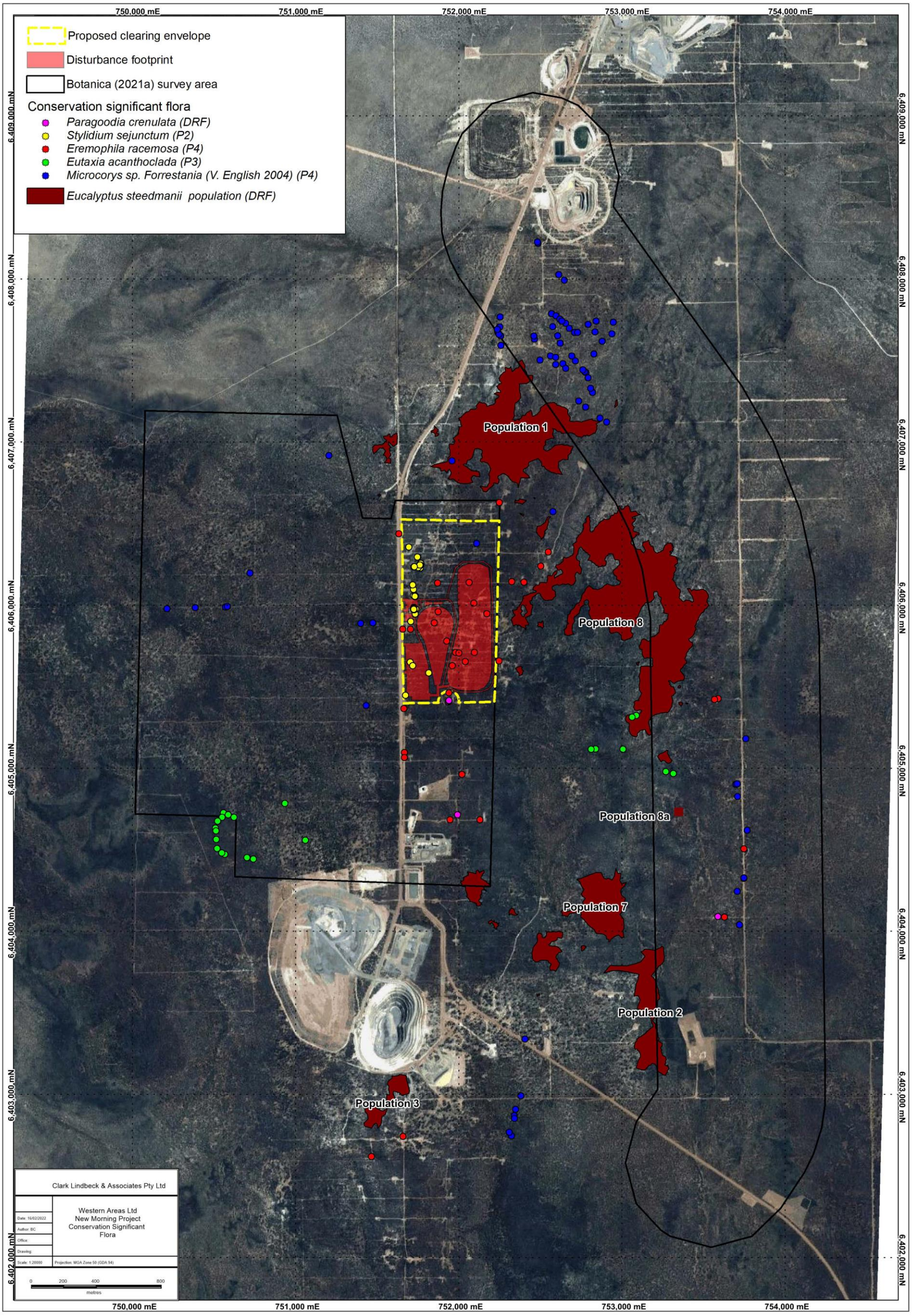

Figure 12: Flora of conservation significance recorded at the Project

3.6.6.1 Eucalyptus steedmanii

Eucalyptus steedmanii is listed as a Threatened Flora taxon (Vulnerable) under the Western Australian BC Act and the Commonwealth EPBC Act.

Numerous surveys in the wider Forrestania area have recorded populations of *E. steedmanii*, with five of these Populations 1, 2, 3, 8 and 8a located at the FNO (Figure 12, Figure 13, Table 7). Two of these populations, Population 1 and Population 8 are located approximately 170 m north and 100 m east of the proposed clearing envelope, respectively.

A management plan for *E.steedmanii* was initially prepared in 2006 (Jim's Seeds Weeds and Trees 2006) to develop management strategies for the protection of *E. steedmanii* given construction of a new dewatering pipeline from the existing Flying Fox mine to Cosmic Boy.

As part of the approval conditions for Spotted Quoll, a second *E.steedmanii* management plan was produced in 2009 (Coffey, 2009a) for the purpose of environmental impact assessment under Part IV of the EP Act for approval for the Spotted Quoll Mine. This was later reviewed and modified as required to meet the requirements of Condition 1 of EPBC 2008/4443 (Coffey 2009b).

An updated plan was produced in 2014 (Astron 2014), which consolidated the two previous plans to the requirements of the OEPA and Commonwealth and was approved by the OEPA in 2014. WSA reviewed and updated this management plan and submitted it to DWER for review and approval during 2020. Feedback from DWER's review of the revised management plan was recently received. This feedback was incorporated into the plan and was resubmitted to DWER on August 25, 2021. This Plan is attached as Appendix 3.

The work which has been undertaken by WSA since 2009 to monitor the health of the local *E. steedmanii* population to ensure there is no impact from mining activities is summarised in Table 6.

Three population censuses have been undertaken to date (2009, 2014, 2019) and the most recent census report is provided as Appendix 4. The results are summarised in Table 8. The results of the current census compared against baseline results obtained in 2009-2010, indicate there is no impact on the *E.steedmanii* populations from mining activities, although there have been impacts from large regional bushfires (Botanica 2020 - Figure 14) and from dieback (Section 3.6.8) (Table 8).

The 2019 population census was required in January 2018; however, this was postponed due to the discovery of Dieback occurrence (*Phytophthora boodjera*) within Population 7 from annual monitoring undertaken by WSA during 2017/18 (Section 3.6.8). Investigations have been undertaken, with the assistance of expert consultants, to identify the occurrence of Dieback through occurrence mapping and by implementing a management plan in order to manage this potential risk (Figure 17).

Recent results relating to the impact of dieback and fire on this species is provided in Table 7.

Whilst undertaking routine monitoring; WSA aims to record the location and extent of any unintentional clearing, saline water spillage, fire or fire management activity or uncontrolled vehicle access where *E. steedmanii* may be present within the tenements. Such incidences are also noted during general surveillance by WSA environmental personnel or via reports from other WSA staff. These records enable any impacts on *E. steedmanii* from these incidences to be investigated and assessed over time.

Table 6: Summary of monitoring requirements during operations and closure

Activity	Parameters	Populations	Frequency
Census	• Plant density • Plant condition rating • Reproductive status	1 to 8^	Four yearly.
E. steedmanii health monitoring (observation)	• Visual observations and photographs	1, 3A/3B and plants identified by Botanica (2009)	Quarterly.
E. steedmanii health monitoring (ratings)	• Plant condition rating • Presence of seed • Seed development • Recruitment	1,2, 3A/3B and 7. 4, 5 and 6.	Quarterly. Annually.
Dust deposition (gauges)	• Weight per unit area per unit time	At-risk populations and control areas*	Quarterly.
Dust deposition (*E. steedmanii*)	• Deposition rating	At-risk populations and control areas*	Quarterly.
Fuel Load	• Unspecified	Areas surrounding Spotted Quoll operations.	Annual.
Miscellaneous potential threats	• Unintentional clearing • Spillage of saline water • Fire and fire management • Uncontrolled vehicle access	Areas surrounding Spotted Quoll operations.	Concurrent with above monitoring activities and opportunistic surveillance at other times.

^ Since the management plan was prepared by Coffey (2009a), Population 8 was identified and included in censuses (Botanica 2014)

*At-risk populations with respect to dust deposition are those adjacent to the haul road and those to the south of the pit; therefore, Population 1, 3a and 3b. Dust gauges and *E. steedmanii* monitoring transects at population 2 and 7 are therefore assumed at present to be controls (that is, sites where no impact of dust from operations is expected).

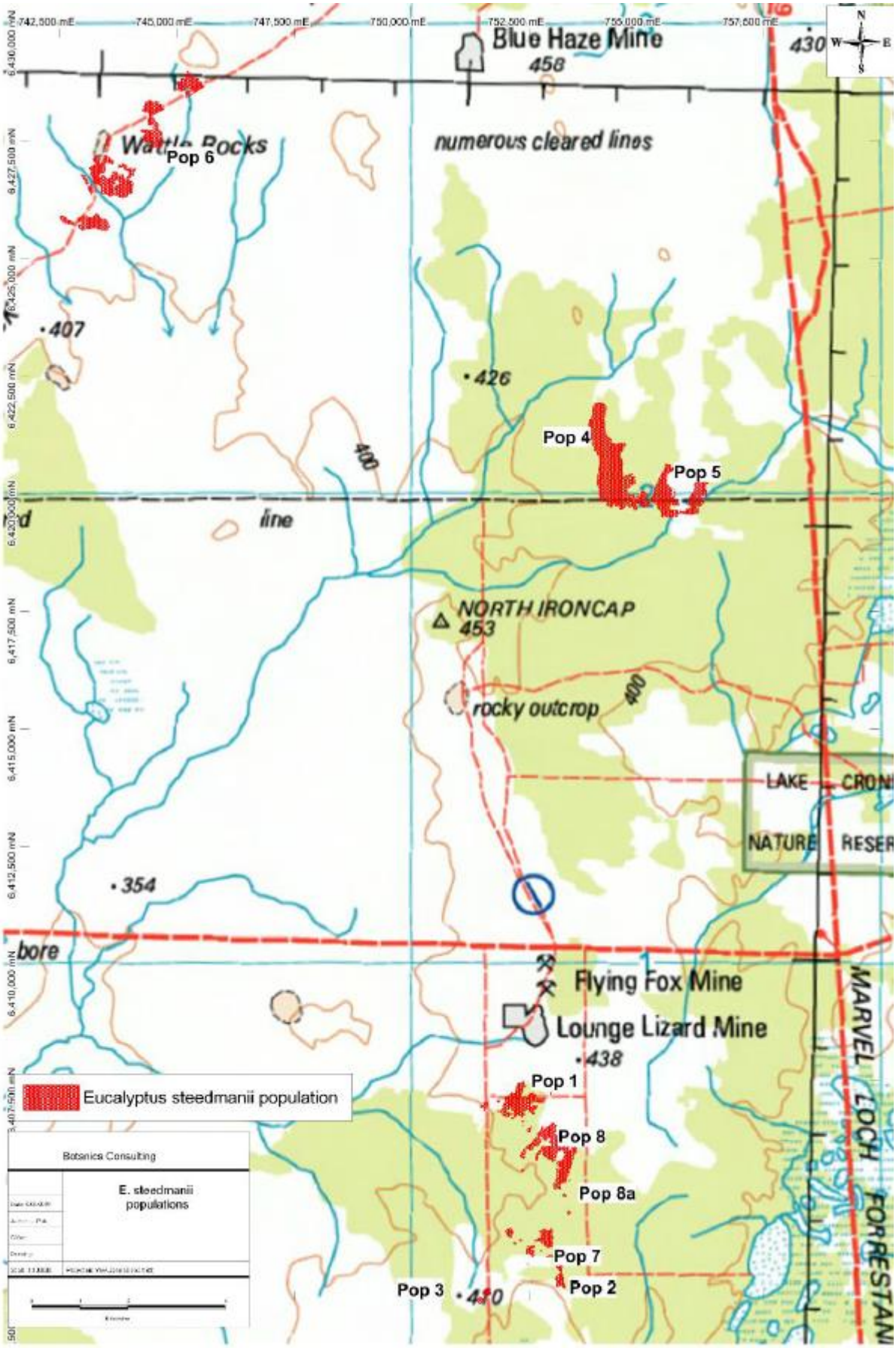

Figure 13: Occurrence of *E steedmanii* in the Forrestania Area

Table 7: Relevant FNO flora and vegetation studies related to *E.steedmanii* (summarised by WSA 2020)

Year	Author	Study	Scope of study	Key relevant findings
2008	Botanica	Vegetation Survey of New Morning to Spotted Quoll Area within the Tenements M77/583 and M77/545	Scoping study for development of a new mine in the New Morning/Spotted Quoll Area. Total of 616.7 ha surveyed in accordance with EPA (2005).	*E. steedmanii* was found and mapped in the study area including portions of populations now referred to at the FNO as populations 1, 2, 3 and 7. The report recommended avoidance of areas containing *E. steedmanii* where possible.
2009	Botanica	Eucalyptus steedmanii Population Monitoring Report	Baseline vegetation monitoring of six *E. steedmanii* populations known to the then Department of Environment and Conservation (DEC), now the Department of Biodiversity Conservations and Attractions (DBCA).	Population 4 had the highest percentage of sterile trees and trees with immature fruit, while Population 2 had the highest percentage of trees with mature fruit. Population 2 also had, on average, the highest percentage cover of DRF along established transects.
2014	AES	Forrestania *Eucalyptus steedmanii* Monitoring Program Review	Review of monitoring program for *E. steedmanii.* This necessitated a review of the 2009 management plans, focusing on the monitoring program outlined within them. It included an analysis of the data collected in the monitoring program to date, particularly for tree health, reproduction, and dust deposition measured in dust gauges.	The replacement of two 2009 management plans for *E. steedmanii* with one new management plan was a key recommendation. This would resolve the issue of having one monitoring program that is guided by two management plans, and would enable the revised plan to incorporate information as at 2014, and provide an opportunity to refine the current monitoring program.
2017	Southern Ecology	Preliminary assessment of health decline in *Eucalyptus steedmanii.*	Work was scoped as a result of recorded vegetation health decline in populations of *E. steedmanii* measured by WSA environmental personnel in July of 2017. A survey of populations 1, 3 and 7 for possible pathogens and causes was carried out in September 2017.	Soil borne *Phytophthora boodjera (P. boodjera*) was detected in populations 3 and 7 by the DBCA and the Vegetation Health Service (VHS) from prior samples submitted by WSA environmental staff. Population 3 was observed to have impeded drainage due to formed road construction immediately below an infection site. Increased soil moisture is known to exacerbate impact and spread of *Phytophthora* species. At the local disease patch level, the vegetation decline appeared to be associated with cascading environmental and ecosystem changes initiated by historical (>5 years) disturbance and indirect community changes. Aerial canker fungi were concluded to be contributing to the cycle of decline combined with invasion by *Phytophthora*.
2018	Southern Ecology	*Phytophthora boodjera* Occurrence Map	A methodology for mapping *P. boodjera* occurrence is not covered in formal guidelines, therefore a novel combination of strategic grid pattern and targeted sampling of soil and roots of recently dead plants was undertaken.	A total of 110 soil and root samples were collected over a 10-month period, between September 2017 and July 2018. *P. boodjera* was recovered from 9 samples at 5 discrete locations. These 5 infested areas of *P. boodjera* were mapped and the extrapolation of potential dispersal by surface water identified a "*P. boodjera* Risk Area" of approximately 518 ha. A total of 3 protectable areas (total of 897 ha) were defined that are (surface) hydrologically isolated from infested areas and encompass multiple populations of *E. steedmanii*.

Year	Author	Study	Scope of study	Key relevant findings
2020	Botanica	Memorandum - *Eucalyptus steedmanii* Fire Damage Assessment – March 2020	Commissioned to assess damage caused by bushfires and firebreaks (February 2020) to populations *E. steedmanii.*	The assessment determined that approximately 4.2 ha (7.9 %) of Population 8 had been damaged during the February 2020 bushfire event. Botanica concluded that given Population 8 comprised mainly mature seeds prior to the fire, the potential to regenerate from seed is possible. Evidence of this occurring in the past is shown by the 1994 fire that swept through Forrestania affecting known populations which regenerated with many trees now present in mallee form. Botanica further concluded that given the small proportion of the population impacted, it is unlikely that the bushfire will result in a significant impact to *E. steedmanii*.

Table 8: Quadrennial census survey results (summary provided by WSA)

Year	Author	Census	Scope	Key relevant findings
2009	Botanica	*Eucalyptus steedmanii* Population Monitoring Report – September 2009	Baseline monitoring of six *E. steedmanii* populations including Populations 1, 2, 3, 4, 5 and 7.	General health condition of all populations was considered excellent (Keighery 1994) with some historical tracks and mine workings noted as occurring 20-25 years ago. Some individual DRF trees amongst each population were in poorer health due to the occurrence of the parasitic creeper *Cassytha melantha* (Large Dodder-laurel). Population 4 had the highest percentage of sterile trees and trees with immature fruit, while Population 2 had the highest percentage of trees with mature fruit. Population 2 also had on average, the highest percentage cover of DRF along established transects.
2014	Botanica	*Eucalyptus steedmanii* Population Monitoring Report – January 2014	Vegetation monitoring of eight *E. steedmanii* populations including Populations 1-8.	Population 6 (previously known to DBCA) and Population 8 (located by Botanica in 2010) were included in census reporting for the first time. Overall, the abundance of average mature fruit increased in Populations 1, 3, 4, 5 and 7 with fruit constant in other populations. Average percentage cover remained constant in Populations 5, 6, 7 and 8 and increased in Populations, 1, 2, 3 and 4. Three of the eight populations recorded increased population size, four populations remained constant and one population (Population 5) recorded a decrease in population size. General health of all populations was considered excellent (Keighery 1994). Populations close to the Spotted Quoll mine operation showed no ascertainable health difference when compared to populations located further away.
2019	Botanica	*Eucalyptus steedmanii* Population Census Monitoring Report – August 2019	Vegetation monitoring of eight *E. steedmanii* populations including Populations 1-8. The population census was due in January 2018 however this was postponed due to the discovery of dieback (*Phytophthora boodjera*) within population 7 from annual monitoring undertaken by WSA during 2017/18.	Population 7 was impact by *Phytophthora boodjera,* resulting in reduced cover. The report concluded that populations closer to the Spotted Quoll mine operation (Populations 1, 2, 3 and 7), have shown no ascertainable difference in individual tree health assessments, percentage cover of *E. steedmanii* or the overall population estimations in the 2019 monitoring period, when compared to the analogue population's (Populations 4, 5, 6 and 8). This is despite *P. boodjera* being detected in Population 3 as part of the survey undertaken by Southern Ecology (2017). The most notable evidence of decline since baseline monitoring, was recorded for the analogue sites with Population 4 and 5 showing an increase in sterile plants and decrease in plant numbers since the baseline monitoring period. All the individual trees recorded within the Population 6 transects had a 'very healthy' (Rating 3) condition. Since 2010, the average extrapolated population size of Population 6 has increased from 514,848 to 517,397 plants. Average percentage cover has also shown a slight increase since 2010 (0.90% increase), increasing from 37.6% to 38.5% in 2019. Average sterile plants have decreased by 9.09% since 2009/2010 (no sterile plants in the current monitoring period), with all trees having mature fruits.

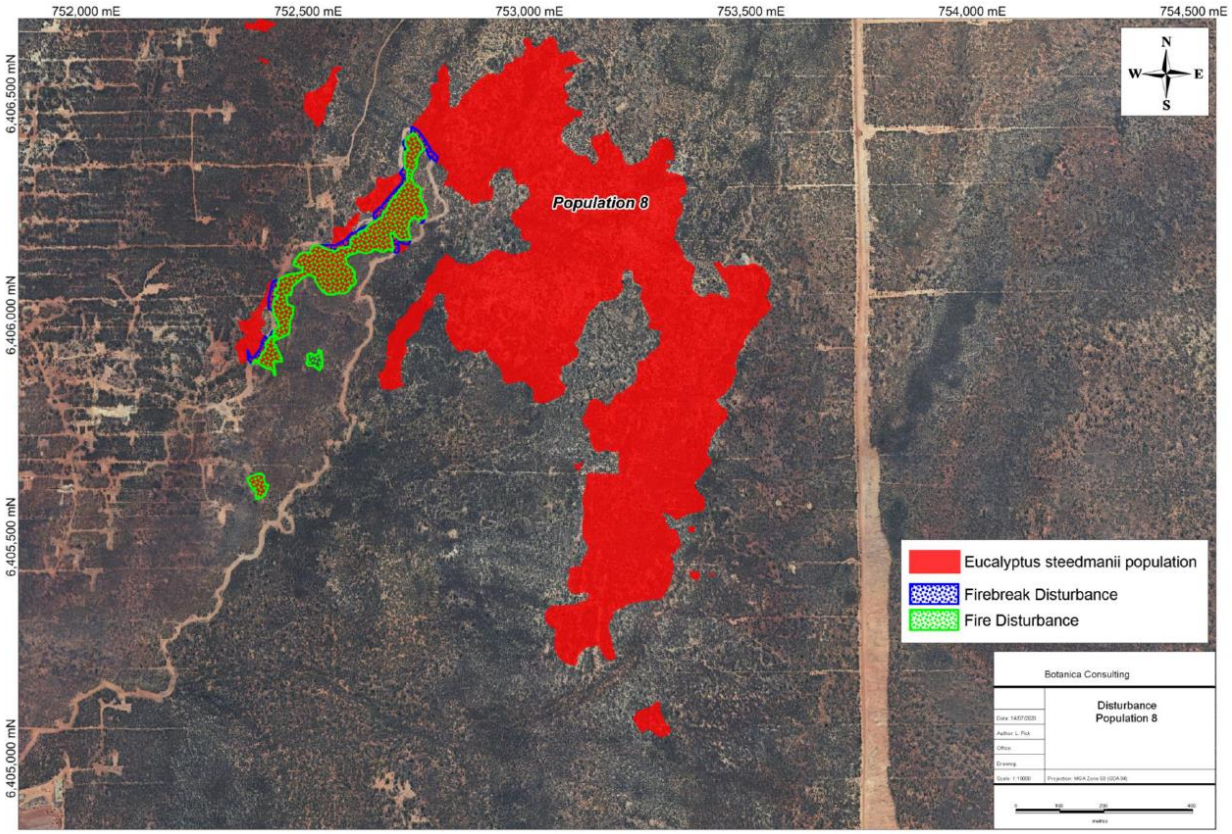

Figure 14: Fire impact to Population 8 mapped by Botanica (2020)

3.6.6.2 Paragoodia crenulata

Paragoodia crenulata is listed as a Threatened Flora taxon (Vulnerable) pursuant to subsection (2) of section 23F of the Western Australian BC Act and Critically Endangered under the Commonwealth EPBC Act. This taxon is described as a small herbaceous plant with perennial underground parts and was previously known from only two populations in the Forrestania area (DAWE 2021).

The species is endemic to the Forrestania region and Botanica (2021b) recorded three additional populations of this taxon with one population identified 50m south of proposed clearing envelope with a total of 1000 plants (Figure 12). There are approximately 4,596 plants recorded in the local region (within 50km of the survey area) (Botanica 2021b).

Botanica (2021a) refer to both recorded locations of this taxon having been identified on previously cleared/ rehabilitated drill pads within one vegetation association: Low open forest of *Eucalyptus flocktoniae/ E. salubris/ E. urna* on clay-loam plain (CLP-EW1).

This species is thought to require disturbance (DEC, 2010) which was supported by Botanica's (2021a) field observations i.e. species located on previously cleared/ rehabilitated drill pads. This vegetation group is not limited to the Project area, it was identified in the survey area and extends outside to the surrounds.

WSA has revised the clearing envelope to ensure it avoids disturbance to this species and is located outside of the 50m buffer from the population extent (i.e. outside of the ESA).

3.6.6.3 *Stylidium sejunctum* (P3)

This taxon is described as a caespitose perennial herb that reaches heights of 0.25–0.45 metres. The flowers are white, pink and purple and bloom from September through November. It inhabits sites with clayey sand, loam or laterite on outcrops, upper slopes and breakaways in the southern wheatbelt (Figure 15).

Botanica (2021) recorded 98 locations of this taxon within their survey area, two of which are DBCA known locations. This taxon was recorded within two vegetation associations (CLP-EW1 and R-MWS1).

Botanica (2021) recorded 563 plants within the proposed clearing envelope which represents 24.9% of the local population.

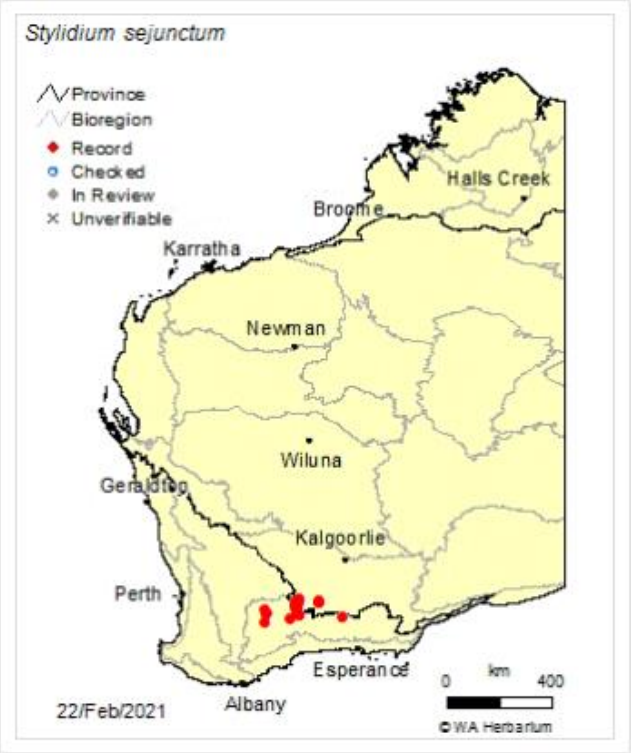

Figure 15*: Stylidium sejunctum* distribution (Source: florabase 2021)

3.6.6.4 *Eremophila racemosa* (P4)

This taxon is described as an erect shrub that grows up to 0.5-1.7m high in sandy or stony loam, clay loam soils and can be found on undulating plains and roadsides (WAHERB, 2018) across the southern wheatbelt (Figure 16).

Botanica recorded 35 locations of this taxon within their survey area, two of which are DBCA known locations. This taxon was recorded within four vegetation associations (CLP-EW1, CLP-EW2, CLP-EW3 and R-MWS1).

Botanica (2021) recorded 666 plants within the proposed clearing envelope which represents 3.8% of the local population.

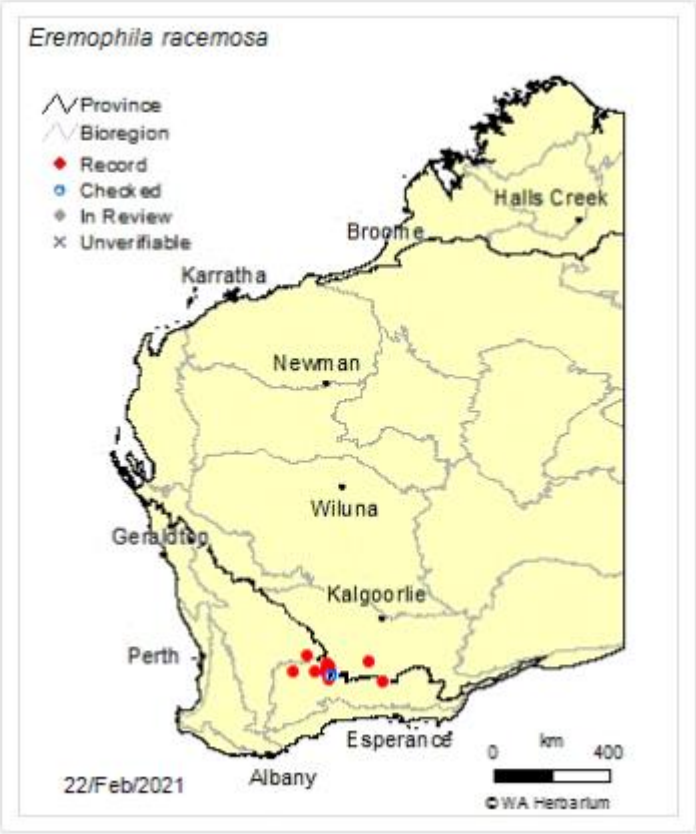

Figure 16: *Eremophila racemosa* distribution (Source: Florabase)

3.6.6.5 *Microcorys* sp. Forrestania (V. English 2004) (P4)

This taxon is described as a prostrate or erect shrub that is up to 0.35-0.4 m high and grows in yellow sandy clay or red-brown clay soils and it can be found in open woodland or cleared areas (WAHERB, 2018).

Botanica recorded 78 locations of this taxon within the survey area. There are no DBCA records of this taxon located within the survey area. This taxon was recorded within five vegetation associations (CLP-EW1, CLP-EW2, CLP-EW3, SLP-MWS1 and SLP-MWS2).

Botanica (2021) recorded one individual plant within the proposed clearing envelope which represents 0.006% of the local population.

3.6.7 Introduced plant species

Four introduced species were identified within the area surveyed by Botanica (2021) with all recorded within the same vegetation association (CLP-EW1):

- *Dittrichia graveolens* (Stinkwort).
- *Lysimachia arvensis* (Pimpernel).
- *Sonchus olearaceus* (Common Sowthistle).
- *Wahlenbergia capensis* (Common Bluebell).

None of these species are listed as a Declared Plant under Section 22 of the *Biosecurity and Agriculture Management Act 2007* (BAM) Act (DPIRD 2021).

3.6.8 Dieback

Dieback occurrence (*Phytophthora boodjera*) was first identified at FNO as part of investigations to determine the cause of a reduction in health of individual *E.steedmanii* plants identified within Populations 1 and 7 during annual monitoring undertaken in 2017-18.

In June 2017, it was noted that the health of Populations 1 and 7 were declining. An investigation by soil sampling identified that *Phytophthora boodjera* is the likely cause. The EPA was subsequently notified of the declining health in the populations. WSA committed to identifying the *P. boodjera* impact zone and implementing a management plan to control and reduce further spread of the dieback pathogen.

WSA Environmental staff took samples of soil, root and collar tissue and sent them for analysis to the Vegetation Health Service (VHS) of DBCA who confirmed the novel soil pathogen *P. boodjera* was detected within the samples. A subsequent investigation by dieback specialists Southern Ecology, confirmed the pathogen as partially responsible for contributing to plant health decline.

Further sampling was undertaken, with the assistance of specialist consultants (Southern Ecology 2018) to identify and map the occurrence of dieback and implement a management plan in order to manage this potential risk (Figure 17).

The sampling used as part of the mapping involved:

- 1 km^2 grid sampling of management area.
- 50 m^2 grid sampling around the existing *P. boodjera* infestation.
- Catchment overlay sampling at the head of micro-catchments.
- 50 m^2 grid sampling of proposed New Morning area (the original larger Project area).

Five discrete infested areas of *P. boodjera* were mapped and the extrapolation of potential dispersal by surface water identified a "*Phytophthora boodjera Risk Area*" of approximately 518 ha (Figure 17). Three protectable areas (a total of 897 ha) were defined that are (surface) hydrologically isolated from infested areas and encompass multiple populations of *E.steedmanii*. WSA subsequently developed and implemented a Dieback Management Plan and a Dieback Hygiene Procedure to reduce the spread of this pathogen (Appendix 6 and Appendix 7).

While dieback does potentially pose a risk to conservation significant flora, there are specific management measures in place to manage this risk.

3.6.9 Cumulative Impacts

The total FNO footprint (based on the 2020 AER), including both historic and existing disturbance that required clearing, is 586 ha, of which 289 ha is rehabilitated (this area does not include evaporation ponds established on cleared farmland).

The development footprint represents:

- <0.01% of the known extent of the Forrestania 511 (Medium woodland; salmon gum & morrel) which has a current extent of 153,002 ha.
- <0.001% of the area of the Greater Western Woodlands (16 million hectares – 60% woodland; 10% Mallee).

Factoring in the existing clearing at FNO, this is not a cumulatively significant contribution at a regional scale.

The potential cumulative impacts to significant flora and vegetation is not considered significant given the extent of these communities outside of the existing and proposed clearing envelope, which are widespread in the region.

Impacts to Priority flora have taken into consideration the regional populations and there are no significant impact to the conservation significance of these species.

WSA has effective management measures in place which will be extended to the Project area and will ensure cumulative indirect adverse impacts from dust generation, introduced weeds and altered fire or surface water regimes are not significant.

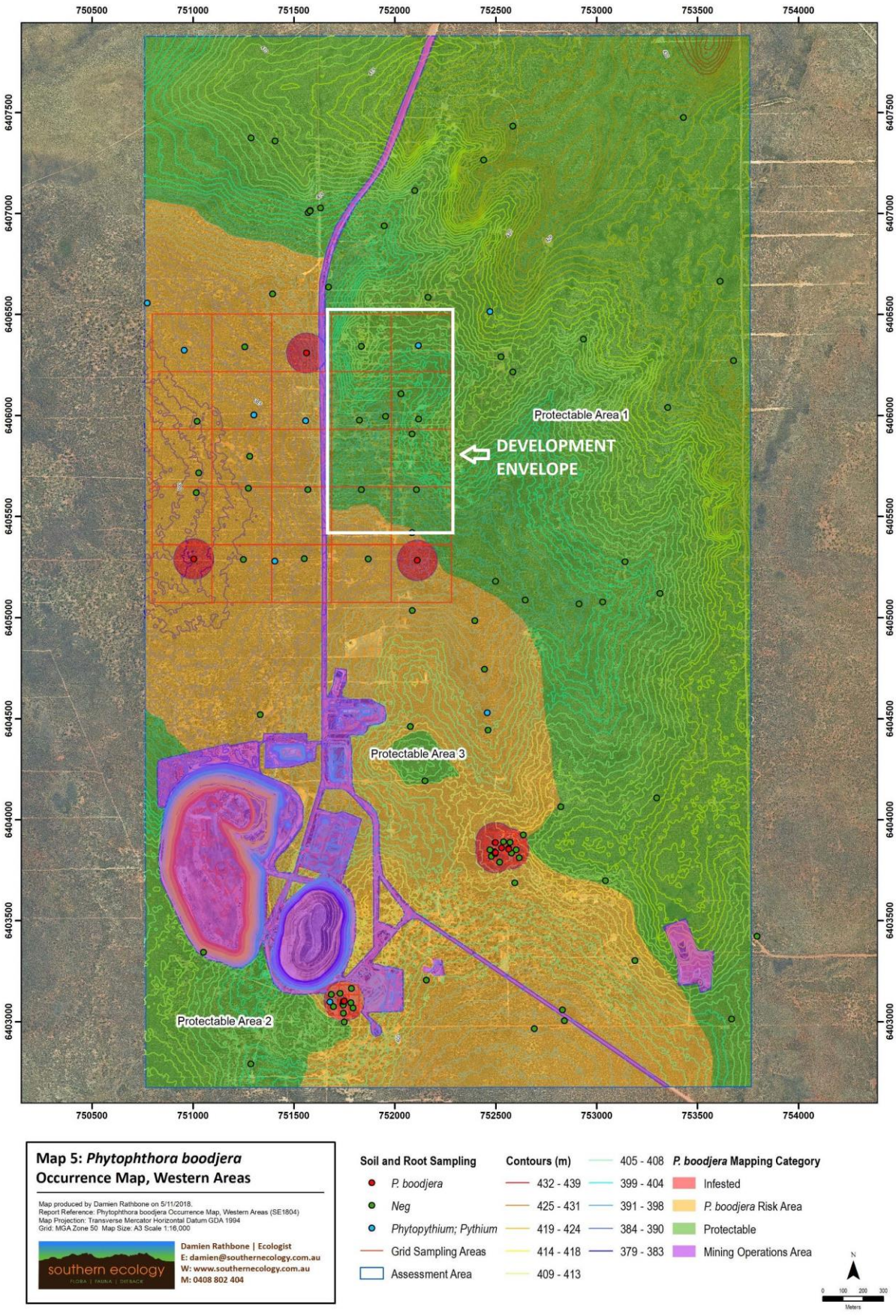

Figure 17: *Phytophthora boodjera* distribution (verified by Southern Ecology in June 2020)

3.7 TERRESTRIAL FAUNA

3.7.1 Fauna Surveys

Numerous surveys have been completed within the wider FNO area to understand the local fauna (Table 9). To date, 2 amphibians species, 51 reptile species, 139 bird species and 23 mammal species (five of which are introduced) have been recorded at the FNO (Biota 2019).

A Level 1 and targeted survey for key conservation significant fauna potentially occurring within the New Morning area was undertaken over a 13-day period from 27 August - 8 September 2018, in accordance with the relevant EPA Technical Guidance and the Commonwealth EPBC Act 1999. The Biota (2019) survey report is attached as Appendix 9.

Sampling effort included (Figure 18):

- Foot traverses encompassing the entire study area to identify Carnaby's Black-Cockatoo breeding 'habitat trees' and secondary evidence of Carnaby's Black-Cockatoo foraging and opportunistic records.
- Foot traverses encompassing the entire study area to identify Malleefowl nesting activity, occurrence and secondary signs.
- Targeted Elliott and Cage trapping at three systematic trapping sites and deployment of six remote cameras to determine occurrence of Chuditch.
- A total of 30 person hours dedicated to Short Range Endemics (SRE) searches at 11 sites within the study area.

Following the Biota (2019) survey, Johnstone and Kirkby (2019) (Black Cockatoo specialists), completed a targeted assessment of potential Carnaby's breeding hollows (identified by Biota). A copy of the report is attached as Appendix 10.

Given the occurrence of smooth barked Eucalypts at the Project, a survey to assess the potential occurrence of Arid Bronze Azure Butterfly (ABAB) was commissioned by WSA in 2021. The ABAB has an obligate association with the sugar ant known as *Camponotus* 'species near' (sp. nr.) *terebrans,* with the larvae of the butterfly residing and receiving protection within the nests of the ant. Therefore, determining ABAB habitat presence essentially comprises a search for nests of the ant.

A survey for the nest of the ant species was undertaken by Biota (2021) on 9 March 2021 in accordance with the DBCA (2020a; 2020b) guidance. Figure 23 shows the search effort undertaken for the ant species. A copy of the ABAB survey report is included as Appendix 11.

Table 9: Fauna surveys conducted within 40kms of New Morning

Survey consultant and date	Survey Title	Description and findings relating to MNES
Biota 2006	Forrestania Water Disposal Pipeline Fauna Survey	Single phase, Level 2 survey for a water disposal pipeline 38 km long Evidence of MNES: • One recently active malleefowl mound (outside of the New Morning footprint) • Carnaby's' Cockatoo – not recorded, however there was suitable breeding and foraging habitat present • Chuditch, Red-tailed phascogale, and Migratory species were not recorded.
Biota 2006	Forrestania Fauna Monitoring Survey	Four phase (February 2005, November 2005, May 2006, November 2006), Level 2 survey Evidence of MNES: • One Malleefowl mound • Carnaby's' Cockatoo – six individuals recorded at one site • Chuditch – one recorded
Biota 2006	Diggers South Fauna Survey	Single phase, Level 2 survey
Biota 2010	Spotted Quoll Haul Road Fauna	Single phase, Level 2 survey
Biota March 2008 May 2008 April 2009 August 2009	Forrestania Targeted Malleefowl Survey	Targeted Malleefowl Surveys • No malleefowl mounds were recorded within the New Morning footprint. • One active mound located 1.5 km east of the New Morning footprint • Two inactive mounds located 1.5 and 2 km south of the New Morning footprint
KLA 2010	Targeted Malleefowl Survey – Spotted Quoll Project	A three day targeted Malleefowl Survey in the Spotted Quoll area. • No Malleefowl or evidence of their recent presence were recorded in the disturbance footprint • Three very old Malleefowl mounds were identified within the survey area
KLA 2010	Targeted Chuditch Survey - Spotted Quoll Project	Targeted Chuditch survey was conducted between 27 February to 3 March 2010 and a second survey was conducted from 28 June- 30 June 2010. • No Chuditch were sighted and no evidence of Chuditch (tracks and scats) was recorded during either of the two targeted Chuditch surveys.
KLA 2011	Targeted Fauna Survey – Spotted Quoll – Cosmic Boy Haul Road	Evidence of significant fauna species: • No individuals were found • Potential Chuditch and Carnaby Cockatoo habitat was identified. • Three old malleefowl mounds were located
Biota 2019*	New Morning Level 1 and Targeted Terrestrial Fauna Survey (Appendix 8)	A 13 day targeted terrestrial fauna study of the proposed New Morning area (which has since been significantly reduced in size) was conducted (27 August – 8 September 2018) including habitat assessment, cage trapping and remote cameras deployment. Evidence of the following MNES was recorded (this area encompasses far larger than the currently proposed Clearing envelope): • Chuditch (one adult male captured, with scats recorded at two other locations – west of the proposed clearing envelope) • Carnaby's' Cockatoo (186 potentially suitable nesting trees) – no individuals recorded. • Malleefowl (six inactive nesting mounds and tracks west of the study site, and one individual 10 km south east of the project area).
Johnstone and Kirkby 2019*	Carnaby's Cockatoo Surveys at Western Areas, New Morning Project Forrestania	A four day targeted survey of 186 potential nesting trees in the vicinity of the New Morning project (as identified by Biota 2019) for use by Carnaby's Cockatoo (6-9 January 2019). Main conclusions were: • there was no evidence of Carnaby's Cockatoo breeding in the greater New Morning area; • Two individuals were observed opportunistically during the survey (adult and juvenile); • New Morning is at the eastern limit for distribution.
Biota Environmental Sciences 2021*	New Morning Arid Bronze Azure Butterfly Habitat Assessment	• A targeted survey over 62 ha for the ant *Camponotus sp. nr. terebrans* with which the ABAB has an obligate relationship. This ant species nests on smooth-barked Eucalypt trees. • No *Camponotus sp. nr. terebrans* were recorded, therefore it is considered highly unlikely that the Arid Bronze Azure Butterfly occurs in the project area.

*surveys commissioned specifically for New Morning

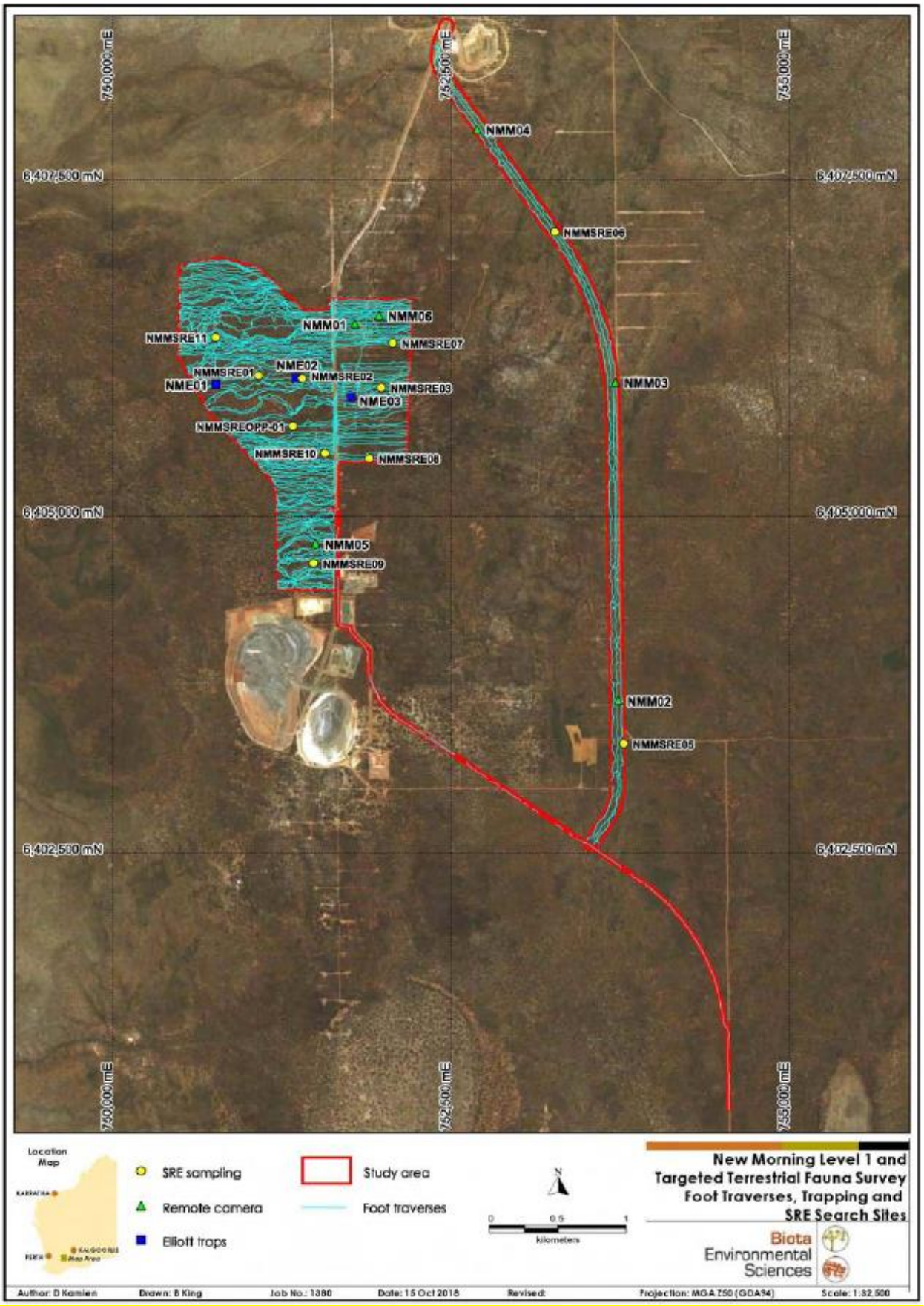

Figure 18: Fauna survey foot traverses and site locations (from Biota 2019)

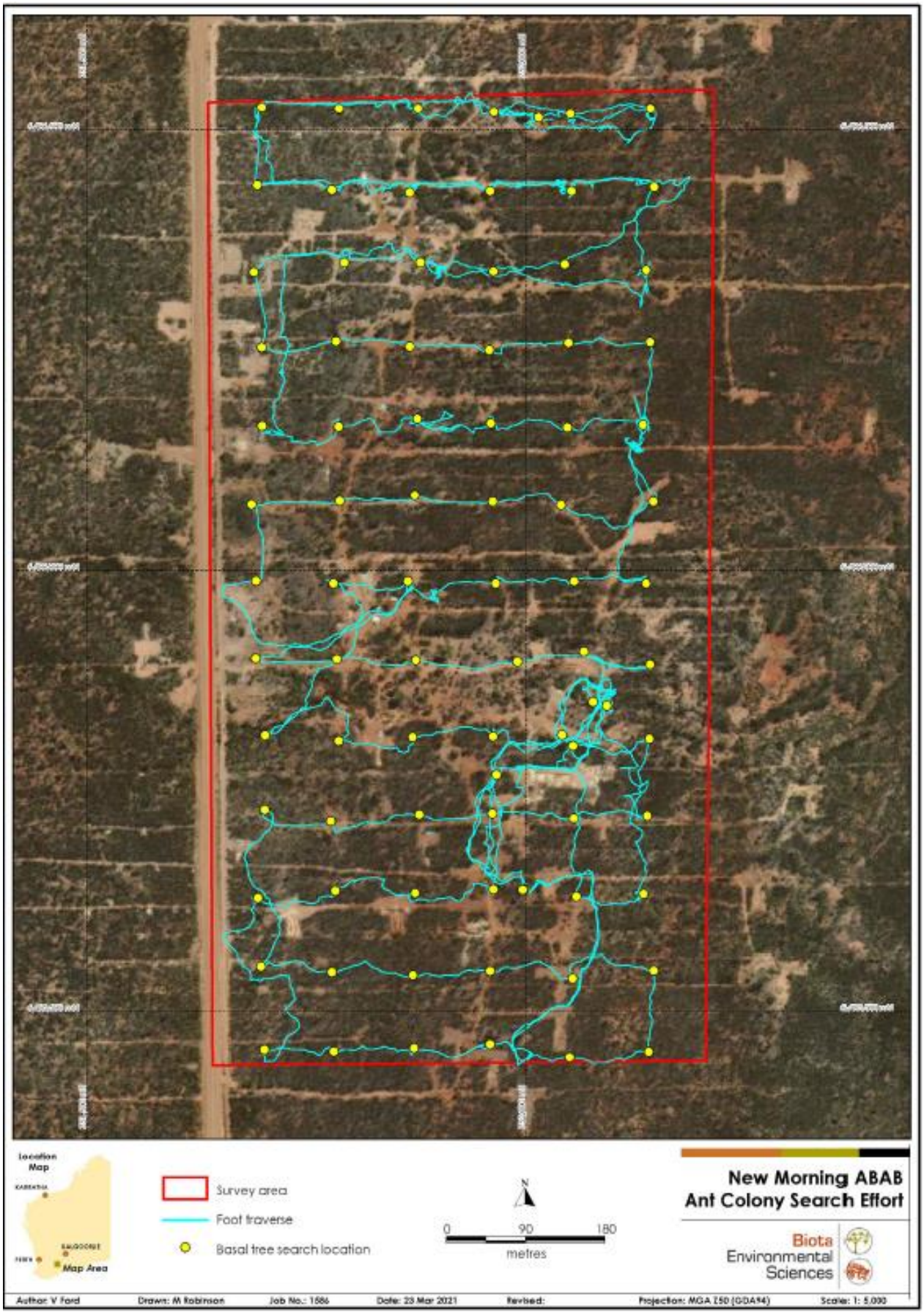

Figure 19: ABAB Ant Colony Search effort within the clearing envelope (from Biota 2021)

3.7.2 Fauna Habitat

Biota (2019) identified three fauna habitats in their survey, two of which occur in the proposed clearing envelope (Table 10):

- Eucalypt woodland on clay-loam plain
- Mallee woodland and shrubland on sand-loam plain on stony rise.

All fauna habitats within the proposed clearing envelope are common within the locality and occur contiguously with the same habitat types outside of the study area. Therefore, although significant fauna potentially occurring within the development footprint may be impacted, it is not likely to affect the persistence of these species in the locality. Similarly, the overall fauna assemblage within the study area would not be unique and would also occur outside of the study area.

Table 10: Fauna habitat areas based on Botanica (2021) vegetation associations in comparison with the proposed clearing envelope

Vegetation Association	Fauna habitat* (ha)	Surveyed fauna habitat in Clearing envelope* (ha)	Habitat in Clearing envelope as % of overall Botanica Survey Area
Low open forest of *Eucalyptus flocktoniae/ E. salubris/ E. urna* on clay-loam plain	322	50.72	15.75
Mid open woodland of *Eucalyptus salmonophloia* on clay-loam plain	121	13.28	5.0

*Based on total areas mapped by Botanica (2021a) consistent with these habitats. This does not account for those areas contiguous between the two survey areas and in the surrounding areas (i.e. these habitats are more extensive in the local area)

3.7.3 Conservation Significant Fauna

Biota's (2019) desktop assessment identified 22 fauna species of conservation significance that could potentially occur within the Project area. Of these, Biota (2019) identified 11 species of conservation significance that have been recorded or may potentially occur within the study site (Table 11). Nine SRE taxa were retrieved from the database search (Table 12).

Of the 22 species of conservation significance potentially occurring, evidence of the following species of conservation significance was recorded by Biota (2019):

- Carnaby's Cockatoo - *Calyptorhynchus latirostris* (Section 3.7.3.1)
- Malleefowl - *Leipoa ocellata* (Section 3.7.3.2)
- Chuditch – *Dasyurus geoffroii* (Section 3.7.3.3).

The results of the ABAB and SRE surveys are provided in Section 3.7.3.4 and Section 3.7.4, respectively.

Of the marine and migratory species listed, they do not rely on the habitats within the clearing envelope for breeding, and are most likely, transient fly over species which may use the habitats within the area for foraging (refer to Appendix 9, Table 5.2, pp 32-33). These marine species are recognised to have broad distributions across Australia and/or internationally where they occur in large numbers when present.

Table 11: Vertebrate species of conservation significance recorded or potentially occurring in the Project area

Species	Common Name	Conservation Status - State	Conservation Status - Commonwealth	Likelihood of occurrence*
AVIFAUNA				
Leipoa ocellata	Malleefowl	Schedule 3	Vulnerable	Recorded
Calyptorhynchus latirostris	Carnaby's Black Cockatoo	Schedule 2	Endangered	Recorded
Apus pacificus	Fork-tailed Swift	Schedule 5 – Migratory	Migratory	May potentially occur
Falco peregrinus	Peregrine Falcon	Schedule 7		Likely to occur
Platycercus icterotis xanthogenys	Western Rosella (inland subspecies)	Priority 4		Likely to occur
Chalcites osculans	Black-eared Cuckoo		Marine	May potentially occur
Merops ornatus	Rainbow Bee-eater		Marine	Likely to occur
MAMMALS				
Dasyurus geoffroii	Western Quoll, Chuditch	Vulnerable	Vulnerable	Recorded
Phascogale calura	Red-tailed Phascogale	Schedule 6	Endangered	May potentially occur
Notamacropus irma	Western Brush Wallaby	Priority 4		Likely to occur
REPTILES				
Paroplocephalus atriceps	Lake Cronin Snake	Priority 3		Likely to occur

*based on Biota (2019) assessment

Table 12: SRE taxa potentially occurring in the Project area

	Family	Species	Likelihood of occurrence*
Mygalamorph Spider	*Actinopodidae*	Missulena `MYG042`	May potentially occur
	Idiopidae	Eucanippe mallee	Unlikely to occur
		Gaius `MYG063`	Unlikely to occur
		Idiosoma `MYG064`	Recorded
		Idiosoma `MYG065`	Recorded
	Nemesiidae	Aname `MYG182`	Likely to occur
		Aname `MYG461`	May potentially occur
		Teyl `MYG068`	May potentially occur
Land Snail	*Bothriembryontidae*	Bothriembryon `Lake Cronin` n. sp.	May potentially occur

3.7.3.1 Carnaby's Cockatoo (*Calyptorhynchus latirostris*)

Carnaby's Black Cockatoo have been recorded in the Forrestania area (Johnstone and Kirkby 2019, Biota 2006).

Based on the results of the Biota (2019) survey, WSA has determined there were 27 potential Carnaby's Breeding Habitat Trees in the disturbance footprint, of which 11 contained nest hollows (Table 13, Figure 20). Further investigation of the trees with potential nest hollows were assessed by Johnstone and Kirkby (2019 – Appendix 10) to accurately define the suitability of the previously identified tree hollows for breeding by Carnaby's Black Cockatoo, and to assess the importance of the potential habitat (breeding and foraging habitat) at New Morning.

This involved a four day targeted survey of 186 potential breeding trees that contained nest hollows (6-9 January 2019), in the vicinity of the New Morning project (as identified by Biota 2019) for use by Carnaby's Cockatoo.

None of the nest hollows studied showed evidence of cockatoo use and most of these hollows were considered by Johnstone and Kirkby (2019) to be unsuitable even for small parrots. One suitable nest hollow is located east of the Project area on the former proposed haul road diversion which is located outside of the proposed clearing envelope (Figure 20).

Johnstone and Kirkby (2019) found no direct evidence of Carnaby's Cockatoos breeding in the New Morning area. Some foraging trees are present in the New Morning area i.e. heaths, comprising *Banksia*, *Dryandra*, *Grevillea* and *Hakea* spp. This vegetation is extensive outside of the Project area.

Table 13: Assessment of Carnaby's Cockatoo Breeding habitat trees in the clearing envelope and disturbance footprint

Parameter	Carnaby's Potential Breeding* Habitat Trees	Carnaby's Potential Breeding Trees Habitat with nest hollows**
Identified during (Biota 2019) survey the survey area extends outside of the proposed clearing area	1,445	186
Within proposed clearing envelope	50	17
Within proposed disturbance footprint	27	11

* Breeding trees includes all tree species of DBH greater than 300 mm
Johnstone & Kirkby (2019) identified that **none of these trees showed evidence of Carnaby's use and were considered unsuitable even for parrots

There was no evidence of feeding by Carnaby's in the clearing envelope.

As part of the Spotted Quoll assessment, Johnstone *et. al.* (2008) noted that only small numbers of the species are likely to occur in the region during the breeding season (September to January) and that many of the birds observed are likely to be migrants returning to and from the Lake Cronin and Hatters Hill feeding areas.

The Forrestania region is at the eastern limit of the distribution for Carnaby's Black Cockatoo in the south-west of the State. Although there are areas in the wider Forrestania region with good stands of Salmon Gum that contain hollows suitable for Carnaby's Black Cockatoos, there is a general lack of foraging habitat (i.e. with extensive *Banksia*, *Dryandra* and *Hakea* shrubs) and water is scarce (Johnstone and Kirkby 2019). This suggests the Project area is sub-optimal habitat for Carnaby's.

In summary, there is no evidence of Carnaby's nesting, nor was there any suitable nesting sites (hollows) in the New Morning area. There is some foraging habitat present (*Banksia*, *Dryandra* and *Hakea* shrubs), and roosting habitat that may be used by Carnaby's moving through the area, although water is scarce.

Johnstone and Kirkby (2019) concluded that: "*Overall we believe that the clearing of vegetation for the New Morning Project will not impact on the availability of breeding, feeding and roosting habitat for Carnaby's Cockatoo or cause a decline in the local (area/region) population as summarised in Appendix A*" (Appendix 10, Appendix A, pp 5-6).

As the site is at the eastern limit of the species' distribution, the habitat is considered to be sub-optimal to support Carnaby's Black Cockatoo populations.

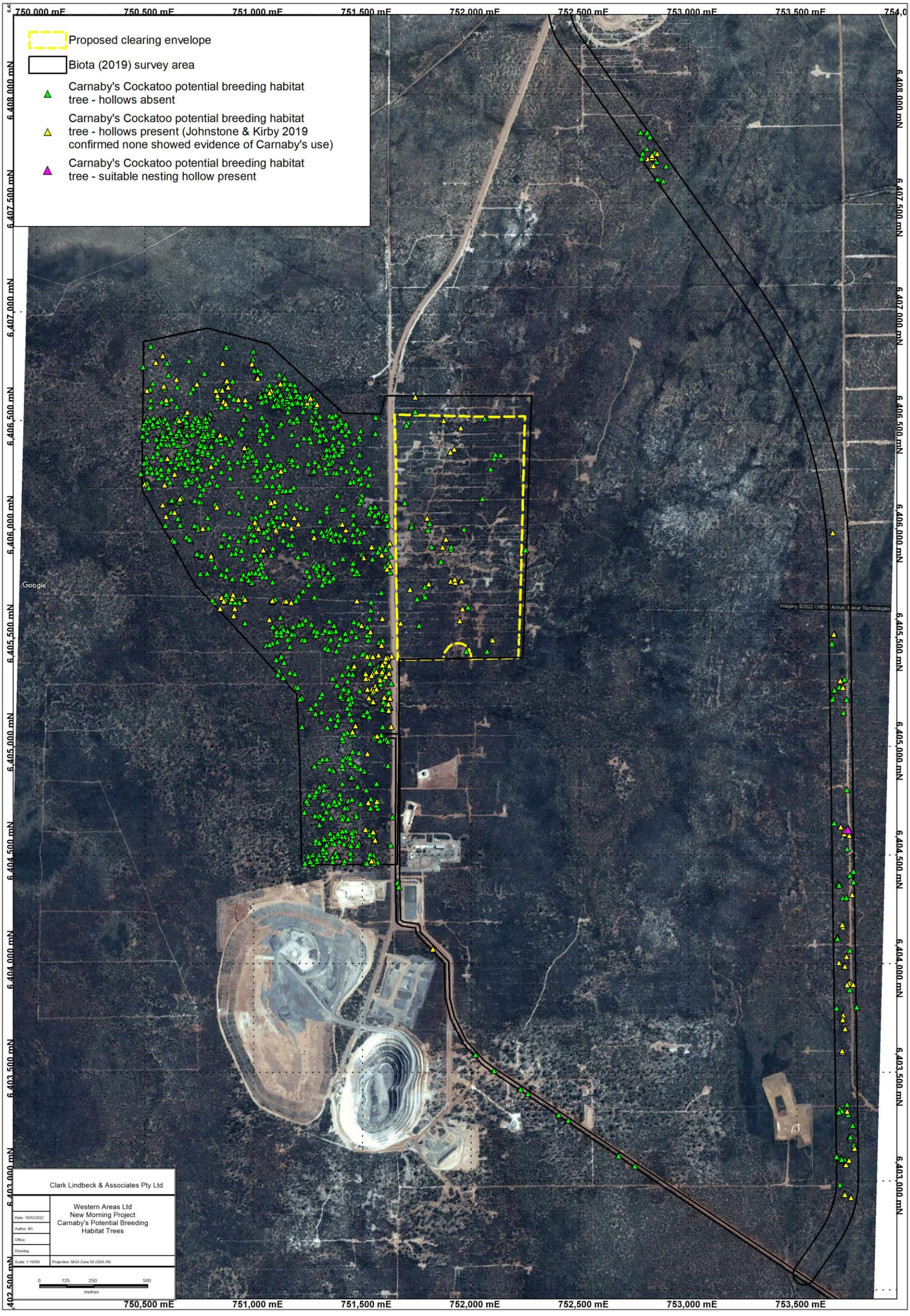

Figure 20: Potential Carnaby's Cockatoo breeding habitat records recorded by Biota (2019) at New Morning within proposed clearing envelope

3.7.3.2 Malleefowl (Leipoa ocellata)

Previous surveys at Forrestania have identified their occurrence across the FNO. As part of approvals associated with Spotted Quoll, WSA has assisted the Malleefowl Preservation Group and assisted in the National Malleefowl Monitoring Program at the FNO Project. Figure 21 shows the results from the 2020-2021 monitoring. Mound WSA-069 (inactive mound) is shown as located within the clearing envelope and is located immediately adjacent to existing disturbance. It is important to note this mound was not identified during the detailed transect survey of the area by experienced Biota zoologists and its occurrence will be confirmed. Of the Malleefowl mounds monitored in 2020-2021 by the Malleefowl Preservation Group in proximity to the clearing envelope, none were active.

The Biota (2019) targeted fauna survey of the New Morning area recorded no Malleefowl individuals, active mounds or tracks in the clearing envelope. Six inactive mounds (>10 years old) were recorded to the west and southwest of the clearing envelope, and tracks were observed west of the clearing envelope (Figure 22). These mounds will not be directly impacted by the Project. The age of the mounds suggest that Malleefowl did once breed in the area but they do not do so currently and potentially use the local area for foraging. All secondary evidence of Malleefowl detected during the survey was recorded from *Eucalyptus* woodland habitat.

WSA will continue their monitoring program to map and monitor Malleefowl activity across the FNO site which will include the New Morning Project area as part of the National Malleefowl Monitoring Program at FNO.

The habitat assessment showed that the Eucalypt woodland and Mallee woodland habitat types within the New Morning area are likely to be core habitat utilised by Malleefowl for breeding (Biota 2019). However, it is important to note that no active mounds occurred within the Project area, suggesting the area is not a preferred breeding site. Both of these woodland habitats are common within the locality and occur contiguously with the same habitat types outside of the study area. Therefore, the species may forage in the clearing envelope, but the project is unlikely to affect the persistence of these species in the locality (Biota 2019).

Figure 21: Malleefowl records from National Malleefowl Recovery Team 2020-2021 monitoring

Figure 22: Malleefowl and Chuditch records at New Morning recorded by Biota (2019) in relation to the proposed clearing envelope

3.7.3.3 Chuditch (Dasyurus geoffroii)

Previous surveys at Forrestania have identified that the Chuditch is widespread throughout the Forrestania region (Biota 2006b, 2007a, 2010).

The Biota (2019) survey, which comprised traps and cameras operating over seven nights, recorded evidence of Chuditch west of the proposed clearing envelope, with one individual captured and one record of scats (Figure 22) (Biota 2019). This area comprises predominantly intact vegetation in comparison with the clearing envelope which contains existing disturbance.

The Biota (2019) habitat assessment showed that the Eucalypt woodland and Mallee woodland habitat types within the New Morning area are 'probable' core habitat, utilised by the Chudtich for breeding. Both habitat types are common within the locality and occur contiguously with the vegetation outside of the study area. Therefore, although fauna within the disturbance footprint may be impacted, it is not likely to affect the persistence of these species in the locality (Biota 2019).

3.7.3.4 Arid Bronze Azure Butterfly

The Arid Bronze Azure Butterfly (ABAB), *Ogyris subterretris petrina* was thought to be extinct (Williams *et al.* 2018) and is currently only known from two locations in Western Australia, one in the Wheatbelt and one in the Goldfields. The species is listed as critically endangered under the national *Environment Protection and Biodiversity Protection Act 1999* and the state *Biodiversity Conservation Act 2016*.

No ants of the host species *Camponotus sp. nr. terebrans* were recorded during the Biota (2021) survey. Ants of the congener *C. nigriceps* were recorded by Biota (2021). Based on the absence of *Camponotus sp. nr. terebrans,* which indicates the absence of the ABAB, no further survey work was recommended by Biota (2021) or undertaken by WSA.

3.7.4 Short Range Endemics (SRE)

The Biota (2019) assessment Short Range Endemics (SRE) recorded the following species and the locations are shown on Figure 24:

- Twelve mygalomorph spiders from three families (Actinopodidae, Idiopidae and Nemesiidae) were collected during the survey, nine of which were successfully sequenced
- A total of five polydesmid millipede specimens were collected from three sites during the survey (NMSRE07, NMSRE08, and NMSREOPP-01), all of which were identified as *Antichiropus exclamatus*; this widespread species is not considered an SRE
- *Bothriembryon* shells were observed at NMSRE05 but no live individuals were located. Shells were not collected due to their deteriorated nature, but other work in the wider locality has commonly found morphologically similar shells to represent the widespread species *Bothriembryon dux*, which is not an SRE.

Four putative mygalomorph spider species, from three families (Actinopodidae, Idiopidae and Nemesiidae) were recorded during the survey, all of which are considered to be potential SRE taxa (Biota 2019, Appendix 9, Table 6.5, pp 47).

Two of these species have been recorded previously in the locality and it is probable that the other two species also occur at least as widely. *Eucalyptus* woodland on clay-loam plain, in which these species were located, extends beyond the Project area and the species' distribution may follow this habitat. Similarly, the soils unit found in the Project area is contiguous with the area surveyed and common in the locality i.e. not restricted to the Project area.

From an SRE perspective, the habitats identified within the study area are typical of those occurring in the wider subregion and they are also contiguous with very similar habitat extending beyond the study area.

Using habitat as a surrogate to infer wider distributions, it is unlikely that any of the potential SRE taxa recorded would be restricted solely to the survey area, as there are no geomorphological or habitat attributes that would suggest a high risk of species level distributions being restricted to the scale of the survey area.

The habitat in the Project area extends outside and is widespread in the surrounds.

3.7.5 Non-native species

House mice (*Mus musculus*), house cat (*Felis catus*) European rabbit (*Oryctolagus cuniculus*), wild dogs (*Canis lupus*) and foxes (*Vulpes vulpes*) have been recorded previously at the FNO.

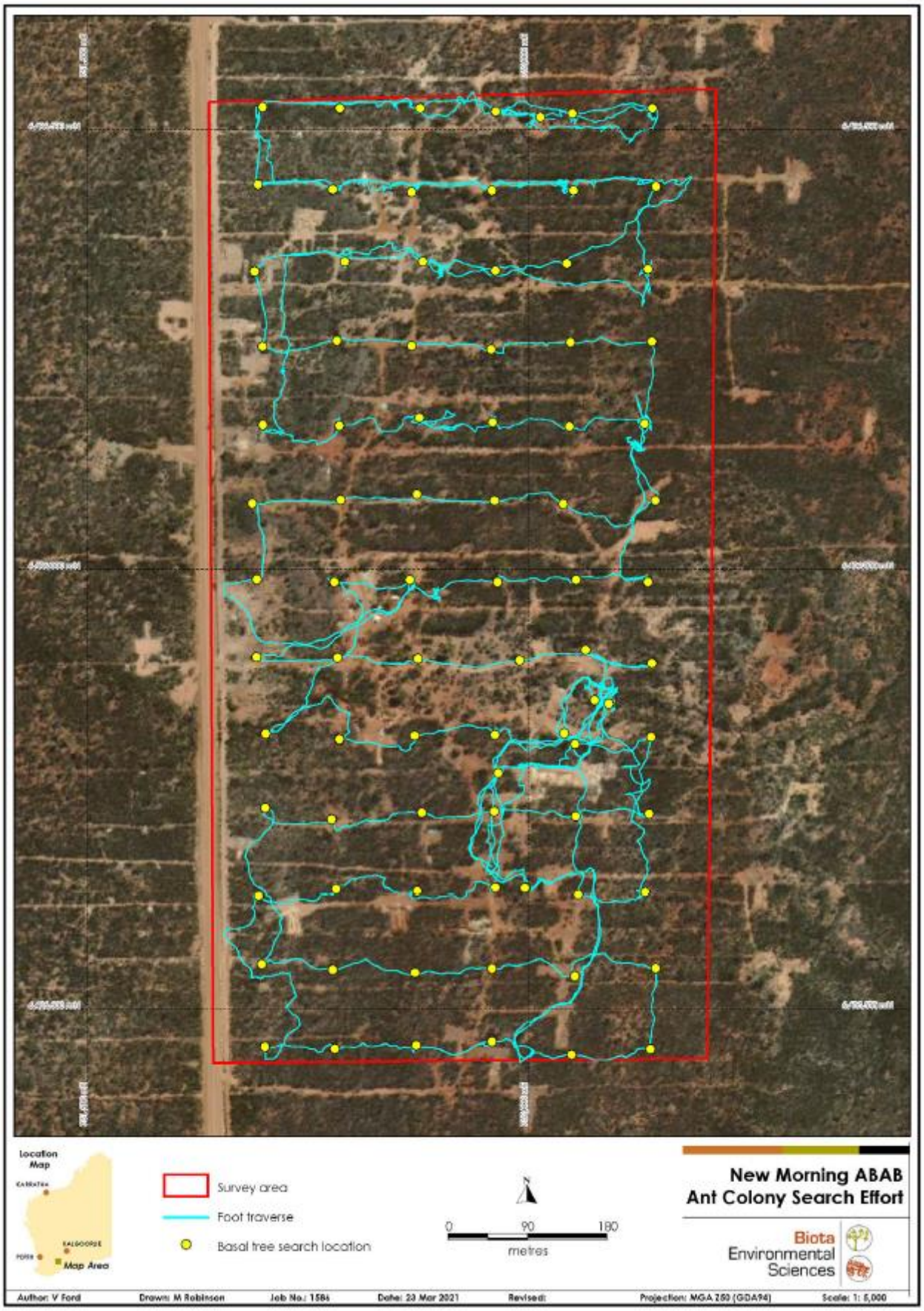

Figure 23: ABAB Ant Colony Search Effort (from Biota 2021)

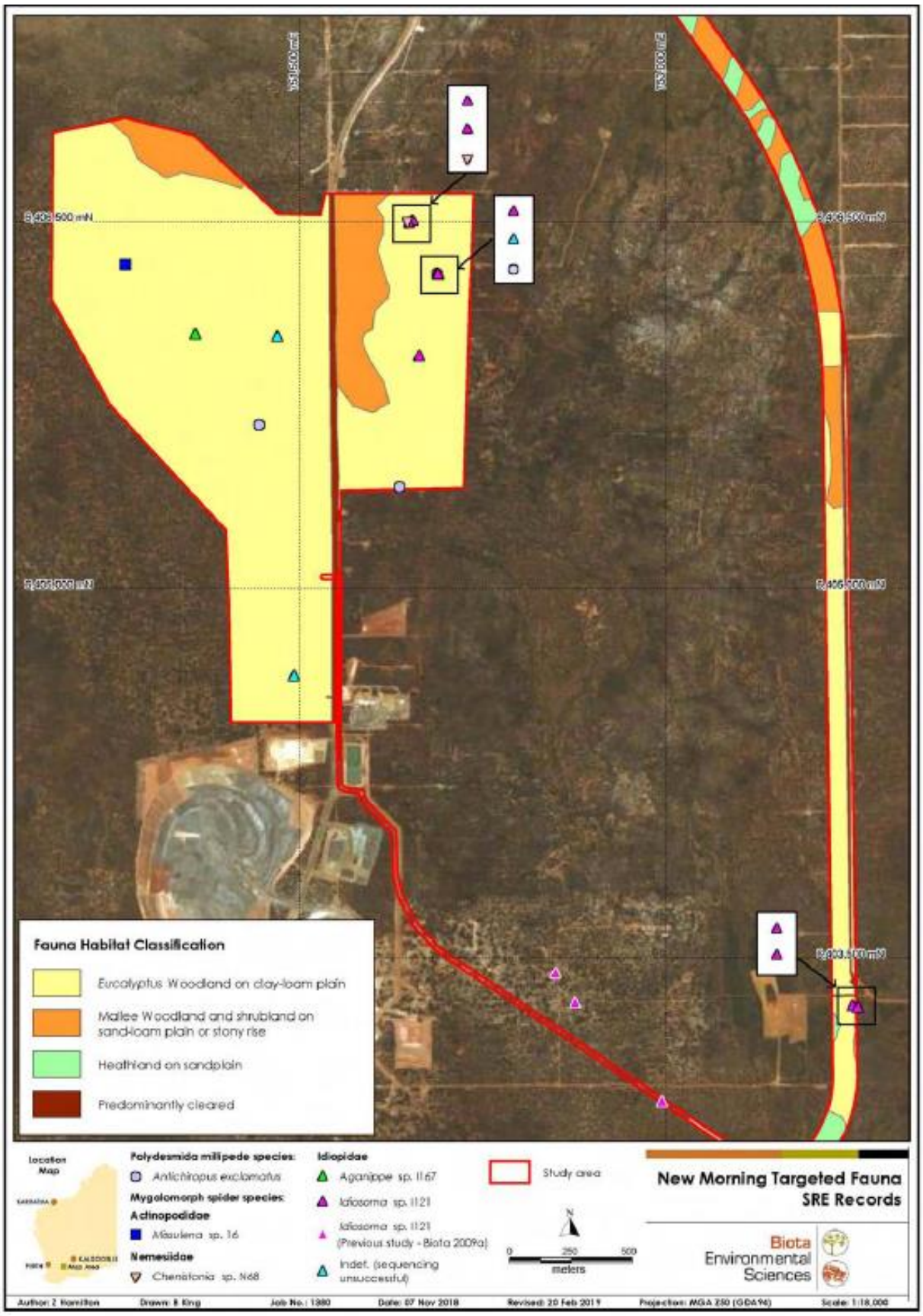

Figure 24: SRE records from Biota survey (from Biota 2019)

3.8 CONSERVATION RESERVES

The Project is located approximately 500 m southwest of the boundary of the Lake Cronin Environmentally Sensitive Area (ESA) and is approximately 5 km south-west of the Lake Cronin 'A' Class Nature Reserve (Figure 3). This ESA is approximately 31,400 ha in area and is considered significant for rare species, high diversity and a high level of endemism. It also contains a large number of species that are disjunct and is listed on the Register of the National Estate (NER 9929).

According to the Environmental Protection Authority report (2009) *Advice on Conservation Values and Review of Nature Reserve Proposals in the Lake Cronin Region*, an area of 56,750 ha within the mineralised greenstone belt in the Lake Cronin Region (encompassing the entire survey area) is proposed to be managed under Section 33(2) of the *Conservation and Land Management Act 1984* but not formally reserved (Figure 3).

A 'C' Class Nature Reserve is also proposed in the surrounding area to protect the Lake Cronin catchment and areas of extensive sandplain and woodland vegetation located immediately east of the Wheatbelt. This represents vegetation communities and fauna habitats that have been extensively cleared and fragmented in the adjacent Wheatbelt. This is located east of the proposed clearing area and the Project will not be impacted.

3.9 MINE CLOSURE AND REHABILITATION

WSA has an approved Mine Closure Plan (MCP) for the FNO (Strategen 2019) and maintains a register of legal obligations that includes commitments and conditions in place for FNO, such as Ministerial Conditions. These direct the completion criteria and implementation of rehabilitation.

Consistent with the MCP, the rehabilitation-related objectives for the Project, which will include New Morning, are summarised as follows:

- To achieve rehabilitated sites and landforms that are safe, stable, non-polluting and capable of supporting a self-sustaining native vegetation community
- Maximise recovery and maintain quality of topsoil and utilise direct return where practicable, to conserve soil structure, nutrients, seed, and soil biota
- Soil properties will be appropriate to support the target ecosystem
- To achieve revegetation that is self-sustaining and consistent with the structure and function of surrounding undisturbed areas
- Rehabilitated areas will provide fauna habitat and facilitate movement of fauna between rehabilitated areas and remnant vegetation
- Waste rock dump designed to agreed standards to create a safe, stable (physical and chemical), free draining, non-polluting final landform which is compatible with the surrounding landscape and capable of supporting the end land use
- To ensure all overburden materials conducive to rehabilitation success are utilised appropriately
- To achieve rehabilitation and revegetation results that are compatible with the immediate and surrounding landscape.

FNO completes rehabilitation on a progressive basis as disturbance areas become available. Rehabilitation work is planned annually and recorded in spreadsheets with data on areas rehabilitated by year with accompanying soils, seeding and planting data.

Current rehabilitation works are characterised by high quality planning and execution, with good use made of topsoil and mulch resources. Native seed is collected from around the project area over the summer months, dried and smoke treated where required. Seed mixes are made up in batches for spreading onto freshly ripped and mulched areas where required.

Seed from native species, also collected locally from the project area, are sent to a plant farm where approximately 15,000 seedlings are grown and subsequently delivered to site annually in June. In addition to direct seeding and planting of seedlings, infill planting of tube stock is undertaken each year in previously rehabilitated areas, to supplement planting and ensure adequate stocking rates of rehabilitated areas.

4 CLEARING PRINCIPLES

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

The Project will result in a maximum of 29 ha of vegetation clearing. Approximately 27.9 ha of the 33.4 ha disturbance footprint will be rehabilitated, with approximately 5.5 ha of habitat (boxcut) will remain non-rehabilitated at completion of operations.

On a regional scale, the Project is located within the Greater Western Woodlands, within one Beard Vegetation Association Forrestania 2048 (COO2). Of the original extent of this vegetation association, >98% of the pre-European extent remains and the proposed 29 ha of clearing will not significantly impact the extent of this association (Table 14).

At a local scale, the percentage impact on each of the three vegetation communities to be impacted is provided in Table 15. Three vegetation associations will be impacted, with clearing of these limited to 10% or less than the area surveyed by Botanica (2021a) which does allow for contiguous areas of vegetation in the surrounding areas which extends outside of the area surveyed i.e. the proposed clearing will not reduce the extent of these vegetation communities.

The Project will not significantly reduce the extent of the local vegetation communities recorded at the Project. All fauna habitats within the proposed clearing envelope are common within the locality and occur contiguously with the same habitat types outside of the study area.

Therefore, although significant fauna potentially occurring within the development footprint may be impacted, it is not likely to affect the persistence of these species in the locality. Similarly, the overall fauna assemblage within the study area would not be unique and would also occur outside of the study area.

As part of the Project design, WSA has minimised the clearing of vegetation required for the Project (i.e reducing the total clearing from 140 ha to 29 ha) and will continue to implement the internal Clearing Procedure to ensure clearing is restricted to the approved areas and only that required.

The vegetation in the clearing envelope is not representative of the North Ironcap of the Ironcap Hills Vegetation Complexes' PEC (Botanica 2021a), thus, no impacts to the PEC are anticipated.

WSA has developed and implemented a Dieback Management Plan (Appendix 6) and a Dieback Hygiene Procedure (Appendix 7) to reduce the spread of this pathogen and all operations at the Project will be undertaken in accordance with this Plan and procedure.

Based on the above, the proposed clearing envelope is considered to comprise a high level of biological diversity. However, all vegetation groups are represented extensively outside the proposed clearing area. The proposed clearing will not reduce the biodiversity of the area.

Based on the above, the proposed clearing may be at variance to this Principle.

Table 14: Direct Impacts on Beard Vegetation Associations

Beard Vegetation Association	Vegetation Description	Pre-European Extent (Ha)	Current Extent (Ha)	Pre-European extent remaining (%)	Clearing required for Project (ha)	Clearing required as % of known extent
Forrestania 511	Medium woodland; salmon gum & morrel	153,641.65	153,002.24	99.58	29	0.02%

Table 15: Vegetation groups identified in Botanica survey (2021a)

Vegetation Code	Landform	NVIS	Vegetation Association	Veg Area surveyed (ha)	% Veg Assoc of overall Survey Area (%)	Veg Assoc in Clearing envelope*	Veg Assoc in Clearing envelope as % of overall survey area*	Vegetation clearing required (ha)	Veg Clearing required as % of overall survey area
CLP-EW1**	Clay-Loam Plain	Eucalyptus Woodland (MVG 5)	Low open forest of *Eucalyptus flocktoniae/ E. salubris/ E. urna* on clay-loam plain	322	24.8	22.37	6.94	14.2	4.4
CLP-EW2			Mid open woodland of *Eucalyptus salmonophloia* on clay-loam plain	121	9.3	23.34	19.2	12.6	10.7
CLP-EW3**			Burnt open low woodland of Eucalyptus salmonophloia over mallee shrubland of *E. pileata/ E. tephroclada/ E. celastrioides* on clay-loam plain	281	21.6	Nil	Nil	Nil	Nil
CLP-EW4			Mid woodland of *Eucalyptus longicormis* on clay-loam plain	75	5.8	Nil	Nil	Nil	Nil
R-MWS1**	Stony rise	Mallee Woodland and Shrubland (MVG 14)	Mid mallee shrubland of *Eucalyptus tephroclada/ E. pileata* on stony rise	36	2.8	13.28	36.9	2.2	6.0
SLP-MWS1	Sand-Loam Plain	Mallee Woodland and Shrubland (MVG 14)	Mid mallee shrubland of *Eucalyptus tephroclada/ E. pileata/ E. transcontinentalis* on sand-loam plain	177	13.6	Nil	Nil	Nil	Nil
SLP-MWS2			Mid mallee shrubland of *Eucalyptus steedmanii* on sand-loam plain	51	3.9	Nil	Nil	Nil	Nil
SP-H1	Sandplain	Heathlands (MVG 18)	Mid heathland of *Allocasuarina corniculata/ Acacia acuminata* on sandplain	112	8.6	Nil	Nil	Nil	Nil
SP-MWS1		Mallee Woodland and Shrubland (MVG 14)	Low open mallee shrubland of *Eucalyptus platycorys/ E. horistes* on sandplain	19	1.5	Nil	Nil	Nil	Nil
CV	N/A	N/A	Cleared Vegetation*	104	8	Nil	Nil	*	*
			TOTAL	**1298**	**100**	**64**	**N/A**	**29**	**N/A**

*this does not take into account the existing disturbance as mapped by WSA

**vegetation in clearing envelope

(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 Western Australia.

The extensive fauna survey work completed at the Project is summarised in Section 3.7.1.

All fauna habitats within the proposed clearing envelope are common in the local area and occur contiguously with the same habitat types outside of the areas surveyed by Biota (2019) and the clearing permit envelope.

The potential impact on these species previously recorded at the Project, and those that have the potential to occur based on Biota (2019) is summarised in Table 16.

In relation to SRE species, the habitats identified within the study area are typical of those occurring in the wider subregion and they are also contiguous with very similar habitat extending beyond the study area.

Using habitat as a surrogate to infer wider distributions, it is unlikely that any of the potential SRE taxa recorded would be restricted solely to the survey area, as there are no geomorphological or habitat attributes that would suggest a high risk of species level distributions being restricted to the scale of the survey area.

The habitat in the Project area extends outside and is widespread in the surrounds.

WSA considers that the proposed clearing area is not necessary for the on-going maintenance of any significant fauna habitat and that equal or higher quality vegetation and fauna habitats exist throughout the surrounding area (i.e. with less disturbance).

Table 16: Fauna species of conservation significance recorded, likely to occur or may potentially occur in the clearing envelope

	Species	Common Name	Conservation Status - State	Conservation Status - Commonwealth	Preferred Habitat	Likelihood of occurrence*	Expected Impact
RECORDED							
AVIFAUNA	*Leipoa ocellata*	Malleefowl	Vulnerable	Vulnerable	Dry inland Scrub and Mallee. Occasionally in adjacent Eucalypt woodland.	Recorded during survey – 6 disused mounds (>10 years old) recorded west and outside of the proposed clearing area.	No active mounds in the proposed clearing envelope. The inactive mounds recorded outside of the proposed clearing area had not have been utilised for at least 10 years, indicating an absence of recent breeding within the area surveyed by Biota (2019). A pre-clearing survey will be undertaken to ensure no active mounds are disturbed as a result of the proposed clearing.
AVIFAUNA	*Calyptorhynchus latirostris*	Carnaby's Black Cockatoo	Schedule 2	Endangered	Eucalypt woodland and mallee in southwest of Western Australia where tree hollows with suitable dimensions for nesting and breeding.	Recorded at Project 17 potential C	The study area is located at the eastern most extent of the species' distribution and may not be considered a significant breeding location (Biota 2019). Johnstone & Kirby (2019) identified: • 17 potential breeding trees with nest hollows in the proposed clearing envelope • 11 potential breeding trees with nest hollows in the proposed disturbance footprint. None of the nest hollows studied showed evidence of cockatoo use and most of these hollows were considered by Johnstone and Kirkby (2019) to be unsuitable even for small parrots. Johnstone and Kirkby (2019) found no direct evidence of Carnaby's Cockatoos breeding in the New Morning area. Potential foraging habitat is located in the proposed clearing area, but is not restricted to this area and is widespread in the surrounds and region.

	Species	Common Name	Conservation Status - State	Conservation Status - Commonwealth	Preferred Habitat	Likelihood of occurrence*	Expected Impact
MAMMALS	*Dasyurus geoffroii*	Western Quoll, Chuditch	Vulnerable	Vulnerable	Eucalypt forest and woodland, heathland and mallee.	Individual trapped west of the proposed clearing area and secondary sings located outside Previously recorded within 5 km of study area.	No evidence of Chuditch in the proposed clearing envelope despite intensive targeted survey. Biota (2019) consider that Chuditch are widespread in the overall Forrestania region.
LIKELY TO OCCUR							
AVIFAUNA	*Falco peregrinus*	Peregrine Falcon	Schedule 7	-	Wide range of habitats including forest, woodlands, wetlands and open country.	Likely to occur – 3 recent records within 10 km of Project area.	Based on the mobility of this species and abundant suitable habitat located outside of the proposed clearing envelope, the proposed clearing is not expected to be a significant impact to this species.
AVIFAUNA	*Platycercus icterotis xanthogenys*	Western Rosella (inland subspecies)	Priority 4	-	Open forest and woodland.	Likely to occur - Numerous records within 5 km of Project area	Of the 186 trees with nest hollows recorded by Biota (2019), only 17 are located within the proposed clearing envelope (9.1%). The fauna habitat is contiguous with the surrounds and widespread in the region. The trees with nest hollows assessed by Johnstone and Kirkby (2019) were considered to be unsuitable even for small parrots.
AVIFAUNA	*Merops ornatus*	Rainbow Bee-eater	-	Marine	Nests in small holes excavated in sandy banks or flat sandy surfaces occurring in landforms that provide suitable soil for nesting and a tall stratum of vegetation for perching.	Likely to occur – numerous records within 5km of Project area	No records in Project area. Suitable habitat identified by Biota (2019) is 'Heathland on sandplain' which is not located in the proposed clearing envelope. Substrate largely unsuitable for nesting.
REPTILES	*Paroplocephalus atriceps*	Lake Cronin Snake	Priority 3		Open forest, woodland and mallee.	Likely to occur Previously recorded within 10 km of study area.	No records in the Project area. Potential habitat is not restricted to the Project area and the proposed clearing will not limit the availability of potential habit in the local area or region.

	Species	Common Name	Conservation Status - State	Conservation Status - Commonwealth	Preferred Habitat	Likelihood of occurrence*	Expected Impact
MAY POTENTIALLY OCCUR							
MAMMALS	*Notamacropus irma*	Western Brush Wallaby	Priority 4		Open forest or woodland.	May potentially occur – recorded within 35km of Project area.	No records in the Project area and the species would not be reliant on the Project area for breeding given the habitat is widespread and common in the locality.
MAMMALS	*Phascogale calura*	Red-tailed Phascogale	Schedule 6	Endangered	Dense, mature forests, providing tree hollows.	May potentially occur - Previously recorded within 10 km of study area.	No records in the Project area. No phascogales were caught despite trapping with Elliott traps at the Project. Potential foraging habitat is not restricted to the Project area and the proposed clearing will not limit the availability of potential habitat in the local area or region.
AVIFAUNA	*Apus pacificus*	Fork-tailed Swift	Schedule 5 – Migratory	Migratory	Varied landforms including coasts and urban areas, with a tendency to more arid areas. Almost exclusively aerial and does not breed in Australia.	May potentially occur, Recorded at Lake Cronin, approximately 10 km NE of study area	Species does not breed in Australia. This species is not considered to be dependent on habitat within the proposed clearing envelope due to its highly mobile and predominately aerial behaviour.
AVIFAUNA	*Chalcites osculans*	Black-eared Cuckoo		Marine	Inland low shrubs and dry forest.	May potentially occur - Recorded approximately 50 km N of the study area.	No records in the Project area. Based on the mobility of this species and abundant suitable habitat located outside of the proposed clearing envelope, the proposed clearing is not expected to be a significant impact to this species.

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

The proposed clearing does not include any plant taxa listed as Threatened pursuant to Schedule 1 of the *EPBC Act (1999)*.

Two threatened flora are located in proximity the proposed clearing area:

- *Eucalyptus steedmanii*
- *Paragoodia crenulata.*

The surveys undertaken in the proposed clearing area were undertaken over numerous seasons and at optimal times to detect the occurrence of these species.

The development of the Project will require the removal of individuals of *Stylidium sejunctum* (P3), *Eremophila racemosa* (P4) and *Microrys sp. Forrestania (V.English 2004)* (P4) in the clearing envelope as presented in Table 17.

Approximately 24.9% of the local *S. sejunctum* (P3) population is located within the clearing envelope, and WSA has allowed provision for removal of 120 individuals of this species, which represents 5.3% of the local population that would be impacted.

The proposed removal of these Priority flora species will have no impact on the conservation significance of these species.

The vegetation associations within the application area are common and widespread within the region (Botanica 2021a), and the vegetation proposed to be cleared is unlikely to be necessary for the continued existence of any species of Threatened (rare) flora.

Thus, the proposed clearing is not at variance to this principle.

Table 17: Significant flora recorded by Botanica (2021) to be impacted by the Project

Species	No. known in Local area (within 50 km)*	No. in clearing envelope	% local population In Clearing envelope	No. in development footprint	% known local population in development footprint
Stylidium sejunctum (P3)	2,264	563	24.9	120**	5.3%**
Eremophila racemosa (P4)	17,740	666	3.8	561	3.16
Microcorys sp. Forrestania (V. English 2004) (P4)	15,505	1	0.006	0	0.0

*Based on both Botanica records and DBCA records (from Botanica 2021)

**The actual number in the proposed development footprint is 28 individuals (1.25% of the known population), however, to allow for flexibility in transportation/infrastructure corridors in the clearing envelope, WSA has allowed for a maximum disturbance of 120 individuals

(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 (TEC).

No TECs are listed under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* or endorsed by the Western Australian Minister for the Environment for the Project area. Therefore, the proposed clearing is not at variance to this principle.

The proposed clearing area is located within the buffer of the 'North Ironcap of the Ironcap Hills Vegetation Complexes' which is listed by the DBCA as a Priority 3 Ecological Community. Botanica (2021a) identified that this vegetation complex associated with the PEC was not represented within the area surveyed.

(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 proposed clearing area is located within pre-European Beard Vegetation Association Forrestania 511 (COO2). Of the original extent of this vegetation association, >99% of the pre-European extent remains and the proposed 29 ha of clearing will not significantly impact the extent of this association (Table 14).

The Project will not significantly reduce the extent of the local vegetation communities recorded at the Project.

Thus the proposed clearing area does not represent a significant remnant of native vegetation in an area that has been extensively cleared.

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

There are no permanent watercourses or wetlands within the proposed clearing area.

There is no riparian vegetation (as identified by Botanica 2021a) in the proposed clearing area.

There is no vegetation growing in association with a water course or wetland. The proposed clearing of 29 ha, therefore, is not at variance to this principle.

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

The disturbed area (with the exception of the open pit) will be rehabilitated at completion of mining.

The proposed clearing of 29 ha of vegetation is not likely to lead to land degradation issues such as salinity, water logging or acidic soils and therefore is not at variance to 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.

The Project is located approximately 500 m southwest of the boundary of the Lake Cronin Environmentally Sensitive Area (ESA) and is approximately 5 km south-west of the Lake Cronin 'A' Class Nature Reserve (Figure 3). This ESA is approximately 31,400 ha in area and is considered significant for rare species, high diversity and a high level of endemism. It also contains a large number of species that are disjunct and is listed on the Register of the National Estate (NER 9929).

According to the Environmental Protection Authority report (2009) *Advice on Conservation Values and Review of Nature Reserve Proposals in the Lake Cronin Region*, an area of 56,750 ha within the mineralised greenstone belt in the Lake Cronin Region (encompassing the entire survey area) is proposed to be managed under Section 33(2) of the *Conservation and Land Management Act 1984* but not formally reserved (Figure 3). The proposed clearing represents 0.05% of this area and will not limit the extent of this area.

A proposed 'C' Class Nature Reserve is also proposed in the surrounding area to protect the Lake Cronin catchment and areas of extensive sandplain and woodland vegetation located immediately east of the Wheatbelt. This represents vegetation communities and fauna habitats that have been extensively cleared and fragmented in the adjacent Wheatbelt. This is located east of the proposed clearing area and will not be impacted.

Based on the above, the proposed clearing is not likely to be at variance to 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.

There are no Public Drinking Water Source Areas within or in close proximity to the proposed clearing area. There is no surface water of significance, large drainage lines, lakes or swamps in the proposed clearing area (Rockwater 2018).

Surface water in the project area is sourced from direct precipitation and surface runoff following rainfall events. Drainage lines are ephemeral and are dry for most of the year, only flowing briefly immediately following significant rainfall.

The proposed clearing of native vegetation of 29 ha is not likely to cause deterioration in the quality of surface or groundwater and therefore, the proposed clearing is not at variance to this principle.

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

The climate of the Project area is semi-arid, with a low average rainfall of approximately 350 millimetres per year (BOM, 2022). Rainfall generally occurs during winter months and it is possible that during times of intense rainfall there may be some localised flooding in adjacent areas (CALM, 2002).

There are no permanent water courses or waterbodies within the proposed clearing area. Seasonal drainage lines are common in the region and temporary localised flooding may occur briefly following heavy rainfall events. However, the proposed clearing is unlikely to increase the incidence or intensity of natural flooding events.

Based on the above, the proposed clearing is not likely to be at variance to this Principle

5 OFFSETS

5.1 EPA OBJECTIVE

To counterbalance any significant residual environmental impacts or uncertainty through the application of offsets.

- WA Environmental Offsets Policy.
- EPBC Act Environmental Offsets Policy.
- Western Australian Government's Environmental Offsets Guideline (Government of Western Australia 2014).
- EPBC Act Offsets Assessment Guide for use in determining offsets under the EPBC Act, (October 2012).

Offsets may be applied after other mitigation measures have been considered, as per the following hierarchy:

- Avoid;
- Minimise;
- Rehabilitate; and
- Offset

5.2 DETERMINATION OF SIGNIFICANT RESIDUAL IMPACT

Table 18 provides an assessment of the residual impact of the Project based on the expected impacts. The Project as assessed by WSA is predicted to not have a significant adverse residual impact on the environment. In accordance with the Guidelines, environmental offsets need only be applied where the residual impacts of a project are determined to be significant, after avoidance, minimisation and rehabilitation have been pursued. As the proposed project is predicted to have no significant residual environmental impacts, no environmental offsets are proposed.

WSA is cognisant of the DAWE decision that the Project is a 'controlled action' and will undertake liaison with DAWE to ensure the Project has no adverse residual impact on the environment.

Table 18: Assessment against residual impact significance model

Part IV Environmental Factors	**Vegetation and flora**			**Terrestrial Fauna**			
Part V Clearing Principles	**Rare Flora**	**TECs**	**Remnant vegetation**	**Wetlands and Waterways**	**Conservation Areas**	**High Biological Diversity**	**Habitat for Fauna**
Significant residual impacts that will require an offset – *all significant residual impacts to species and ecosystems are protected by statute or where the cumulative impact is already at a critical level*	No residual impacts have been identified to meet this criterion: • No Threatened Flora records are located within the clearing envelope • Impacts to Priority Flora are not considered significant	No residual impacts are considered to meet this criterion – no TECs were recorded within the clearing envelope.	No residual impacts are considered to meet this criterion – the vegetation association has >98% or more of its pre European extent remaining and impacts will be less than 2.41% of the vegetation association.	No residual impacts are considered to meet this criterion – there are no wetlands or waterways within the clearing envelope or any that will be indirectly impacted by the Project	No residual impacts are considered to meet this criterion - no conservation areas are located within the clearing envelope or would be indirectly impacted by the Project	No residual impacts are considered to meet this criterion, the vegetation is known to have high diversity, however, the residual impacts on these areas are not considered significant given the area of intact habitat that will remain outside the clearing envelope.	No residual impacts are considered to meet this criterion – refer below. By redesigning the project, WSA has reduced the proposed vegetation clearing required from 140 ha to 29 ha.
Significant residual impacts that may require an offset – *any significant residual impacts to potentially threatened species and ecosystems, areas of high environmental value or where the cumulative impact may reach critical levels if not managed*	N/A – refer to above.	N/A – refer to above.	N/A – refer to above.	N/A – refer to above.	N/A – refer to above.	N/A – refer to above.	Residual impacts to Carnaby's Black Cockatoo foraging habitat, Malleefowl habitat and Chuditch habitat could meet this criterion. No evidence of breeding was recorded in the clearing envelope and suitable habitat is widespread outside of the proposed clearing area.
Residual impact that is environmentally unacceptable and cannot be offset	**No residual impacts are considered to activate this criterion.**						

6 MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

6.1 LIKELIHOOD OF OCCURRENCE OF MNES

An EPBC Act Protected Matters Search Tool Report (with a 20 km buffer) generated in February 2021 identified numerous threatened species/communities that could potentially occur at the Project (Table 19).

An assessment of the likelihood of the occurrence of the MNES listed species is also provided within Table 19. A recent search of the EPBC PMST completed in January 2022 did not reveal any additional MNES species.

Table 19: Likelihood of occurrence of conservation significant species/communities near the Project Area from the MNES search

Species/Community	Conservation Status	Likelihood of occurrence**
Threatened Ecological Communities (TECs)		
Eucalypt Woodlands of the Western Australian Wheatbelt	Critically Endangered	N/A – Project is located in the Great Western Woodlands.
Threatened Species – Plants		
Woolly Wattle *Acacia lanuginophylla*	Endangered	Unlikely to occur – no local records.
Ironcaps Banksia *Banksia sphaerocarpa var. dolichostyla*	Vulnerable	Possible – however, this species was not recorded during the Botanica survey work.
Ironcap Boronia *Boronia revoluta*	Endangered	Unlikely to occur – no local records.
Steedmans Gum *Eucalyptus steedmanii*	Vulnerable	**Recorded at Forrestania.**
Paragoodia crenulata	Critically Endangered	**Recorded at Forrestania.**
Wyalkatchem Foxglove *Pityrodia scabra*	Endangered	Unlikely to occur – known records from central Wheatbelt and Northern agricultural region (outside of region).
Saltmat *Roycea pycnophylloides*	Endangered	Unlikely to occur – favoured habitat, saline flats - none occur within clearing envelope.
Granite Featherflower *Verticordia staminosa var. cylindracea*	Endangered	Unlikely to occur – favoured habitat, soil pockets in granite outcrops - none located in clearing envelope.
Threatened Species – Invertebrates (listed as MNES, but not shown in the area search)		
Arid Bronze Azure Butterfly *Ogyris subterrestris petrina*	Critically Endangered	Unlikely to occur - A targeted survey conducted in 2021 did not record the obligate ant species, which is an indicator of ABAB occurrence.
Threatened Species - Birds		
Curlew Sandpiper *Calidris ferruginea*	Critically Endangered	Unlikely to occur - Recorded 80 km west of study area; core habitat not present in study area.
Carnaby's Cockatoo, Short-billed Black-Cockatoo *Calyptorhynchus latirostris*	Endangered	**Recorded at Forrestania.**
Grey Falcon *Falco hypoleucos*	Vulnerable	Unlikely to occur – no records in surveys completed to date. May be rare visitor.
Malleefowl *Leipoa ocellata*	Vulnerable	**Recorded at Forrestania.**
Threatened Species – Mammals		
Chuditch, Western Quoll *Dasyurus geoffroii*	Vulnerable	**Recorded at Forrestania.**
Red-tailed Phascogale, Red-tailed Wambenger, Kenngoor *Phascogale calura*	Vulnerable	Previously recorded within 10 km of study area. Preferred habitat is Eucalypt open forest or woodland, scrubby thickets, mallee and heathland. May potentially occur – not recorded during surveys completed to date in Project area.
Listed Migratory Species		
Fork-tailed Swift *Apus pacificus*	Migratory	May potentially occur - Recorded at Lake Cronin, ~10 km NE of clearing envelope. However, no water bodies within the Project area and species almost exclusively aerial and does not breed in Australia (Biota 2019).

6.2 CONTROLLED ACTION PROVISIONS

The Project was referred to the DAWE in June 2021 (EPBC 2021/8971) and on 14 July 2021 WSA received advice that the Project was considered a 'Controlled Action' and requires formal assessment under the EPBC Act.

In the context of the Project, the relevant matter of MNES is "nationally threatened species and ecological communities", with the following species of conservation significance listed under the EPBC Act which have been recorded in proximity to the Project:

Threatened Flora

- *Eucalyptus steedmanii*;
- *Paragoodia crenulata*;

Threatened Fauna

- Malleefowl (*Leipoa ocellata*);
- Chuditch (*Dasyuris geoffroii*); and
- Carnaby's Black-Cockatoo (*Calyptorhynchus latirostris*).

6.3 Previous EPBC Controlled Actions - Spotted Quoll open pit and haul road

The Spotted Quoll Project, located 1.5 km south of New Morning, involving the development of an open pit and associated infrastructure (EPBC 2008/4443) was reviewed by the Department of Environment, Water, Heritage and the Arts (DEWHA) that assessed the project as a 'controlled action' under the EPBC Act on 8 October 2008. This was a result of the proximity of the then proposed infrastructure to populations of the Threatened flora species *E.steedmanii* and the perceived impacts on this species.

The Spotted Quoll – Cosmic Boy Haul Road was referred to the Department of Sustainability, Environment, Water, Population and Communities (EPBC 2011/6003), and was declared a controlled action under the EPBC Act in July 2011. The action was approved on 10 February 2012 subject to ten implementation conditions. The conditions relating to MNES were predominantly related to the potential impacts on Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*).

6.4 ALTERNATIVES TO PROPOSED ACTION

6.4.1 Alternative of taking no action

The proposed action to develop the New Morning underground nickel deposit is required to continue active operations at FNO.

The Project is one of the highest grade nickel operations in the world, and the development of the Project is key to maintaining this supply.

6.4.2 Alternatives considered

The current Project design is a revised design ('alternative') to that originally proposed by WSA which included an open pit, waste dump, heap leach pad and associated infrastructure, and a 7.5 km haul road diversion to replace that currently in place between Flying Fox and Spotted Quoll which would have been encompassed within the formerly proposed New Morning open pit (Section 2.3, Figure 6).

To reduce the amount of clearing required for the Project, WSA revised the Project design to a boxcut and underground operation, thus significantly reducing the native vegetation clearing required from 140 ha to 29 ha and the overall footprint of the operation. Consequently, this modified proposal contains 110 ha less native vegetation clearing than that required by the original Project design.

This project has been optimised to reduce environmental impacts, particularly, with a significantly reduced clearing footprint since the original design. WSA considers there are no alternative options for development of New Morning deposit that that would further reduce the potential for adverse environmental impacts.

6.5 EXISTING ENVIRONMENT VALUES RELEVANT TO MNES

A summary of the survey work completed to date and an outline of survey findings relevant to each of the MNES species is provided in Section 3.6 (Flora and Vegetation) and Section 3.7 (Terrestrial Fauna) and a summary is included in the following sub-sections specific to the listed threatened species under the EPBC Act as referred to in the EPBC referral decision notice (EPBC Ref: 2021/8971).

6.6 FLORA - EUCALYPTUS STEEDMANII & PARAGOODIA CRENULATA

6.6.1 Relevant guidance

- Significant Impact Guidelines: 1.1 – Matters of National Environmental Significance (DoEE, 2013)
- *Eucalyptus steedmanii*
    - Approved conservation advice for *Eucalyptus steedmanii* (Steedmans Gum) (DAWE 2008).

6.6.2 Species occurrence

Numerous ecological surveys have been completed within the wider Forrestania Project Area to understand the local vegetation and flora with Table 20 summarising the surveys' results relative to flora species of MNES.

Figure 26 shows the location of the EPBC listed flora species in proximity to the proposed clearing envelope and these species are described in the following sections.

Table 20: Vegetation and flora surveys conducted within 20 kms of the Project and results relevant to MNES

Survey consultant and date	Survey Title	Description and findings relating to MNES
Botanica Consulting 2007	New Morning/Spotted Quoll Flora Survey	• A Flora and vegetation survey over 617 ha in the New Morning/Spotted Quoll area • A population of Declared Rare Flora (DRF) pursuant to the EPBC Act (*Eucalyptus steedmanii*) was recorded
Botanica Consulting 2007	Cosmic Boy Flora and Vegetation Survey	• A Flora and vegetation survey over 109 ha in the Cosmic Boy area • No DRF or TECs, pursuant to the EPBC Act, were recorded within the project area.
Department of Environment and Conservation 2009	Flora of select areas of three greenstone belts in the Yilgarn Craton: Bullfinch, Forrestania and Ravensthorpe	• A flora survey of the Northern Forrestania region, 50 20x20 m quadrats were established (approximately 15 km from the northern boundary of the New Morning Project area). • Two species of DRF were recorded: o *Banksia sphaerocarpa var. dolichostyla* o *Eucalyptus steedmanii*
Botanica Consulting 2009	Flora and Vegetation Survey within the Greater Cosmic Boy Area	• A Flora and vegetation survey over 102 ha in the greater Cosmic Boy area • No DRF or TECs, pursuant to the EPBC Act, were recorded within the project area.
Botanica Consulting 2009	Spotted Quoll Expansion Area Flora and Vegetation Survey	• A Flora and vegetation survey in the Spotted Quoll exploration area. • *Eucalyptus steedmanii* (DRF pursuant to the EPBC Act) was recorded in three vegetation types. • No TEC's were recorded within the project area.

Botanica Consulting 2011	Spotted Quoll/Cosmic Boy Haul Road Flora and Vegetation Survey	• No DRF, pursuant to the EPBC Act, were recorded within the project area. • However, Population 2 of the DRF species *Eucalyptus steedmanii* was identified located approximately 20 m north-east and 470 m west of the most northern region of the survey area. • There were no TECs as defined by the EPBC Act 1999 recorded within the survey area.
Botanica Consulting 2021a	Detailed Flora and Vegetation Survey and Targeted Flora Survey of the New Morning Project.	• A two-season flora and vegetation survey and targeted flora survey over 1,298 ha which included the larger New Morning Project area. • Two DRF species, *Eucalyptus steedmanii* and *Paragoodia crenulata,* listed by the EPBC Act, were recorded near the Project area. • There were no TEC's as defined by the EPBC Act 1999 recorded within the survey area.
Botanica Consulting 2021b	Memorandum: New Morning Project – Targeted Flora Survey	• Targeted survey of 64 ha in the proposed disturbance envelope planned to occur during the flowering period of DRF species *Paragoodia crenulata*. • A total of 1,000 plants of *Paragoodia crenulata* recorded with the survey area.

6.6.2.1 Eucalyptus steedmanii

Eucalyptus steedmanii has not been recorded in the proposed clearing envelope.

Figure 26 shows the location of two populations of *E. steedmanii* located in proximity to the clearing envelope, Population 1 to the north, and Population 8 to the east.

As described in Section 3.6.6.1, significant work has been completed since 2007 in relation to mapping the occurrence of *E. steedmanii* at FNO, and ongoing monitoring of the health of the populations in proximity to Spotted Quoll.

6.6.2.2 Paragoodia crenulata

The species is endemic to the Forrestania region and Botanica (2021a; 2021b) recorded three additional populations of this taxon with one population identified 50 m south of proposed clearing envelope with a total of 1000 plants (Figure 12).

There are approximately 4,596 plants recorded in the local region (within 50 km of the survey area) (Botanica 2021b).

Botanica (2021a) refers to both recorded locations of this taxon having been identified on previously cleared/ rehabilitated drill pads within one vegetation association: Low open forest of *Eucalyptus flocktoniae/ E. salubris/ E. urna* on clay-loam plain (CLP-EW1).

This species is thought to require disturbance (DEC, 2010) which was supported by Botanica's (2021a) field observations i.e. species located on previously cleared/ rehabilitated drill pads. This vegetation group is not limited to the Project area, it was identified in the survey area and extends outside to the surrounds.

WSA has revised the clearing envelope to ensure it avoids disturbance to this species and is located outside of the 50 m buffer from the population extent (i.e. outside of the ESA).

Figure 25: Botanica (2021b) targeted flora survey area (consistent with proposed clearing envelope) showing area excluded from clearing envelope (basemap from Botanica 2021b)

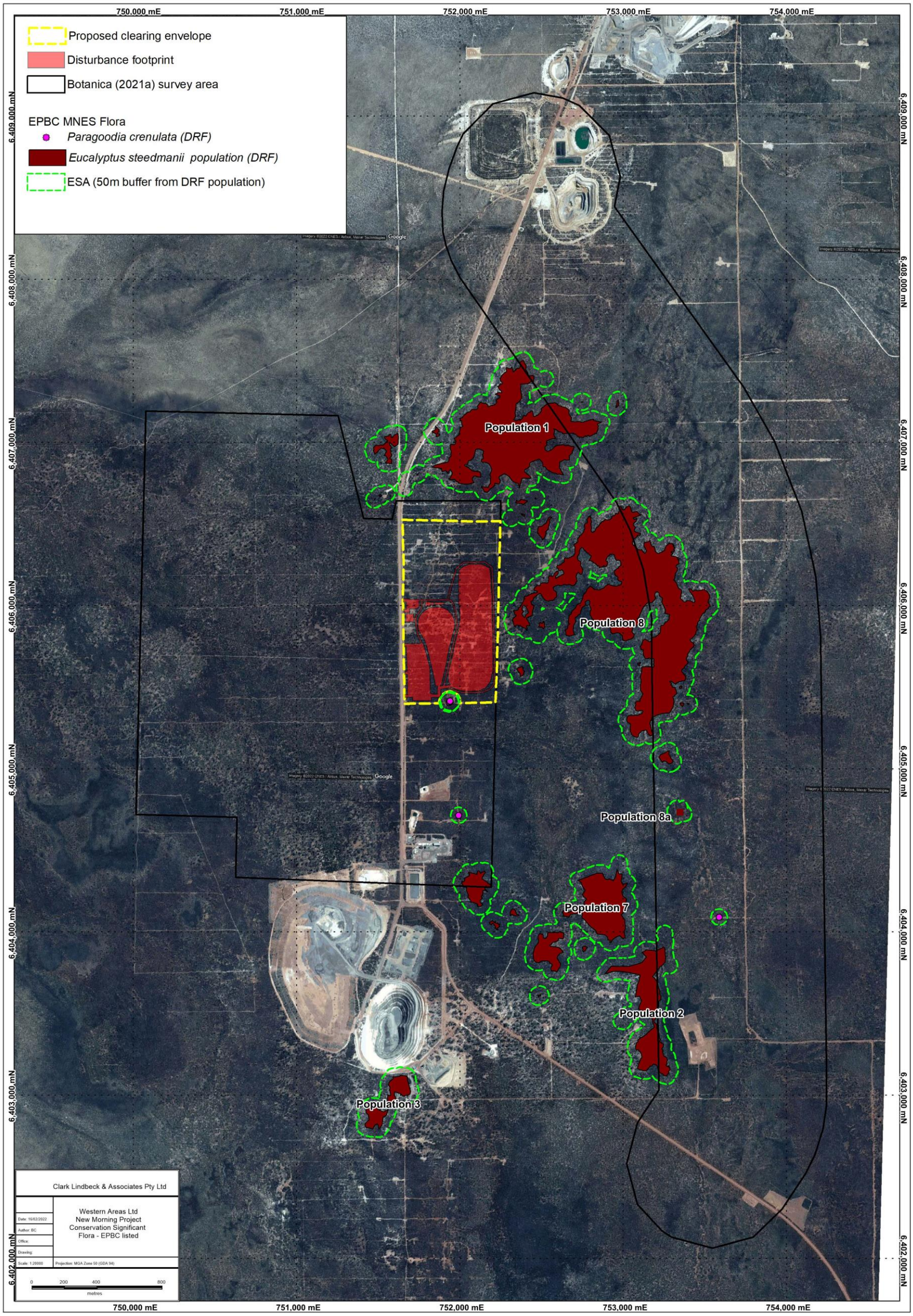

Figure 26: Location of EPBC listed Threatened flora relative to the proposed clearing envelope

6.6.3 Potential Impacts on Threatened Flora

WSA considered the following potential impacts from the Project on threatened flora:

Direct impacts

- Loss of Threatened flora as a result of clearing of 29 ha of native vegetation.

Indirect impacts resulting in reduction in health of Threatened flora in proximity

- Dieback spread - resulting from poor vehicle hygiene, land clearing, soil relocation or poor surface water management.
- Dust generation during construction and from usage of haul and access roads.
- Introduction and spread of introduced plant species.
- Changes to surface water flows and soil drainage.
- Groundwater drawdown from mine dewatering adversely impacting health of vegetation.
- Bushfire and changing fire regimes.
- Inadvertent spillage of hypersaline water and hydrocarbons.

An assessment of these potential impacts is provided in the following Section.

6.7 ENVIRONMENTAL IMPACT ASSESSMENT RELEVANT TO THREATENED FLORA

6.7.1 Assessment of Direct Impacts – Removal of flora

6.7.1.1 Eucalyptus steedmanii

There will be no removal of any *Eucalyptus steedmanii* individuals, nor removal of any vegetation within the *E. steedmanii* buffer zone.

The Proponent will manage vegetation clearing for the Project in accordance with the WSA Clearing Procedure and continue monitoring in accordance with the *E. steedmanii* Management Plan (Appendix 3). This Plan will be updated to include installation of dust monitoring and transects in Population 8, which is located east of the proposed clearing envelope.

6.7.1.2 Paragoodia crenulata

There will be no removal of any *P. crenulata* individuals, nor removal of any vegetation within the 50 m buffer zone surrounding the population located south of the proposed clearing envelope. The Proponent will manage vegetation clearing for the Project in accordance with the WSA Clearing Procedure to ensure no disturbance of this species.

6.7.2 Assessment of Indirect Impacts

6.7.2.1 Degradation of vegetation health as a result of dieback

No known dieback infestations are located in the proposed clearing envelope. The majority of the clearing envelope is located in a protectable area, with a small at risk area in the southwest corner (Figure 17).

WSA has developed and implemented a Dieback Management Plan (Appendix 6) and a Dieback Hygiene Procedure (Appendix 7) to reduce the spread of this pathogen and all operations at the Project will be undertaken in accordance with this Plan and procedure.

Dieback mapping identified three protectable areas (total of 897 ha) that are (surface) hydrologically isolated from infested areas and encompass multiple populations of *E. steedmanii* in proximity to the Project.

As the Project area is located downstream of the *E. steedmanii* populations, clearing activities do not pose a risk to spread of dieback to these populations (Figure 8).

In relation to *P.crenulata*, the population south of the proposed clearing envelope is located downstream of a 'Protectable' dieback area so the proposed clearing/action is not expected to pose a risk to spread of dieback to this population.

6.7.2.2 Degradation of vegetation health as a result of dust deposition

Dust generated as part of construction activities, movement of ore and waste and transport of ore will be minimised by using a water cart for dust suppression on an as required basis to reduce dust generation and this will be assessed on a daily basis during construction and operations. Vehicle speed limits are restricted to 40 km/hr around the mine and 90 km/hr on the haul roads.

The review of dust monitoring data from the previous eleven years (2011-2020) at Spotted Quoll (1.5 km south of New Morning FNO), indicates that dust deposition has not been a significant factor in regard to the health of the *E. steedmanii* populations at the FNO (Botanica 2020 - Appendix 5).

Despite this finding, WSA intend to install additional dust deposition gauges and monitoring transects at Population 8 (east of the Clearing envelope) to monitor this population to ensure that dust generated from the Project will continue to have no adverse impact on the health of this species.

An acceptable limit for dust deposition has been set at three standard deviations of the mean for each monitoring point based on deposition records to date (values below three standard deviations but exceeding two standard deviations provide an alert to management). In the event that these three standard deviation limits are exceeded, dust suppression measures will be reviewed and more stringent measures implemented if appropriate.

WSA will establish transects near the dust gauges to be installed at Population 8 and will undertake monthly monitoring of dust deposition on plants where any exceedance is recorded, until dust deposition readings return to below three standard deviations from the mean.

Higher dust levels are anticipated during summer due to warmer temperatures drying the WRD, ore on the ROM and the unsealed access and haul roads. Prevailing winds during this summer are easterlies in the morning and strong south easterlies in the afternoon. As the closest *E. steedmanii* population (Population 8) is located east of the clearing envelope (east of the WRD), the potential for dust is reduced.

The closest *P. crenulata* population is located 50 m south of the clearing envelope and WSA expects that given this species is a prostrate plant, and the predominant winds as outlined above, the potential for dust is reduced in comparison with *E. steedmanii* (for which no dust impacts have been identified). Health monitoring of this population will occur during operations.

6.7.2.3 Degradation of vegetation health as a result of occurrence of introduced plant species

The introduction and/or spread of weeds can result in a decline of threatened flora. The weed hygiene and management measures implemented to date at the FNO, which include washing/blowing down of machinery to remove soil/seeds prior to utilisation at the Project and inspection of all vehicles prior to commencing work at site, have resulted in no major weed outbreaks, including at Spotted Quoll tenements since implementation of that project (WSA 2018).

WSA environmental staff currently undertake quarterly weed monitoring and mapping on tenements at the FNO. Where weed species are identified they are immediately controlled either via mechanical removal or chemical treatment. These monitoring and management measures will be extended to include the New Morning Project area.

It is expected the management measures implemented for dieback will also prevent the introduction and spread on introduced plant species.

6.7.2.4 Degradation of vegetation health as a result of modified surface water flows and drainage patterns

Rockwater (2018) investigated surface hydrological and hydraulic analysis of relevant catchment areas and natural creeks that could impact the Project area. Although the assessment was based on the original Project design, it identified that the Project area is downstream of *E. steedmanii* populations (Figure 8) and therefore, the New Morning project will not impact on surface water flow to the *E. steedmanii* populations that could have indirect adverse health impacts.

An updated surface water assessment will be completed for the Project area to identify infrastructure, i.e. diversions/bunding, required to maintain natural surface water flows at the Project.

Monitoring of *E. steedmanii* undertaken by WSA since the commencement of mining operations in 2002 has recorded no evidence suggesting a decline in population health from identified potential threats (vegetation or unintentional clearing, mining activities, saline water use and spillage, and fire management) during the operation of the Spotted Quoll mine (WSA 2018).

Monitoring of the health of *P. crenulata* population located south of the Project will occur to ensure the health of the population is maintained.

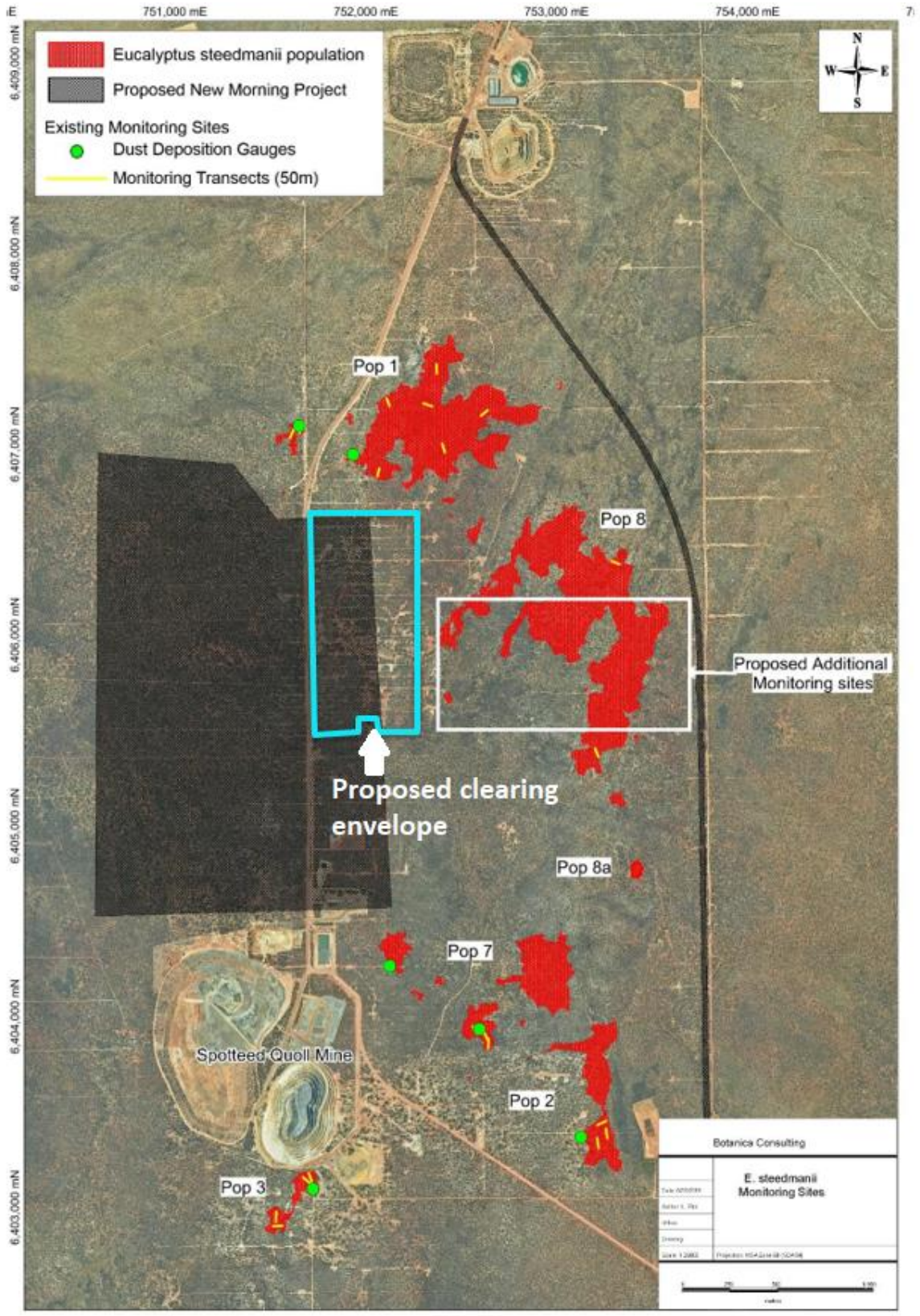

Figure 27: Location of existing monitoring sites and area for additional monitoring sites to be installed (from Botanica 2020) – the additional monitoring sites will be increased to includes those immediately east of the proposed New Morning clearing envelope

6.7.2.5 Degradation of vegetation as a result of groundwater drawdown

The potential impacts of dewatering and the resulting groundwater drawdown on local vegetation (which includes flora of MNES) is monitored as part of the existing GWL and DWER Licence.

Detailed monitoring is undertaken in accordance with the GWL and Operating Strategy which includes monitoring of extraction volumes, groundwater levels, groundwater quality and vegetation monitoring across the FNO Project. A summary of impacts as reported in Rockwater (2020) were:

- Groundwater levels showed generally stable or falling trends over the three years at the Flying Fox and Spotted Quoll mines, as a result of groundwater extraction for mine dewatering.
- Vegetation monitoring (adjacent to areas of discharge) has shown some fluctuation in plant densities and vegetation condition in some monitoring transects. In most cases, this is reflected in both analogue (control) and monitoring sites and is likely to reflect the variation in rainfall or the aftermath of bushfires rather than groundwater-related activities at the Forrestania Nickel Operation.
- There have been no observed detrimental effects attributable to either dewatering or discharge activities outside the immediate vicinity of the FNO activities. Although groundwater levels have fallen or risen locally as a result of extraction or discharge, no significant long-term changes have been detected in regional bores, and no compliance limit levels have been breached during the 2019-2020 period (while mitigation measures were in place).

Vegetation has shown some fluctuations in plant density and condition over the 2017-2018 review period (Rockwater 2018a). However, Rockwater (2018a) noted that similar variations were observed at both the monitoring sites and the analogue sites (the latter being located outside the inferred impact area). It is thought the fluctuations reflect the impacts of natural (uncontrollable) conditions such as rainfall and not the dewatering or water-discharge activities at Forrestania.

E. steedmanii populations are considered highly unlikely to rely on local groundwater supplies due to the depth to groundwater (30 mbgl) and the hypersaline characteristics of the groundwater (Rockwater 2018). This is also considered to be the case for local vegetation.

Given the short duration of mining activities at New Morning and the current SWL (approximately 30 mbgl), there is not anticipated to be any exacerbation of the current groundwater trends which will impact flora of MNES or vegetation.

6.7.2.6 Degradation of vegetation as a result of inadvertent saline water or hydrocarbon spills/leaks

All hyper-saline dewatering pipelines will be buried and fitted with a telemetry-based leak detection system in the form of a flow meter and transmitter at each end of the pipeline. Leak monitoring is via a PLC and control circuit containing software and programming to detect any discrepancy of flow rates between the associated magnetic flow meters. In the event of a leak or breach in the pipeline, the pipeline pump stations can be shut down. Additionally, all dewatering infrastructure will be visually inspected daily in accordance with the DWER Licence (L8041/1990/5) which will be updated to include New Morning dewatering infrastructure.

Surface water management structures will be constructed, where required, along the dewatering pipeline corridor so that in the event of a failure of the pipeline, saline water will be contained within the corridor.

The dewatering pipeline will not run proximal to *E. steedmanii* or *P. crenulata* populations.

All hydrocarbons will be stored and used according to the requirements of the various government Acts, Regulations and Australian Standards. If an inadvertent hydrocarbon spill occurs at New

Morning, the spill will be isolated as soon as possible to reduce spread and the contaminated soil removed and treated off-site. Hydrocarbon/chemical storage will not be located in proximity to *E. steedmanii* or *P. crenulata* populations.

6.7.2.7 Degradation of vegetation as a result of bushfire

Fires are a threat to these threatened flora species through direct mortality of individuals and habitat loss, fragmentation and degradation.

The Project has a low risk of generating a fire (resulting from mining activities) due to the clearing of land within the Project area. Diesel storage and diesel use will be undertaken in accordance with the *Dangerous Goods Safety Act 2004* and the *Dangerous Goods Safety (Storage and Handling of Non-explosives) Regulations 2007*.

In addition, WSA has a Bushfire Management Plan at the FNO which will be implemented for all activities at New Morning.

Key components of this plan include:

- Assessment of fuel loads and fire risks particularly relating to site infrastructure.
- Establishment of 30 m wide low fuel buffer zones around critical infrastructure.
- Installation of fire suppression systems including a mobile fire and emergency truck, fixed 23,000L + 34,000L water tanks, and a standpipe with quick fill located at the dewatering settling ponds.
- All site vehicles carry handheld fire extinguishers and two-way radios.
- The FNO has an emergency response team that is regularly trained in fire suppression techniques.
- Smoking is only permitted in designated areas on site.
- Hot work permits are required to be issued by the Mine Manager prior to this type of work commencing on site.
- Training and induction on fire management for all staff and contractors prior to commencing work on site.

A Bushfire at the FNO in 2020 was attributable to a lightning strike (DFES 2020) and not caused by mining related activities (Figure 28).

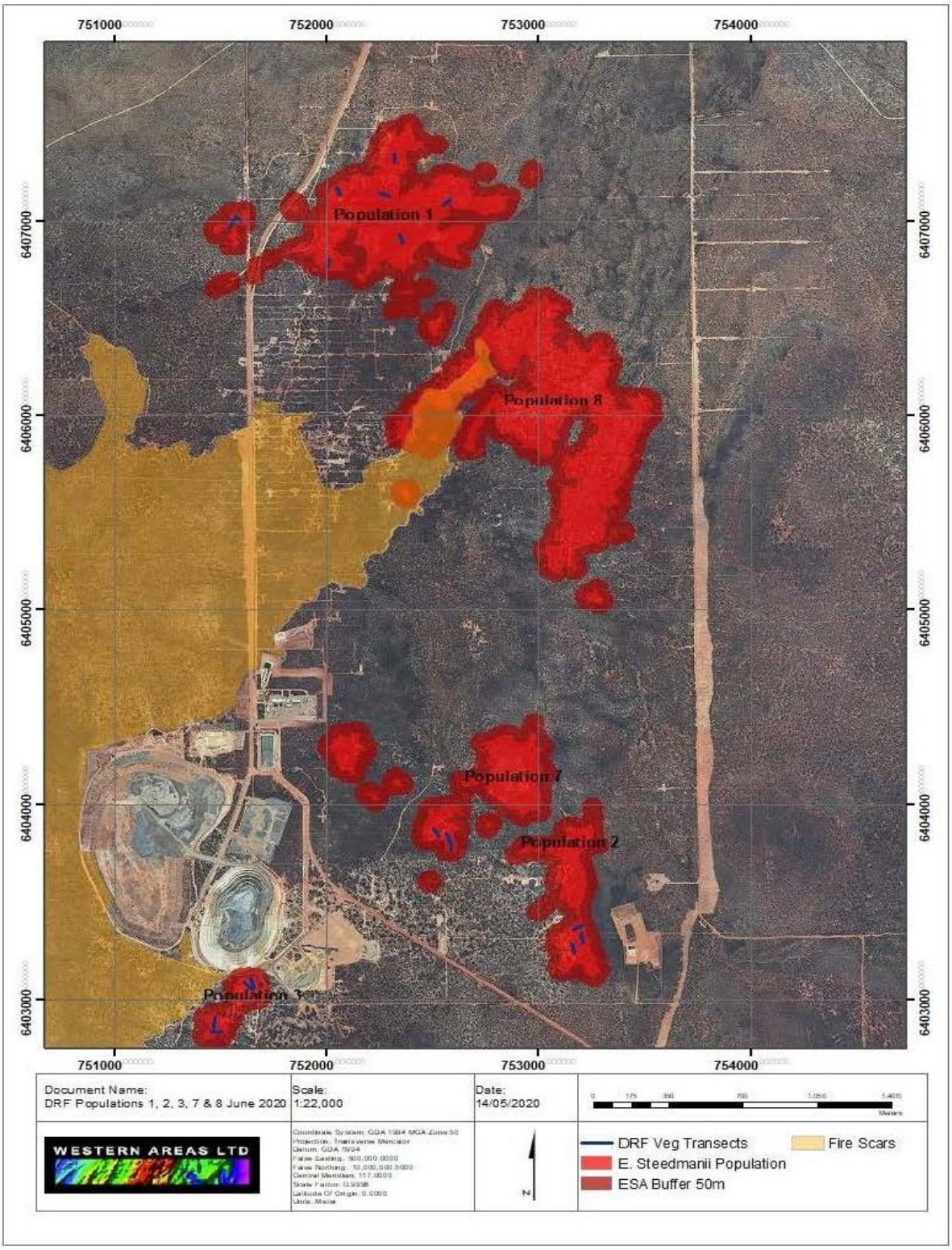

Figure 28: Fire scar caused by recent bushfire

6.7.3 Mitigation

As the New Morning Project is located within the FNO, all managed by WSA, current mitigations to control potential environmental impacts at FNO will be revised to include the New Morning Project and are outlined in the following sections.

6.7.3.1 Avoid

The key avoidance mechanism utilised by WSA is the reduction in the size of the original development footprint from 140 ha to 33.4 ha (29 ha of clearing), thus significantly reducing the amount of vegetation clearing required. Other mitigation measures are:

- Avoid disturbance to *E. steedmanii* populations.
- Avoid disturbance to *P. crenulata* populations.
- Maintain a 50 m buffer around these population where no disturbance will occur.
- Avoid clearing of vegetation where existing disturbed areas can be utilised
- Avoid unauthorised clearing though implementation of an internal clearing permit procedure.
- Avoid areas of *P. boodjera* infestation.
- Avoid the impact of changing surface water flows on vegetation health and soil by constructing surface water management structures (where required) to maintain natural surface water flow downstream of the Project.

6.7.3.2 Minimise

- Minimise the effects of dieback (*P. boodjera)* with all activities undertaken in accordance with the Dieback Management Plan and Procedure (Appendix 6, Appendix 7).
- Minimise the effects of weeds in accordance with the Weed Management Plan – including weed monitoring, location recording, identification and immediate treatment via mechanical removal or chemical treatment.
- Minimise the effect of dewatering and groundwater abstraction on local groundwater systems by complying with the DWER Operating licence (L8041/1990/5) and GWL156549(4) and continuing with the extensive groundwater monitoring program to assess the current (and future) impact of dewatering activities at the FNO.
- Dust suppression activities during construction and operations to minimise dust emissions.
- Minimise the risk of saline dewatering water entering the environment by:
    - telemetry systems and pressure sensors along pipelines to enable the detection of leaks and failures
    - automatic cut-outs in the event of a pipe failure
    - sumps will be constructed at regular intervals with sufficient volume to ensure that between inspections, any leak does not escape onto neighbouring soil
    - pipelines will be inspected daily for visual integrity.
- Minimise the impact of dust on vegetation health by:
    - Water trucks with dribble bars will be utilised during construction to control dust as required
    - Water carts are employed as required to reduce dust emissions from vehicle movements and stockpiles

- Water sprays are located at transition points on the crushing circuit to minimise dust emissions
- Implementation of vehicle speed limits.
- Revise and implement the *E. steedmanii* Conservation Management Plan to include additional monitoring points in Population 8.

- Minimise saline dust suppression water overspray by using trucks with dribble bars on roadways near vegetation, constructing earthen bunds on roadsides and complying with the DWER licence
- Minimise impact of site and bushfires via the Bushfire Management Plan – specifically:
  - installation of fire suppression systems including a mobile fire and emergency truck, fixed 23,000L + 34,000L water tanks, and a standpipe with quick fill located dewatering settling ponds
  - The site emergency response team that is regularly trained in fire suppression techniques
  - Buildings and vehicles have appropriate fire extinguishers fitted.

6.7.3.3 Rehabilitate

WSA has an approved Mine Closure Plan (MCP) for the FNO (Strategen 2019) and maintains a register of legal obligations that includes commitments and conditions in place for FNO, such as Ministerial Conditions. These direct the completion criteria and implementation of rehabilitation.

Consistent with the MCP, the rehabilitation-related objectives for the Project, which will include New Morning, are summarised as follows:

- To achieve rehabilitated sites and landforms that are safe, stable, non-polluting and capable of supporting a self-sustaining native vegetation community
- Maximise recovery and maintain quality of topsoil and utilise direct return where practicable, to conserve soil structure, nutrients, seed, and soil biota
- Soil properties will be appropriate to support the target ecosystem
- To achieve revegetation that is self-sustaining and consistent with the structure and function of surrounding undisturbed areas
- Rehabilitated areas will provide fauna habitat and facilitate movement of fauna between rehabilitated areas and remnant vegetation
- Waste rock dump designed to agreed standards to create a safe, stable (physical and chemical), free draining, non-polluting final landform which is compatible with the surrounding landscape and capable of supporting the end land use
- To ensure all overburden materials conducive to rehabilitation success are utilised appropriately
- To achieve rehabilitation and revegetation results that are compatible with the immediate and surrounding landscape.

FNO completes rehabilitation on a progressive basis as disturbance areas become available. Rehabilitation work is planned annually and recorded in spreadsheets with data on areas rehabilitated by year with accompanying soils, seed and planting data.

Current rehabilitation works are characterised by high quality planning and execution, with good use made of topsoil and mulch resources. Native seed is collected from around the project area over the summer months, dried and smoke treated where required. Seed mixes are made up in batches for spreading onto freshly ripped and mulched areas where required.

Seed from native species, also collected locally from the project area, are sent to a plant farm where approximately 15,000 seedlings are grown and subsequently delivered to site annually in June. In addition to direct seeding and planting of seedlings, infill planting of tube stock is undertaken each year in previously rehabilitated areas, to supplement planting and ensure adequate stocking rates of rehabilitated areas.

6.7.3.4 Predicted Outcome

The predicted Environmental Predicted Outcomes (EPO) for the Project on threatened flora include:

- No removal *of E. steedmanii* or *P. crenulata*.
- No adverse impacts on *E. steedmanii* populations.
- No adverse impacts on *P. crenulata* populations.

Populations of *E. steedmanii* (DRF) within the FNO area are mapped and have established buffer (protection) zones. WSA have implemented management systems to ensure sound management of these populations. Long-term monitoring by WSA has shown no effects on the species from past or current mining activities. WSA has established a buffer zone around the *P. crenulata* populations and will undertake monitoring of the health of these populations consistent with that undertaken for *E. steedmanii*.

Monitoring of the *P. crenulata* population to the south of the proposed clearing envelope will occur to ensure the Project does not impact the health of this population.

Impacts to flora and fauna will be minimised by inclusion of the New Morning Project into WSA's well established management systems. Key management documents include:

- *E. steedmanii* Management Plan;
- *P.crenulata* Management Plan (in development);
- Dieback Management Plan;
- Dieback Hygiene Procedure;
- Internal Clearing Procedure;
- Fire Prevention and Control Strategy.

The Project activities are not considered to pose any significant residual risks to the protection of these Threatened flora species. WSA is of the belief the proposed action will not have a significant impact on *E. steedmanii* and P*. crenulata* and an 'assessment of the significance' on this species in accordance with significant impact criteria is provided in Tables 22 and 23.

Table 21: Assessment of significance of potential impacts to *Eucalyptus steedmanii*

Significant impact criteria for Vulnerable listed species	Significant impact	Response to criteria
Lead to a long-term decrease in the size of a population	Unlikely	The proposed action will result in no direct impacts (i.e. removal) to this species or vegetation within the buffer zone. WSA has internal vegetation clearing permitting processes to ensure clearing is restricted to only that which has been approved. Vegetation monitoring of these populations has been undertaken by the proponent since 2009 (in accordance with the DRF Management Plan (Coffey 2009) and the revised DRF Management Plan (Astron 2014a)). To date, the *.E steedmanii* population numbers have not been affected by nearby mining activities (Botanica Consulting 2019). This monitoring will continue will mining occurs and additional transects set up in Population 8 located east of the clearing envelope. Given the above, it is unlikely that the proposed action will cause a long-term decline in population size.
Reduce the area of occupancy of the species	Unlikely	The Proposed Action does not require removal of any individuals of this species and is unlikely to reduce the area of occupancy of the species. 'Area of occupancy' (AOO) is defined as the area within a species' extent of occurrence which is occupied by that species (IUCN 2012). The proposed action will result in no direct impacts (i.e. removal) to this species or vegetation within the buffer zone. WSA has internal vegetation clearing permitting processes to ensure clearing is restricted to only that which has been approved. As indicated above, vegetation monitoring of these populations has been undertaken extensively by the proponent since 2009 and this monitoring will continue and additional transects set up in Population 8 located east of the clearing envelope. As such, this project is unlikely to reduce the area of occupancy of *E. steedmanii.*
Fragment an existing population into two or more populations	Unlikely	The proposed action will result in no direct impacts (i.e. removal) to this species or vegetation within the buffer zone which would fragment a population.
Adversely affect habitat critical to the survival of the species	Unlikely	The proposed action will result in no direct impacts (i.e. removal) to this species or vegetation within the buffer zone. As such, this proposed action is unlikely to adversely affect critical habitat of *E. steedmanii.*
Disrupt the breeding cycle of a population	Unlikely	*E steedmanii* is an obligate seeder, known to only regenerate from seeds after a fire or other disturbance event (DEWHA 2008). A fire affecting populations of predominately immature trees may result in poor recovery, as the seeds only have a short viability, and the soil-stored seed bank is generally negligible to low. However, all populations in the FNO area have significant numbers of mature trees, so even if a fire occurred, seeding, and hence regeneration, is likely. The proposed action will result in no direct impacts (i.e. removal) to this species or vegetation within the buffer zone. Therefore, it is unlikely that the proposed action will result in disturbance to the reproduction cycle.
Modify, destroy, remove or isolate or decrease the availability of habitat to the extent that the species is likely to decline	Unlikely	N/A.
Result in invasive species that are harmful to the endangered species becoming established	Unlikely	WSA has strong established weed and hygiene management measures in place, including quarterly monitoring and immediate weed control, resulting in no major weed outbreaks. WSA manages the *E. steedmanii* buffer zone to exclude non-essential traffic, and any essential vehicles into the buffer zone (such as for environmental monitoring) are managed according to the vehicle hygiene processes. As such, this proposed action is unlikely to cause a significant weed invasion in the of *E. steedmanii* populations.
Introduce disease that may cause the species to decline	Unlikely	The emerging threat of *Phytophthora boodjera* has had some impact on the population health of *E. steedmanii.* This dieback strain has already been recorded in Populations 3 and 7, with a decline in vegetative cover in Population 7 and is not

Significant impact criteria for Vulnerable listed species	Significant impact	Response to criteria
		considered to be attributable to mining activities. WSA has implemented a Dieback Management Plan, and a Dieback Hygiene Procedure to reduce the potential spread of this pathogen. WSA manages the *E. steedmanii* buffer zone to exclude non-essential traffic, and any essential vehicles into the buffer zone (such as for environmental monitoring) are managed according to the dieback and vehicle hygiene processes. As such, this project is unlikely to exacerbate the impact or extent of dieback or introduce new disease in the *E. steedmanii* populations.
Interfere substantially with the recovery of the species	Unlikely	The proposed action will result in no direct impacts (i.e. removal) to this species or vegetation within the buffer zone. WSA has an internal vegetation clearing permitting process to ensure clearing is restricted to only that which has been approved. Vegetation monitoring of these populations, including population censusing, is undertaken to ensure the Project does not interfere with this species (or recovery).

Table 22: Assessment of significance of potential impacts to *Paragoodia crenulata*

Significant impact criteria for Vulnerable listed species	Significant impact	Response to criteria
Lead to a long-term decrease in the size of a population	Unlikely	The proposed action will result in no direct impacts (i.e. removal) to this species or vegetation within the buffer zone. WSA has internal vegetation clearing permitting processes to ensure clearing is restricted to only that which has been approved. Vegetation monitoring of the population located 50 m south of the proposed clearing envelope will be undertaken (consistent with the population monitoring undertaken for *E. steedmanii*) to ensure the population is not adversely impacted by the Project. Given the above, it is unlikely that the proposed action will cause a long-term decline in population size.
Reduce the area of occupancy of the species	Unlikely	The Proposed Action does not require removal of any individuals of this species and is unlikely to reduce the area of occupancy of the species. 'Area of occupancy' (AOO) is defined as the area within a species' extent of occurrence which is occupied by that species (IUCN 2012). The proposed action will result in no direct impacts (i.e. removal) to this species or vegetation within the buffer zone. WSA has an internal vegetation clearing permitting processes to ensure clearing is restricted to only that which has been approved. WSA has revised the clearing envelope to ensure disturbance to this population, and a 50 m buffer zone, is avoided. As such, this project is unlikely to reduce the area of occupancy of *P. crenulata.*
Fragment an existing population into two or more populations	Unlikely	The proposed action will result in no direct impacts (i.e. removal) to this species or vegetation within the buffer zone which would fragment a population.
Adversely affect habitat critical to the survival of the species	Unlikely	The proposed action will result in no direct impacts (i.e. removal) to this species or vegetation within the buffer zone. The vegetation group in which this species was identified is widespread outside of the Project area. As such, this proposed action is unlikely to adversely affect critical habitat of *P. crenulata.*
Disrupt the breeding cycle of a population	Unlikely	The proposed action will result in no direct impacts (i.e. removal) to this species or vegetation within the buffer zone. Therefore, it is unlikely that the proposed action will result in disturbance to the breeding cycle.
Modify, destroy, remove or isolate or decrease the availability of habitat to the extent that the species is likely to decline	Unlikely	N/A.

Significant impact criteria for Vulnerable listed species	Significant impact	Response to criteria
Result in invasive species that are harmful to the endangered species becoming established	Unlikely	WSA has strong established weed and hygiene management measures in place, including quarterly monitoring and immediate weed control, resulting in no major weed outbreaks. WSA manages the *E. steedmanii* buffer zone to exclude non-essential traffic, and any essential vehicles into the buffer zone (such as for environmental monitoring) are managed according to the vehicle hygiene processes. As such, this proposed action is unlikely to cause a significant weed invasion in the of *E. steedmanii* populations.
Introduce disease that may cause the species to decline	Unlikely	The emerging threat of *Phytophthora boodjera* has had some impact on the population health of *E. steedmanii.* This dieback strain has already been recorded in Populations 3 and 7, with a decline in vegetative cover in Population 7 and is not considered to be attributable to mining activities. WSA has implemented a Dieback Management Plan and a Dieback Hygiene Procedure to reduce the potential spread of this pathogen. WSA manages the *E. steedmanii* buffer zone to exclude non-essential traffic, and any essential vehicles into the buffer zone (such as for environmental monitoring) are managed according to the dieback and vehicle hygiene processes. As such, this project is unlikely to exacerbate the impact or extent of dieback or introduce new disease in the *E. steedmanii* populations.
Interfere substantially with the recovery of the species	Unlikely	The proposed action will result in no direct impacts (i.e. removal) to this species or vegetation within the buffer zone. WSA has an internal vegetation clearing permitting process to ensure clearing is restricted to only that which has been approved. Vegetation monitoring of these populations, including population censusing, is undertaken to ensure the Project does not interfere with this species (or recovery).

6.8 TERRESTRIAL FAUNA

6.8.1 Relevant Guidance

The relevant policy and guidance for MNES relevant to the Project include:

- Significant Impact Guidelines: 1.1 – Matters of National Environmental Significance (DoEE, 2013)
- Carnaby's Cockatoo (*Calyptorhynchus latirostris*)
  - Carnaby's Cockatoo (*Calyptorhynchus latirostris*) Recovery Plan (DPAW 2013)
  - EPBC Act referral guidelines for three threatened black cockatoo species: Carnaby's cockatoo (endangered), *Calyptorhynchus latirostris*; Baudin's cockatoo (vulnerable), *Calyptorhynchus baudinii*; Forest red-tailed black cockatoo (vulnerable), *Calyptorhynchus banksii naso* (DSEWPaC 2012)
  - Revised draft referral guideline for three threatened black cockatoo species: Carnaby's Cockatoo (Endangered) *Calyptorhynchus latirostris,* Baudin's Cockatoo (Vulnerable) *Calyptorhynchus baudinii,* Forest Red-tailed Black Cockatoo (Vulnerable) *Calyptorhynchus banksii naso* (DoEE 2017).
- Malleefowl (*Leipoa ocellata*)
  - National Recovery Plan for Malleefowl *Leipoa ocellata* (Benshemesh 2007).
- Chuditch (*Dasyurus geoffroii*):
  - Chuditch (*Dasyurus geoffroii*) National Recovery Plan (DEC 2012).

6.8.2 Species occurrence

6.8.2.1 Carnaby's Black Cockatoo

Species

Carnaby's Black-Cockatoo is listed as Endangered under the EPBC Act (1999).

Carnaby's Black-Cockatoo, *Calyptorhynchus latirostris* (formerly called the short-billed form of the White-tailed Black Cockatoo) is a large, mostly black bird with white cheek patches, large white panels on the tail and a strong curved bill (Plate 1, DPaW, 2013).

Carnaby's Black-Cockatoo is endemic to southwest Western Australia, extending from the Murchison River to Esperance, and inland to Corrow, Kellerberrin and Lake Cronin (Figure 29) (Johnstone and Storr 1998). Carnaby's Black-Cockatoo is highly mobile, and has a seasonal migratory pattern linked to breeding. The breeding season is July to December, taking place in the drier inland areas, with high numbers in the Wheatbelt region (Johnstone and Storr 1998, Saunders *et al*. 2014b). During the non-breeding season, the majority of the birds move to higher rainfall areas (DPaW 2013), including the midwest, Swan Coastal Plain and south coast. Here they forage in large flocks (Saunders *et al*. 2011), feeding on the seeds of Banksia, Dryandra and Eucalypt species such as Jarrah, Marri and Karri (*E. diversicolor*). They are also known to forage and eat seed from *Pinus radiata*. Carnaby's are typically scarce and patchily distributed in the drier eastern parts of its range and in the extreme south west.

The species requires tree hollows with suitable dimensions for nesting, which typically occur in larger trees over 200 years old (DSEWPaC 2012a). Breeding habitat trees are therefore defined in the Commonwealth guidelines as any trees with diameter at breast height (DBH) equal to or greater than 500 mm, or Wandoo (*Eucalyptus wandoo*) and Salmon Gum (*E. salmonophloia*) trees with DBH equal to or greater than 300 mm (DSEWPaC 2012a). In the Wheatbelt, Carnaby's Black Cockatoos nest primarily in Salmon Gum and Wandoo trees, but are also known to utilise Tuart, Marri, Red Morrel

(*E. longicornis*) and York Gum (*E. loxophleba*) (Johnstone and Storr 1998). Long term studies have shown Carnaby's Black-Cockatoos utilise hollows ranging from 10 – 65 cm in diameter (average 26 cm) and approximately 130 cm deep (Saunders *et al*. 2014a, 2014b).

Carnaby's has declined to less than 50% of its original population size and shown a reduction in its breeding range, particularly in the northern and eastern areas of the wheatbelt, largely because of clearing for agriculture (Cale 2003). Over the last 10-30 years their breeding range has expanded further south and west towards the Jarrah (*Eucalyptus marginata*) and Marri (*Corymbia calophylla*) forests of the Darling Scarp and Tuart (*E. gomphocephala*) forests of the Swan Coastal Plain (Johnstone *et al.* 2010).

The primary threat to Carnaby's Black cockatoo is the loss and fragmentation of foraging, roosting and breeding habitat (DAWE 2021). Land clearing for urban development and mining has been identified as key threats, though revegetation after mining has the potential to provide suitable habitat once the trees mature. Other threatening processes include competition for nest hollows, habitat degradation, illegal trade, human conflict, climate change, fire, and vehicle strike.

Map 3: Modelled distribution for Carnaby's Cockatoo
(*Calyptorhynchus latirostris*)

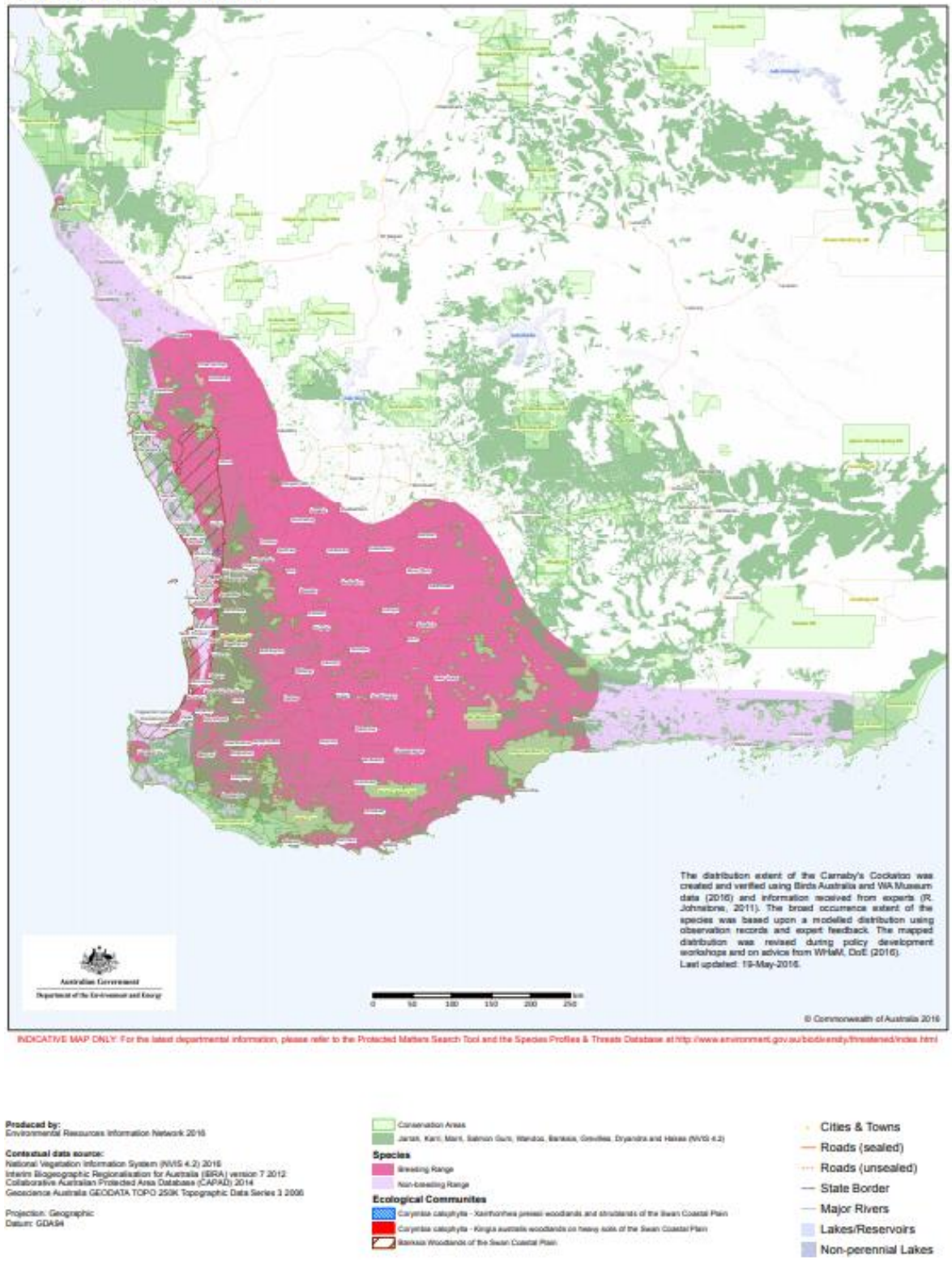

Figure 29: Distribution of Carnaby's Black Cockatoo within Australia (Commonwealth of Australia 2016)

Regional work – WA Museum

As part of the approvals associated with previous approvals at FNO, WSA funded research by WA Museum to assess the occurrence of Carnaby's Cockatoo and monitoring in the south-eastern Wheatbelt and Great Western Woodlands.

The Carnaby's Black Cockatoo surveys and monitoring was carried out between 2012 and 2018 by R.E. Johnstone and T. Kirkby (WA Museum) at different times of the year to include both the breeding and non-breeding migration periods for this species to cover a broad area of the south-eastern Wheatbelt and parts of the Great Western Woodlands where limited research work has been carried out in the past.

Johnstone and Kirkby (2018) indicate that there has been an apparent shift in its breeding range further west and south since the middle of last century with a more rapid increase in the past 10–30 years into the Jarrah-Marri forests of the Darling Scarp and the Tuart forests of the Swan Coastal Plain. In addition, there is also an indication that this species is expanding its breeding range in the far south-east i.e. Lake King and Ravensthorpe region.

Occurrence in the Project Area

Carnaby's Black Cockatoo have been recorded in the Forrestania area (Johnstone and Kirkby 2019, Biota 2006).

Based on the results of the Biota (2019) survey, WSA has determined there were 27 Carnaby's Breeding Habitat Trees in the disturbance footprint, of which 11 contained nest hollows (Table 23, Figure 20). Further investigation of the trees with potential nest hollows were assessed by Johnstone and Kirkby (2019 – Appendix 10) to accurately define the suitability of the previously identified tree hollows for breeding by Carnaby's Black Cockatoo, and to assess the importance of the potential habitat (breeding and foraging habitat) at New Morning.

This involved a four-day targeted survey of 186 potential nesting trees (6-9 January 2019), in the vicinity of the New Morning project (as identified by Biota 2019) for potential use or in use by Carnaby's Cockatoo

None of the nest hollows studied showed evidence of cockatoo use and most of these hollows were considered by Johnstone and Kirkby (2019) to be unsuitable even for small parrots. One suitable nest hollow is located east of the Project area on the former proposed haul road diversion but which is located outside of the proposed clearing envelope (Figure 20).

Johnstone and Kirkby (2019) found no direct evidence of Carnaby's Black Cockatoos breeding in the New Morning area. Some foraging trees are present in the New Morning area i.e. heaths, comprising *Banksia*, *Dryandra*, *Grevillea* and *Hakea* spp. This vegetation is extensive outside of the Project area.

Table 23: Assessment of Carnaby's Cockatoo Breeding habitat trees in the clearing envelope and disturbance footprint

Parameter	Carnaby's Potential Breeding* Habitat Trees	Carnaby's Potential Breeding Trees Habitat with nest hollows**
Identified during survey (Biota 2019) – the survey area extends outside of the proposed clearing area	1,445	186
Within proposed clearing envelope	50	17
Within proposed disturbance footprint	27	11

* Breeding trees includes all tree species of DBH greater than 300 mm
Johnstone & Kirkby (2019) identified **none of these trees showed evidence of Carnaby's use

There was no evidence of feeding by Carnaby's in the clearing envelope.

As part of the Spotted Quoll assessment, Johnstone *et al.* (2008) noted that only small numbers of the species are likely to occur in the region during the breeding season (September to January) and that many of the birds observed are likely to be migrants returning to and from the Lake Cronin and Hatters Hill feeding areas.

The Forrestania region is at the eastern limit of the distribution for Carnaby's Black Cockatoo in the south-west of the State. Although there are areas in the wider Forrestania region with good stands of Salmon Gum that contain hollows suitable for Carnaby's Black Cockatoos, there is a general lack of foraging habitat (i.e. with extensive *Banksia*, *Dryandra* and *Hakea* shrubs) and water is scarce (Johnstone and Kirkby 2019). This suggests the Project area is sub-optimal habitat for Carnaby's.

In summary, there is no evidence of Carnaby's nesting, nor was there any suitable nesting sites (hollows) in the New Morning area. There is some foraging habitat present (*Banksia*, *Dryandra* and *Hakea* shrubs), and roosting habitat that may be used by Carnaby's moving through the area, although water is scarce.

Johnstone and Kirkby (2019) concluded that: "*Overall we believe that the clearing of vegetation for the New Morning Project will not impact on the availability of breeding, feeding and roosting habitat for Carnaby's Cockatoo or cause a decline in the local (area/region) population as summarised in Appendix A*" (Appendix A in Appendix 10, , pp 5-6).

As the site is at the eastern limit of the species' distribution, the habitat is considered to be sub-optimal to support Carnaby's Black Cockatoo populations.

6.8.2.2 Malleefowl

Species

Nationally, the Malleefowl (*Leipoa ocellata)* is listed as a Vulnerable species under the EPBC Act (1999) and the *Biodiversity Conservation Act 2016.*

The Malleefowl is a large long-lived sedentary species with an average lifespan of roughly 15 years. They have a unique appearance with a distinctly barred upper body of grey, white, black, buff and pale chestnut feathers, with a crest extending from the front of the crown to the nape which is raised when the bird is alarmed.

The Malleefowl is a species which occupies semi-arid to arid regions of Western Australia, inhabiting dense shrublands and thickets of Mallee (*Eucalyptus* spp.), Boree (*Melaleuca lanceolata*), Bowgada (*Acacia linophylla*), or areas which form dense leaf litter (Johnstone and Storr 1998). Malleefowl prefer habitat that is long unburnt for breeding and shelter. However, Malleefowl will feed in recently burnt areas (Benshemesh 1992).

Originally, Malleefowl were widespread and common across the southern arid and semi-arid zone. However, the species has now become patchily distributed due to the effects of habitat clearing and fox and feral cat predation (Johnstone and Storr 1998). Unlike other megapods that prefer damp forest, the Malleefowl does not inhabit the higher rainfall area of the Swan Coastal Plain and the wetter parts of the south coast of Western Australia.

Major threats to the Malleefowl include clearing and burning of native vegetation, the introduction and spread of predatory species, grazing, starvation and road deaths (DWER 2021d).

Regional Malleefowl surveys

As part of approvals associated with Spotted Quoll, WSA has assisted the Malleefowl Preservation Group and assisted in the National Malleefowl Monitoring Program at the FNO Project. Figure 21 shows the results from the 2020-2021 monitoring. Mound WSA-069 is located within the clearing envelope and is located immediately adjacent to existing disturbance.

Project occurrence

The Biota (2019) targeted fauna survey of the New Morning area recorded no Malleefowl individuals, no active mounds nor tracks in the clearing envelope, suggesting the area is not a preferred breeding site (Figure 22).

Six inactive mounds were recorded west and south of the proposed clearing area (Figure 22). The age of the inactive mounds (>10 years old) recorded (west and south) outside of the clearing envelope suggest that Malleefowl did once bred in the area but they do not any longer and

potentially only use the local area for foraging. This assumption is confirmed by the results of the Malleefowl mounds monitored in 2020-2021 by the Malleefowl Preservation Group in proximity to the clearing envelope, of which none were active.

WSA will continue their monitoring program to map and monitor Malleefowl activity across the FNO site which will include the New Morning Project footprint.

6.8.2.3 Chuditch

Species

The Chuditch (*Dasyurus geoffroii*) is listed as Vulnerable under the Commonwealth EPBC Act 1999 and the *Biodiversity Conservation Act 2016*.

The Chuditch is the largest carnivorous marsupial occurring in Western Australia, with adults reaching up to 0.9 kg for females and 1.3 kg for males (Orell and Morris 1994). The Chuditch can be distinguished from other mammals within its area by their white spotted brown pelage, pointed muzzle, rounded ears, large dark eyes and non-hopping gait (Orell and Morris 1994). It has a long tail which is roughly three quarters the size of its head and body length with a black brush on the distal half (Van Dyck and Strahan 2008). Chuditch are principally nocturnal.

Formerly, Chuditch were widespread and occurred over nearly 70% of the Australian continent (DEC 2010). The Chuditch was relatively abundant over this large range before a drastic decline contracted their range to the southwest of Western Australia. The Chuditch now has a patchy distribution throughout the Jarrah Forest and Karri/Marri/Jarrah forest of the southwest, in riparian vegetation and native vegetation along road reserves. The Chuditch also occurs in very low numbers in the Midwest, Wheatbelt and South Coast Regions (DEC 2010). Wherever appropriate, Chuditch habitat must contain suitable hollow logs and/or tree hollows for use as den and refuge sites. Earth burrows and old bird nests may also be used for these purposes (Orell and Morris 1994).

Chuditch are solitary animals for most of their lives. They exhibit low population densities and patchy distribution of populations. They occupy relatively large home ranges with males ranging over 15 km^2 and females 3 - 4 km^2 (Serena and Soderquist 1989). Females tend to be territorial and their 'core areas', defined by den locations, are typically non-overlapping.

The extent of the Chuditch's former range suggest that the species utilised a wide variety of habitats including woodland associations, dry sclerophyll forests, beaches and deserts (Orell and Morris 1994). The current knowledge suggests that Chuditch feed opportunistically and will feed on whatever food sources are abundant in the area, including food scraps around campsites and mining messes. Their carnivorous diet can consist of mammals (including numbats, woylies, brush-tail possums, southern brown bandicoots and rodents), small lizards, birds, and eggs. However, they predominantly feed on a range of large invertebrates. Although Chuditch are sometimes active during the day, they are essentially nocturnal and forage primarily on the ground at night (Orell and Morris 1994; DEC 2010). Thus, in addition to having dens and refuges, Chuditch require sufficient prey biomass to survive.

Chuditch are seasonal breeders and both males and females are sufficiently mature to breed in their first year. Mating occurs in late April to early July and two to six young are born after a gestational period of 17-18 days. The young remain in the mother's pouch for about two months before being left in the den while the mother leaves to forage. Young are fully weaned at 170 days and subsequently disperse. The average lifespan of the Chuditch in the wild is two years, however, five years has been recorded (DEC 2012).

Major threats to the Chuditch include habitat loss and degradation, competition and predation from introduced species, road deaths, poisoning, hunting and trapping (DEC 2012).

Project occurrence

The Biota (2019) survey, which comprised traps and cameras operating over seven nights, recorded evidence of Chuditch west of the proposed clearing envelope, with one individual captured and one record of scats (Figure 22).

6.8.3 POTENTIAL IMPACTS ON FAUNA OF CONSERVATION SIGNIFICANCE

WSA has considered the following potential direct impacts:

- Direct loss of individuals of conservation significant fauna due to clearing of 29 ha;
- Loss of conservation significant fauna habitat due to clearing of 29 ha; and
- Death, injury and displacement of conservation significant fauna during construction and mining operations.

WSA has considered the following potential indirect impacts:

- Habitat degradation through fragmentation, changing fire regimes and modified biodiversity;
- Individual displacement due to dust, light, noise and vibration; and
- Increased competition and predation with feral fauna.

WSA has also considered the cumulative impacts from the Forrestania Operations on conservation significant fauna.

6.9 ENVIRONMENTAL IMPACT ASSESSMENT RELEVANT TO THREATENED FAUNA

6.9.1 Loss of fauna due to clearing

6.9.1.1 Carnaby's Black Cockatoo

No suitable nesting hollows were identified for Carnaby's Cockatoo in the clearing envelope, thus no loss of individuals or breeding habitat is expected.

Clearing will be completed outside of the Carnaby's Cockatoo breeding season whenever possible. However, if clearing in the breeding season is to occur, a targeted survey of the nest hollows in the development footprint will be undertaken to confirm no change in the status of the nesting hollows (which were not suitable for Carnaby's Cockatoo).

WSA has minimised clearing of vegetation required for the Project (Section 2.3) and will continue to implement the internal Clearing Procedure.

6.9.1.2 Malleefowl and Chuditch

No evidence of Malleefowl or Chuditch was recorded by Biota (2019) in the proposed clearing envelope.

Clearing will be completed outside of the Chudtich and Malleefowl breeding season whenever possible. However, if this is not possible, a pre-clearing field survey will be undertaken.

Prior to vegetation clearing, the Clearing envelope will be surveyed for Chuditch dens and Malleefowl mounds. WSA will liaise with the WA DBCA if any active mounds are identified. Any individual Chuditch in the Clearing envelope will be trapped and relocated.

WSA has minimised clearing of vegetation required for the Project (Section 2.3) and will continue to implement the internal Clearing Procedure.

6.9.2 Loss of fauna habitat due to clearing

Approximately 27.9 ha of the 33.4 ha clearing envelope will be rehabilitated, 5.5 ha of habitat (boxcut) will remain non-rehabilitated at completion of operations.

All fauna habitats within the proposed clearing envelope are common within the locality and occur contiguously with the same habitat types outside of the study area. Taking into account only the area surveyed, the proposed clearing area represents 15.75% and 5% of the fauna habitats of the survey area (Table 25). This is not a significant reduction in fauna habitat in the survey area and taking into account the wider distribution of this habitat, it is not a significant impact.

Table 24: Fauna habitat areas based on Botanica (2021) vegetation associations in comparison with the proposed clearing envelope

Fauna habitat (consistent with Botanica 2021 mapping)	Fauna habitat in survey area* (ha)	Surveyed fauna habitat in Clearing envelope* (ha)	Habitat in Clearing envelope as % of overall Survey Area
Eucalyptus woodland on clay-loam plain	322	50.72	15.75
Mallee woodland and shrubland on sand-loam plain	121	13.28	5.0

*Based on total areas mapped by Botanica (2021a) consistent with these habitats. This does not account for those areas contiguous between the two survey areas and in the surrounding areas (i.e. these habitats are more extensive in the local area).

Therefore, although significant fauna potentially occurring within the development footprint may be impacted, it is not likely to affect the persistence of these species in the locality. Similarly, the overall fauna assemblage within the study area would not be unique and would also occur outside of the study area.

As part of the Project design, WSA has minimised the clearing of vegetation required for the Project (i.e reducing the total clearing from 140 ha to 29 ha) and will continue to implement the internal Clearing Procedure to ensure clearing is restricted to the approved areas and to only that required.

The Project mine life is approximately 3 years and closure and rehabilitation works will be undertaken at the completion of operations.

6.9.2.1 Carnaby's Black Cockatoo

The Project will result in removal of 27 potential Carnaby's Breeding Habitat Trees in the disturbance footprint, of which 11 contained nest hollows.

None of the 11 trees with nest hollows showed evidence of cockatoo use, and most of these hollows were considered by Johnstone and Kirkby (2019) to be unsuitable even for small parrots.

There was no evidence of feeding by Carnaby's in the clearing envelope.

The Project will result in clearing of a maximum of 29 ha of native vegetation. This habitat is not considered optimal breeding or foraging habitat for the Carnaby's Black Cockatoo. Johnstone and Kirkby (2019) provided an assessment of the significance of the Project in accordance with the EPBC significance guidelines (Appendix A in Appendix 10, , pp 6) and consider the Project is 'not significant'.

6.9.2.2 Chuditch

The Project will result in clearing of a maximum of 29 ha of native vegetation which is potential breeding and foraging habitat. However, no evidence of Chuditch (individuals or secondary signs) was recorded in the clearing envelope.

The fauna habitats in the clearing envelope are common within the locality and occur contiguously with the same habitat types outside of the study area and Chuditch occur widely throughout the region. The proposed clearing will not impact the persistence of this species in the locality.

6.9.2.3 Malleefowl

The targeted fauna survey of the New Morning area recorded no Malleefowl individuals, active mounds or tracks in the clearing envelope, suggesting the area is not a preferred breeding site (Biota 2019). The age of the inactive mounds (>10 years old) recorded west and south of the clearing

envelope suggest that Malleefowl did once breed in the area, but they do not any longer and potentially (and maybe) only use the local area for foraging.

WSA will continue their monitoring program to map and monitor Malleefowl activity across the FNO site, which will include the New Morning Project footprint.

The project will result in clearing of up to 29 ha of native vegetation. The fauna habitats in the clearing envelope are common within the locality and occur contiguously with the same habitat types outside of the Project area. Although the species may forage in the clearing envelope, it is unlikely to affect the persistence of this species in the locality (Biota 2019).

WSA has minimised the clearing of vegetation required for the Project and will continue to implement their internal Clearing Procedure. WSA has a Malleefowl Management Plan and will ensure all operations are undertaken in accordance with that plan.

6.9.3 Death, injury and displacement from construction and mining operations

The use of vehicles and machinery for construction and mining operations has the potential to result in collision with fauna species present in the clearing envelope. This may result in injury to or mortality of individuals.

WSA will include the New Morning Project within its existing FNO Traffic Management Strategy, which includes limiting speed near known Malleefowl mounds (where identified) and relevant signage. Vehicle speed limits are restricted to 40 km/hr around the mine and 90 km/hr on the haul roads.

Dewatering pipelines will be buried and the construction trenches will be short in length and will be ramped on the edges during construction to enable fauna egress.

Fauna egress structures will be installed in any water storage structures.

6.9.4 Indirect impacts

6.9.4.1 Degradation of habitat through fragmentation, changing fire regimes and modified biodiversity

Flora and fauna habitat may be degraded by weed invasion, edge effects caused by land clearing and the effects of pathogens, such as dieback. The potential impacts to fauna habitat associated with dieback, dust and weeds are consistent with that outlined in Sections 6.7.2.1 to 6.7.2.7.

6.9.4.2 Individual displacement due to dust, light, noise and vibration

Noise and light from the workshop, movement of vehicles and operation of heavy machinery may cause avoidance behaviour or cause increased stress in fauna. Due to the small size of the proposed Project these impacts are not considered significant given the extent of suitable habitat located outside of the Project area.

Dust suppression will be undertaken as required on all haul and access roads by the use of a dribble bar mounted on a water truck.

6.9.4.3 Increased competition with and predation by feral fauna

Predation by the introduced fox, and to a lesser extent by feral cats and native raptors, can have a negative effect on fauna populations.

The Project is not likely to result in increased local populations of feral animals, as there is no mine camp or landfill on site or available water sources within the clearing envelope.

WSA are aware that in addition to local control of waste, effective feral animal control should be undertaken at the regional level to be effective. To this end, WSA intend to continue assistance with the existing feral animal control program which includes feral cat trapping and 1080 baiting (via the Eastern Wheatbelt Declared Species Group) at the New Morning and adjacent areas.

WSA has a sponsorship agreement with the Eastern Wheatbelt Declared Species Group until 2023 and intends to enter into further discussions to extend this agreement.

6.9.5 Assessment of Cumulative Impacts

The development footprint represents:

- <0.01% of the known extent of the Forrestania 511 (Medium woodland; salmon gum & morrel) which has a current extent of 153,002 ha.
- <0.001% of the area of the Greater Western Woodlands (16 million hectares – 60% woodland; 10% Mallee).

The Project will result in a direct loss of 29 ha of fauna habitat (5.5 ha for boxcut will not be returned to native vegetation at closure) which is not considered significant given the extent of the habitats outside of the existing and proposed clearing envelope. These habitats are widespread in the region.

6.9.6 Mitigation

As the New Morning Project is located within the FNO, all managed by WSA, current mitigation measures to control potential adverse environmental impacts on fauna of conservation significance at FNO will be revised to include the New Morning Project. Mitigation measures for each potential impact are discussed below in terms of the EPA's mitigation hierarchy (avoid, minimise, rehabilitate).

6.9.6.1 Avoid

The key avoidance mechanism utilised by WSA was the reduction in the size of the original development footprint from 140 ha to 33.4 ha (29 ha of clearing), thus significantly reducing the amount of fauna habitat to be cleared. Other mitigation measures will be:

- Avoid clearing of mine and infrastructure construction outside the Carnaby's Black Cockatoo and Malleefowl breeding seasons;
- Avoid clearing of fauna habitat where existing disturbed areas can be utilised;
- Avoid unauthorised clearing though implementation of the internal clearing permit procedure;
- Avoid accidental disturbance or injury/mortality to fauna and habitats by enforcing the Vehicle Management Procedure;
- Avoid accidental death and/or entrapment of fauna by installing egress points and/or fauna ladders in excavations and dams/ponds and/or regularly inspecting such facilities;
- Avoid attraction of both feral and native species to the Project footprint by implementing domestic waste management procedures (e.g. fencing of the landfill site, regularly covering putrescible waste, securing lids on bins);
- All Malleefowl mounds (active and inactive) will be recorded in a "Malleefowl Register" which will include date, observer, status of mound/presence or absence of Malleefowl and a GPS/location and description;
- A suitably qualified environmental professional (fauna spotter) will be present during all land clearing. The person will hold a permit to handle and move significant fauna under Regulation 15 of the BC Act, and have access to a care facility that can be used to rehabilitate injured fauna;
- Avoid the establishment and spread of invasive plant species according to the Weed Management Plan, including vehicle inspection and washed/blown down to remove soil/seeds prior to utilisation at the project with continuation of the weed monitoring program; and

- Avoid bushfires via the Bushfire Management Plan – specifically assessment of the fuel loads and wide low fuel buffer zones around critical infrastructure, smoking only being permitted in designated areas, and the procedure for hot work permits.

6.9.6.2 Minimise

- Revision and implementation of the feral animal control management plan to mitigate the risk of predation (cats and foxes) through a continued feral animal-control baiting programme within WSA's tenements;
- Minimise disturbance to fauna and habitat by locating infrastructure, where possible, in existing disturbed areas and undertaking clearing in a progressive manner;
- Minimise injury and/or death of Chuditch during day time clearing by implementing a capture and release program by a suitably qualified and experienced environmental professional, in consultation with DBAC:
- Minimise the impacts of weeds in accordance with the Weed Management Plan – including weed monitoring, location recording, identification and immediate treatment via mechanical removal or chemical treatment; and
- Minimise impact of bushfires via the Bushfire Management Plan – specifically:
    - installation of fire suppression systems including a mobile fire and emergency truck, fixed 23,000L + 34,000L water tanks, and a standpipe with quick fill located at the dewatering settling ponds.
    - The site emergency response team that is regularly trained in fire suppression techniques
    - Buildings and all vehicles have appropriate fire extinguishers fitted.

6.9.6.3 Rehabilitate

- Progressive rehabilitation of fauna habitat will be undertaken in accordance with the Mine Closure Plan; and
- Completion criteria incorporating fauna and fauna habitat restoration objectives.

6.9.7 PREDICTED OUTCOME

6.9.7.1 Carnaby's Black Cockatoo

The Project will result in removal of 27 potential Carnaby's breeding habitat trees in the disturbance footprint, of which 11 contain nest hollows. None of these nest hollows showed evidence of cockatoo use and most of these hollows were considered by Johnstone and Kirkby (2019) to be unsuitable, even for small parrots.

There was no evidence of feeding by Carnaby's in the clearing envelope.

The Project will result in clearing of a maximum of 29 ha of native vegetation. This habitat is not considered optimal breeding or foraging habitat for the Carnaby's Black Cockatoo. Johnstone and Kirkby (2019) concluded that:

"*Overall we believe that the clearing of vegetation for the New Morning Project will not impact on the availability of breeding, feeding and roosting habitat for Carnaby's Cockatoo or cause a decline in the local (area/region) population as summarised in Appendix A*" (Appendix A in Appendix 10, pp 5-6).

The Proponent will minimise clearing of vegetation required for the Project and will continue to implement the internal Clearing Procedure.

If clearing for the Project cannot be completed outside of the Carnaby's breeding season, then a pre-clearing field survey of the 27 potential breeding tree hollows will be undertaken to confirm the survey findings.

WSA is of the belief the proposed action will not have a significant impact on Carnaby's Cockatoo and an 'assessment of the significance' on this species in accordance with significant impact criteria is provided in Table 25.

6.9.7.2 Malleefowl

The Biota (2019) targeted fauna survey of the New Morning area recorded no Malleefowl individuals, active mounds or tracks in the clearing envelope, suggesting the area is not a preferred breeding site.

The age of the inactive mounds (>10 years old) recorded west and south of the clearing envelope suggest that Malleefowl did once breed in the area, but they do not any longer and potentially only use the local area for foraging.

WSA will continue their monitoring program to map and monitor Malleefowl activity across the FNO sites which will include the New Morning Project footprint.

The project will result in clearing of up to 29 ha of native vegetation. The fauna habitats in the clearing envelope are common within the locality and occur contiguously with the same habitat types outside of the study area. Therefore, the species may forage in the clearing envelope, but the clearing is not likely to affect the persistence of this species in the locality (Biota 2019).

WSA has minimised the clearing of vegetation required for the Project and will continue to implement their internal Clearing Procedure. Prior to commencement of vegetation clearing, a survey will be undertaken to confirm the presence or absence of active Malleefowl mounds in the disturbance footprint. WSA has a Malleefowl Management Plan and will ensure all operations are undertaken in accordance with this plan.

WSA is of the belief the proposed action will not have a significant impact on Carnaby's Cockatoo and an 'assessment of the significance' on this species in accordance with significant impact criteria is provided in Table 26.

6.9.7.3 Chuditch

The Proposed Action will result in clearing of a maximum of 29 ha of native vegetation which is potential breeding and foraging habitat. However, no evidence of Chuditch was recorded within the clearing envelope.

The fauna habitats in the clearing envelope are common within the locality and occur contiguously with the same habitat types outside of the study area and Chuditch occur widely throughout the region.

The Proponent will minimise clearing of vegetation required for the Project and will continue to implement the internal Clearing Procedure.

Prior to vegetation clearing the clearing envelope will be surveyed for Chuditch (in conjunction with a Malleefowl survey) and individuals in the clearing envelope will be trapped and relocated.

WSA is of the belief the Project will not have a significant impact on Chuditch and an 'assessment of the significance' on this species in accordance with significant impact criteria is provided in Table 27.

6.9.7.4 Summary of Predicted Outcome on Threatened Fauna

In summary, the Proponent predicts the following EPO on fauna species of conservation significance for the Project:

- Direct removal of a maximum of 29 ha of native fauna habitat;

- Approximately 27.9 ha of the 33.4 ha clearing envelope will be rehabilitated, 5.5 ha of habitat (boxcut) will remain non-rehabilitated at completion of operations;
- Habitat critical to the survival of fauna species of conservation significance occurring in the clearing envelope will continue to be available outside of the Project Area and across the wider region; and
- Populations of Carnaby's Black Cockatoo, Malleefowl and the Chuditch will continue to persist in the Project Area and wider region.

On the basis of the above information, the small amount of clearing required (29 ha) along with the existing management and monitoring commitments, it has been concluded that the Project will not result in a significant impact on any fauna species of conservation significant.

Habitat assessments show the Project area contains potential fauna habitat for Carnaby's Black Cockatoo, Malleefowl and the Chuditch. However, site surveys reveal that these species have not been recorded breeding within the area. It is important to note that habitat defined as critical for breeding and foraging for these species does occur widely outside the proposed Project Area.

Impacts to fauna will be minimised by inclusion of the New Morning Project into WSA's well established management systems. Key management documents include:

- Carnaby's Black Cockatoo Management Plan;
- Malleefowl Monitoring;
- Dieback Management Plan;
- Dieback Hygiene Procedure;
- Clearing Procedure;
- Feral Animal Management Strategy;
- Fire Prevention and Control Strategy; and
- Traffic Management Strategy.

These will be implemented effectively throughout the organisation and by contractors, with information being provided via inductions, training and education sessions, toolbox meetings and relevant signage.

The combined impacts of the Project are not considered to pose any significant residual risks to the protection of terrestrial fauna and, therefore, biological diversity and ecological integrity can be maintained.

Table 25: Assessment of significance of potential impacts to the Carnaby's Black Cockatoo

Significant impact criteria for Vulnerable listed species	Significant impact	Response to criteria
Lead to a long-term decrease in the size of a population	Unlikely	No breeding has been observed at the site, and foraging (especially water availability) and roosting habitat is sub-optimal. The Forrestania region is at the eastern limit of the distribution for Carnaby's Cockatoo in the south-west of WA, and the habitat is considered to be sub-optimal to support Carnaby's populations. WSA has strong fire management processes to reduce the risk of fires caused by operations, and in 12 years of operation at the FNO, there have been no bushfires caused by the mining operations. It is unlikely that the proposed action will lead to a long-term decrease in the size of the Carnaby's population.
Reduce the area of occupancy of the species	Unlikely	The Project will result in the removal of 27 potential breeding trees, of which 11 contained nest hollows. None of the nest hollows showed evidence of cockatoo use and most of these hollows were considered by Johnstone and Kirkby (2019) to be unsuitable even for small parrots. Johnstone and Kirkby (2019) found no direct evidence of Carnaby's Cockatoos breeding in the New Morning area. The Project is unlikely to reduce the area of occupancy of the species. 'Area of occupancy' (AOO) is defined as the area within a species' extent of occurrence which is occupied by that species (IUCN 2012). The Forrestania region is at the eastern limit of the distribution for Carnaby's Cockatoo in the south-west of WA, and the habitat is considered to be sub-optimal to support Carnaby's populations. No breeding has been observed at the site and foraging and roosting habitat is sub-optimal. The distribution of Carnaby's is likely to shift further west away from the Forrestania area, due to lack of available water, caused in part by climate change (*pers. comm* Ron Johnstone). This shift is outside of WSA's control. It is unlikely that the proposed action will reduce the area of occupancy of the Carnaby's Cockatoo.
Fragment an existing population into two or more populations	Unlikely	There is no established population of Carnaby's cockatoo at Forrestania, as this species is highly mobile and transient. It is unlikely that the proposed action will fragment a population of the Carnaby's Cockatoo.
Adversely affect habitat critical to the survival of the species	Unlikely	The potential breeding and foraging habitat within the New Morning and wider Forrestania area is not restricted to the New Morning area. However, given that the site is at the eastern limit of the distribution, the habitat is considered to be sub-optimal to support Carnaby's populations Potential foraging habitat was identified but is not considered ideal as it is distant from fresh water sources. It is unlikely that the proposed action will adversely affect critical habitat for the Carnaby's Cockatoo.
Disrupt the breeding cycle of a population	Unlikely	No breeding has been observed, nor are there any established populations of Carnaby's cockatoos at the New Morning site. It is unlikely that the proposed action will disrupt the breeding cycle of the Carnaby's Cockatoo.
Modify, destroy, remove or isolate or decrease the availability of habitat to the extent that the species is likely to decline	Unlikely	The Forrestania region is at the eastern limit of the distribution for Carnaby's Cockatoo in the south-west of WA, and the habitat is considered to be sub-optimal to support Carnaby's populations. No breeding has been observed at the site, and foraging (especially water availability) and roosting habitat is sub-optimal. The potential for Carnaby's habitat degradation caused by fire, weeds, dieback or other mining related factors that reduce vegetation health is small, and all of these threats are managed by WSA through Management Plans. It is unlikely that the proposed action will lead to a habitat degradation causing a decline in the size of the Carnaby's population.
Result in invasive species becoming established that are harmful to the endangered species	Unlikely	The Project is not considered to result in establishment of harmful invasive species which may impact the transient Carnaby's population.
Introduce disease that may cause the species to decline	Unlikely	Diseases are not a known threat to Carnaby's Cockatoo, dieback may adversely impact foraging habitat. It is unlikely that the proposed action will result in the introduction of disease to the Carnaby's population.

Significant impact criteria for Vulnerable listed species	**Significant impact**	**Response to criteria**
Significant impact criteria for Vulnerable listed species	Significant impact	Response to criteria
Interfere substantially with the recovery of the species	Unlikely	The Forrestania region is at the eastern limit of the distribution for Carnaby's Cockatoo in the south-west of WA and Johnstone and Kirby (2019) state that the distribution of Carnaby's is likely to shift further west away from the Forrestania area, due to lack of available water, caused in part by climate change. This shift is outside of WSA's control. The habitat is considered to be sub-optimal to support Carnaby's populations and no breeding has been observed at the site. As there is abundant potential habitat in the local and wider region available, the Project will not interfere with the recovery of the species.

Table 26: Assessment of significance of potential impacts to the Malleefowl

Significant impact criteria for Vulnerable listed species	Significant impact	Response to criteria
Lead to a long-term decrease in the size of a population	Unlikely	Despite being classified as containing probable core (breeding) habitat, no mounds occur within the clearing envelope. The six inactive mounds recorded west of the clearing envelope, suggest the area is not a preferred breeding site. Both of these woodland habitats in which the inactive mounds were recorded, are common within the locality and occur contiguously with the same habitat types outside of the study area and, as such, suitable breeding and foraging habitats will remain in the wider region. Vehicle and machinery movements associated with the Project may result in injury to or mortality of individuals, which is unlikely to lead to a long-term decrease in population size. The Proponent will continue to implement the Traffic Management Plan within FNO to reduce the risk of vehicle strike. It is unlikely that the proposed action will lead to a long-term decrease in the size of the Malleefowl population.
Reduce the area of occupancy of the species	Unlikely	The Proposed Action is unlikely to reduce the area of occupancy of the species. 'Area of occupancy' (AOO) is defined as the area within a species' extent of occurrence which is occupied by that species (IUCN 2012). As discussed above, there are no nesting sites within the project area, suggesting the area is used for foraging only. A malleefowl survey will be undertaken immediately prior to commencement of vegetation clearing to ensure no active mounds or individuals are present. If any are located, individuals will be relocated to surrounding suitable habitat. It is unlikely that the proposed action will reduce the area of occupancy of the Malleefowl.
Fragment an existing population into two or more populations	Unlikely	Given that Malleefowl have only limited recent use of habitat in the clearing envelope, and the small extent of the proposed clearing, the Project is not likely to fragment a population. Malleefowl will be able to move around the project as it is surrounded by uncleared native vegetation.
Adversely affect habitat critical to the survival of the species	Possible	Despite being classified as containing core (breeding) habitat, no active mounds occur within the project area, suggesting the area is not a preferred breeding site. Both of the woodland habitats within the Project area are common in the locality and occur contiguously with the same habitat types outside of the study area and, as such, suitable breeding and foraging habitats will remain in the wider region.
Disrupt the breeding cycle of a population	Unlikely	No known active or inactive mounds were identified in the clearing envelope. A Malleefowl survey will be undertaken prior to vegetation clearing to confirm no active mounds or individuals are present. It is unlikely that the Proposed Action will disrupt the breeding cycle of the Malleefowl.
Modify, destroy, remove or isolate or decrease the availability of habitat to the extent that the species is likely to decline	Unlikely	Despite being classified as containing potential core (breeding) habitat, no active mounds occur within the project area, suggesting the area is not a preferred breeding site. Both of these woodland habitats in which the inactive mounds occur are common within the locality and occur contiguously with the same habitat types outside of the study area and, as such, suitable breeding and foraging habitats will remain in the wider region. It is unlikely that the proposed action will lead to a habitat degradation causing a decline in the size of the Malleefowl population.
Result in invasive species becoming established that are harmful to the endangered species	Unlikely	Predation by foxes, to a lesser extent feral cats and raptors, are known threats to the Malleefowl. Feral cats and foxes are widely distributed across Australia. WSA will continue their Feral Animal Management Strategy to control predators in areas under its control. The Project is not likely to increase populations of feral foxes or cats.
Introduce disease that may cause the species to decline	Unlikely	Disease is not a known threat to Malleefowl and the Proposed Action is not expected to introduce any disease that may cause the species to decline. The potential for dieback which could impact habitat is addressed in Table 5.
Interfere substantially with the recovery of the species	Unlikely	The 'National Recovery Plan for Malleefowl *Leipoa ocellata* (Benshemesh 2007) has the primary objectives to secure existing populations across the species' range and achieve de-listing of Malleefowl under the EPBC Act within 20 years. The potential impacts to Malleefowl individuals and their habitat in the Project Area will not affect the overall viability of the population. As such, the Project will not interfere substantially with the recovery of the species.

Table 27: Assessment of significance of potential impacts to the Chuditch

Significant impact criteria for Vulnerable listed species	Significant impact	Response to criteria
Lead to a long-term decrease in the size of a population	Unlikely	Despite being classified as containing core (breeding) habitat, no dens have been recorded within the project area, suggesting the area is not a critical breeding site. Both of these woodland habitats in which Chuditch activity was identified are common within the locality and occur contiguously with the same habitat types outside of the study area and, as such, suitable breeding and foraging habitats will remain in the wider region. Vehicle and machinery movements associated with the Project may result in injury to or mortality of individuals, which are unlikely to lead to a long-term decrease in population size. WSA will continue to implement the Traffic Management Plan within the Project Area to reduce the risk of fauna strike. It is unlikely that the Project will lead to a long-term decrease in the size of the Chuditch population.
Reduce the area of occupancy of the species	Unlikely	The Project which will result in 29 ha of native vegetation clearing is unlikely to reduce the area of occupancy of the species. 'Area of occupancy' (AOO) is defined as the area within a species' extent of occurrence which is occupied by that species (IUCN 2012). As discussed above, there are no den sites recorded within the clearing envelope, suggesting the area is used for foraging only. A Chuditch survey will be undertaken prior to vegetation clearing to confirm no individuals are present. If any are located, individuals will be relocated to surrounding suitable habitat. It is unlikely that the proposed action will reduce the area of occupancy of the Chuditch.
Fragment an existing population into two or more populations	Unlikely	Given that Chuditch have only limited recent use of habitat in the Project Area, and the small size of the proposed clearing, the Project is not likely to fragment a population. The largely contiguous area of vegetation in which the Chuditch was recorded will not be impacted. Chuditch will be able to move around the project as it is surrounded by uncleared native vegetation. Following completion of operations, the site will be substantially rehabilitated. It is unlikely that the proposed action will reduce or fragment a population of Chuditch.
Adversely affect habitat critical to the survival of the species	Possible	Despite being classified as containing probable core (breeding) habitat, core habitat is common and widespread in the wider region. Both of the woodland habitats in which Chuditch activity was identified are common within the locality and occur contiguously with the same habitat types outside of the study area and, as such, suitable breeding and foraging habitats will remain in the region.
Disrupt the breeding cycle of a population	Unlikely	No Chuditch dens were identified or recorded within the project area. Given this, the Project is not likely to disrupt the breeding cycle of a population. A Chuditch survey will be undertaken immediately prior to vegetation clearing to ensure no sites that could be suitable as dens are occupied or individuals are present.
Modify, destroy, remove or isolate or decrease the availability of habitat to the extent that the species is likely to decline	Unlikely	Both of these woodland habitats are common within the locality and occur contiguously with the same habitat types outside of the study area and, as such, suitable breeding and foraging habitats will remain in the wider region. A Chuditch survey will be undertaken immediately prior to commencement of vegetation clearing to ensure no sites that could be suitable as dens are occupied or individuals are present. It is unlikely that the proposed action will lead to habitat degradation causing a decline in the size of the Chuditch population.
Result in invasive species becoming established that are harmful to the endangered species	Unlikely	Predation by feral animals, are known threats to the Chuditch. Feral cats and foxes are widely distributed across Australia. WSA will continue to implement the Feral Animal Management Strategy to control predators in areas under its control.
Introduce disease that may cause the species to decline	Unlikely	Disease is not a known threat to the Chuditch and the Project is not expected to introduce any disease that may cause the species to decline.
Interfere substantially with the recovery of the species	Unlikely	Suitable breeding and foraging habitats will remain locally and in the wider region. It is unlikely that this project will interfere substantially with the recovery of the Chuditch.

6.10 MONITORING AND MANAGEMENT TARGETS

Table 28 provides a summary of the monitoring to be undertaken to ensure no adverse impact to MNES threatened flora and fauna occurs, and includes the current monitoring programs undertaken by WSA which will be expanded to include the New Morning Project area.

Table 28: Flora and Fauna Monitoring Action Summary

Aspect	Monitoring Method	Monitoring Action	Timing/Frequency	Records	Reporting
E. steedmanii	As per Table 6.	As per Table 6.	As per Table 6.	As per Appendix 3.	AER CAR
P. crenulata	Assessment of health of *P. crenulata* population located south of proposed clearing envelope	Conduct quarterly visual observations of *P. crenulata* populations in close proximity to the operations.	Quarterly during operations.	Written and photographic records	AER CAR
Ground Disturbance/ Clearing Activities	Post-clearing survey pick-up of areas cleared	Clearing inspection to ensure areas restricted to the clearing envelope (and compliance with WSA internal clearing permit).	Post-clearing survey pick up (weekly during clearing/construction)	Internal Clearing Permit	AER Annual Clearing Report
	Disturbance Mapping and Reconciliation	Survey of all disturbed areas in the clearing envelope.	Annually	GIS survey pick-up	AER Annual Clearing Report to DMIRS
Dust Emissions	Environmental Inspection	Visual inspections of area during construction to observe dust emissions.	Weekly during construction	Daily inspection forms Environmental Incident register	AER
	Dust monitoring as per Table 6.	As per Table 6.	As per Table 6.	As per Appendix 3.	AER CAR
Fire Fuel Loading	Fuel Load Assessments	For areas surrounding New Morning (as per *E. steedmanii* plan): • Ground litter (% litter cover in 2 m radius; Mean litter depth within 2 m radius) • Scrub fuels (t/ha, % fuel cover between 0 and >2.0 m height)	Annually	WSA Records	AER CAR
Weed hygiene	Environmental inspection	Review of hygiene forms and/or inspection of vehicles entering Project site	Ongoing and annual review	Vehicle hygiene inspection forms	AER

Aspect	Monitoring Method	Monitoring Action	Timing/Frequency	Records	Reporting
Weed Establishment	Weed Identification and Mapping	Inspection of disturbed area in the Project area for weed occurrence.	Quarterly	WSA Weed record register Environmental incident register	AER
Dieback	E. steedmanii health monitoring – Populations 1, 2, 3, 7, 8 (Populations 4 & 5 Annually)	As per *E. steedmanii* Management Plan (Appendix 3)	Quarterly	As per Appendix 3	As per Appendix 3
	Vegetation Tissue Sampling	Vegetation tissue sampling annually for analysis at the VHS lab for *Phytophthora*. Sampling is to be conducted within known infested area boundaries to determine spread and for any unplanned incidents resulting in soil movement across these area boundaries.	Annual (3rd Qtr); adhoc after summer rain events	Sampling results. GIS maps	AER
	Signage condition of access tracks to infested areas	Determine if replacement signage required to ensure no access to infested areas.	Annual (3rd Qtr);	Annual inspection sheet	AER
	Occurrence mapping at New Morning and Spotted Quoll	Review of dieback occurrence mapping using a suitably qualified professional	Validate at least every 2 years or sooner if evidence of additional infestations suspected.	Sampling results. GIS maps	AER CAR
Rehabilitation	Rehabilitation monitoring	As defined in Project Mine Closure Plan.	Biennially following completion of rehabilitation activities	Annually as defined in the MCP.	AER
	Visual inspections	As defined in Project Mine Closure Plan.	Annually following completion of rehabilitation activities	Annually as defined in the MCP.	AER
Feral Animals (wild dog, fox and cat)	Visual sightings	Lodge environmental incident report.	As reported	Environmental incident register	AER

Aspect	Monitoring Method	Monitoring Action	Timing/Frequency	Records	Reporting
Carnaby's Cockatoo	Targeted survey of proposed clearing area prior to clearing activities	Undertake 'pre-clearance' assessment of nest hollows identified in the proposed clearing area, if the clearing is to occur during the breeding season.	Pre-clearing activities at New Morning	Targeted survey records.	AER CAR
Malleefowl Mounds	Targeted survey of the proposed clearing area prior to clearing activities	Undertake 'pre-clearance' field survey for Malleefowl of the proposed clearing area, if the clearing is to occur during the breeding season (September to January inclusive, annually).	Pre-clearing activities at New Morning	'Pre-clearing' records Targeted survey records.	AER CAR
	National Malleefowl Recovery Database (total of 109 mounds currently) and Remote Camera monitoring	All known Malleefowl mounds will be monitored annually during the breeding season, September – February, in accordance with the National Malleefowl Recovery Team, Standards, Protocols and Monitoring Procedures Manual (NMRT, 2016). At the conclusion of the breeding season, all data is uploaded to the National Mound Monitoring Database (NMMD). Throughout the year ad-hoc sightings are recorded in the fauna register.	Annually	Trigger level reporting via EMS incident procedure. Threshold level reporting to Environmental Regulator. Five yearly review of monitoring data.	Annual reporting to identify all monitoring results and trends over time. AER CAR
Western Quoll (Chuditch)	Targeted survey of the proposed clearing area prior to clearing activities	Undertake 'pre-clearance' field survey for Chuditch of the proposed clearing area, if the clearing is to occur during the breeding season (September to January inclusive, annually).	Pre-clearing activities at New Morning	Targeted survey records.	

Aspect	Monitoring Method	Monitoring Action	Timing/Frequency	Records	Reporting
	Remote Camera and Nocturnal Monitoring	Throughout the year ad-hoc sightings are recorded in the fauna register.	Biannual		
Environmental Management	Internal audit of management system	Review and audit of	Annually	Environmental incident register	AER
Incidents	Internal review	WSA assessment of environmental incidents including: • conservation significant fauna species from vehicle strike • spills (saline water, hydrocarbons)	Quarterly	Environmental incident register	AER

CAR – Compliance Assessment Report prepared in accordance with MS808 for Spotted Quoll

7 CONSULTATION

7.1 STAKEHOLDERS

A stakeholder engagement register is maintained by WSA in accordance with their Stakeholder Engagement Strategy. This ongoing engagement program includes:

- Correspondence to potentially impacted parties to advise them about the project and offer detailed briefings
- Workshop meetings with representatives of decision-making authorities to brief them on key issues and obtain feedback on issues and concerns
- One-on-one briefings and feedback sessions with specific stakeholders.

Key stakeholders for this project are identified in Table 29.

Table 29: Key Project Stakeholders

Group	Stakeholder
Local Government Authorities	Shire of Kondinin
Traditional Owners	Ballardong Group Traditional Owners
Commonwealth Government Agencies	Department of Agriculture, Water and the Environment
State Government Agencies	Department of Mines, Industry Regulation and Safety (DMIRS) Department of Water and Environmental Regulation (DWER) (includes EPA within DWER) Department of Biodiversity Conservation and Attractions (DBCA) Department of Planning, Lands and Heritage (DPLH)
Non-government Agencies (NGO)	Conservation Council of WA Gondwana Link Western Australian Naturalists Club Wilderness Society Wildflower Society of WA

7.2 STAKEHOLDER CONSULTATION UNDERTAKEN

WSA commenced the stakeholder consultation program for the New Morning proposal in early 2018 and has met with several government agencies. A summary of the consultation undertaken to date is provided in in Table 30.

The stakeholder engagement register is updated on an ongoing basis and will be maintained during operations and closure. Further consultation with DAWE and NGO's is proposed for Q2-Q3 2022.

Part 3 of Annex 7 (included in the online DMIRS submission) 'Consultation' requires the roles and interests of Indigenous people to be taken into consideration.

WSA has had ongoing consultation with the traditional owners, the Ballardong Group, which most recently included completion of an Aboriginal heritage survey of the Project area in February 2022.

Table 30: Stakeholder consultation

Date	Stakeholder	Consultation	Outcome
27-Apr-18	Environmental Protection Authority Services (EPAS) - Tania Liaghati, Hans Jacob	Discussion regarding approach for assessment for New Morning, EPAS suggested a s.45C is unlikely to have the capacity to cover the proposed changes in the Project to include New Morning. Provided examples of 'Revised Proposals' which have recently been assessed by EPAS that may be a more appropriate way for moving forward.	Acknowledged.
1-May-18	EPAS - Tania Liaghati, Claire Stevenson	EPAS advised that a Level 1 assessment and targeted fauna assessment would be appropriate for the New Morning Project.	N/A
9-Aug-18	Department of Biodiversity, Conservation & Attractions (DBCA) Environmental Management Branch (EMB) – Sandra Thomas	Sandra advised that advice should be coordinated through EPAS. The following interim advice was provided: • ensure vegetation survey is done to BIF standards, • ensure vegetation data is analysed effectively, • reiterated the Project is located within an area of known conservation significance and new species are not uncommon, • EMB is cognisant of removing entire populations of threatened/Priority flora, • ensure impact to Carnaby's habitat trees are assessed, • suggested review of Keren Reiter's articles in relation to cumulative impacts in the Greater Western Woodlands.	Incorporated into flora survey and comments will be addressed as part of the impact assessment. Potential Carnaby's trees have been assessed (Section 3.7.3.1)
17 August 2018	Department of Mines, Industry Regulation and Safety (DMIRS) – Tony Bullen	• Advised that an MP submitted to support Mining Lease Application (MLA) must meet the MP guidelines – Environment Division of DMIRS advises Mineral Titles of DMIRS if this has occurred. • Supportive of submission of MP to support MLA and reiterated the MP must be a valid application • Suggest WSA speak with Daniel Endacott to ascertain Environment Division's thought on this process	WSA followed up with Daniel Endacott. No longer applicable as infrastructure restricted to granted Mining Lease.
21-Aug-18	Meeting EPAS - Tania Liaghati, Claire Stevenson, Robert Hughes	• Comments made in the meeting by EPAS were followed in an email (see next row).	Nil.
29-Aug-18	Email EPAS - Tania Liaghati	<u>Terrestrial Fauna</u> Targeted surveys for Terrestrial Fauna should include searches for the Lake Cronin Snake, which is a regional endemic species. Surveys for Carnaby's Cockatoo should be as per *Environmental*	Advice incorporated into survey work (where applicable) and relevant sections addressed as part of impact assessment.

Date	Stakeholder	Consultation	Outcome
		Protection & Biodiversity Conservation Act (EPBC – Commonwealth) survey guidelines for this species with particular attention to surveying for breeding birds at this time of year. As previously advised, the single-phase survey should include a Level 1 survey (as per EPA guidance) in any new impact areas that were previously unsurveyed, including fauna habitat mapping. <u>Subterranean Fauna</u> Based on the results of previous subterranean fauna surveys in the proposal area and region, the proposed sampling program for stygofauna and desktop study for troglofauna is appropriate. <u>Flora & Vegetation comments</u> Note that there was no botanist at the meeting, so the comments below are based solely on a review of the PowerPoint presentation dated 21/8/2018 (attached). <u>Slide 5</u> * Justification should be provided for the haul road diversion to clear vegetation in the northern end of its alignment, rather than using existing cleared tracks for its entire length. <u>Slide 8</u> * Agree that additional quadrats are required * Recommend re-scoring the previously-established quadrats * Current vegetation mapping should be reviewed and potentially adjusted in light of extra survey work/analysis * Vegetation mapping should be extended to the north of the proposed pit and waste rock dump * Additional targeted survey work should be for all species and vegetation units meeting the definition of significant in the EPA's Environmental Factor Guideline for Flora and Vegetation (not restricted to those listed as threatened or priority) * 100 m wide haul road corridor may be acceptable if any significant flora or vegetation occurrences intersected by the corridor are then surveyed and mapped to their full extent.	Sampling program completed for subterranean fauna. Haul road diversion no longer required. Autumn 2019 survey completed – total of 36 quadrats assessed. Survey work completed is considered sufficient for the reduced Project development footprint. Haul road diversion no longer required.

Date	Stakeholder	Consultation	Outcome
		Slide 9 * *Cumulative impacts should be addressed at the appropriate scale for the environmental value being addressed – e.g. impacts to the PEC should be at the scale of the PEC and include any other clearing/proposals in the PEC. Cumulative impacts are not restricted to Flying Fox and Spotted Quoll, but all past, present and reasonably foreseeable future impacts on each of the significant environmental values.* * *Direct and indirect impacts should be addressed for all vegetation and all significant flora (see the definition of significant in the EPA's Environmental Factor Guideline for Flora and Vegetation (not restricted to those listed as threatened or priority)). The scale at which they are assessed should be based on the known extent of the environmental value (e.g. entire extent of significant flora species, mapped extent of vegetation unit)* * *Maps should be provided showing the existing extent of P. boodjera and showing contours to allow an understanding of the role topography may play in exacerbating or preventing its further spread. The relative landscape positions of the E. steedmanii populations and the proposed infrastructure (or existing infrastructure proposed to be re-used) should be discussed.*	Project area vegetation does not comprise vegetation consistent with the PEC. These have been addressed. Section 6.3.8 provides maps based on the results of sampling to map the occurrence of *P. boodjera*. The development envelope is located downstream of the *E. steedmanii* populations.
26-Sep-18	DMIRS - Rosemarie de Barie, Will Moore, Kobie, Ashby	DMIRS satisfied with this approach and advised that they will not assess the MP/MCP until tenement grant. DMIRS advised that the MP must meet the MP guidelines.	MP to support new MLA no longer required.
26-Sep-18	DMIRS – Rosemarie de Barie	Email received from DMIRS on 1 Oct 2018 confirming 'that the email is an accurate record of the discussions undertaken'.	MP to support new MLA no longer required.
10-Oct-18	DMIRS – Rosemarie de Barie	Rosemarie advised that in order to support the MLA, DMIRS (Environment) will be looking for the following: the MP submitted with an MCP, written in accordance with the MP structure outlined in the Guidelines and contains a signed checklist. DMIRS won't be looking at the content but advised that WSA should make clear which elements that are 'missing' from the document. Rosemarie reaffirmed this is not something they generally accept but acknowledged this is the only way moving forward.	MP to support new MLA no longer required.

Date	Stakeholder	Consultation	Outcome
1-Oct-18	South West Land Sea Council and Ballardong People	WSA email to South West Aboriginal Land and Sea Council advising of the planned New Morning project and how best to engage with the Ballardong people.	Email response from Ettienne van Tonder Senior Legal Officer as the point of contact for SWALSC on behalf of the Ballardong people.
12-Dec-18	South West Land Sea Council and Ballardong People	WSA (Bryan Williams) attended a meeting at the SWALSC Cannington office with Ettienne van Tonder to discuss the New Morning project and the best process for engagement with the Ballardong people.	SWALSC appreciated the contact and engagement and suggested an Activity Notice for the project is provided by WSA. WSA committed to provide an Activity Notice.
19-Dec-18	South West Land Sea Council and Ballardong People	WSA emailed Activity Notice to Ettiene van Tonder at South West Aboriginal Land and Sea Council providing an overview of the New Morning project for the Ballardong people's consideration at their Directors' meeting.	SWALSC acknowledged receipt of the activity notice and committed to presenting at the next Ballardong Directors' meeting. The Directors' meeting was subsequently postponed.
1-May-19	South West Land Sea Council and Ballardong People	WSA emailed project status update to SWALSC and enquired the date of the next Ballardong Directors' meetings.	SWALSC advised next Directors' meeting for 15 May 2019. The Directors' meeting was subsequently postponed.
12-Jul-19	South West Land Sea Council and Ballardong People	WSA emailed revised Activity Notice to Ettiene van Tonder at South West Aboriginal Land and Sea Council providing an overview of the New Morning project for the Ballardong people's consideration at their Directors' meeting.	SWALSC acknowledged receipt of the activity notice and committed to presenting at the next Ballardong Directors' meeting scheduled for July 2019. Meeting postponed and rescheduled once again to September 2019.
15-Aug-19	South West Land Sea Council and Ballardong People working group	WSA received invitation from SWALSC to attend the Ballardong Working Party Meeting on 4th September 2019 at the SWALSC offices.	WSA accepted the invitation by email to attend the SWALSC.
4-Sep-19	South West Land Sea Council and Ballardong People working group	Bryan Williams and Tamsin Sender attended the Ballardong Directors' meeting and presented the New Morning project to the Ballardong people, and requested an Aboriginal heritage survey in the future.	The presentation was well received by the Ballardong people. The Ballardong people agreed to a future Aboriginal heritage survey. A number of questions were raised regarding the Future Act application for mining tenement M77/1289 for the open pit. (The open pit and Future Act application are no longer required for the New Morning project as the project has been reduced in size from 140 ha to only 29 ha and is now proposed as an underground operation with no open pit. The mining tenement application for M77/1289 was withdrawn in March 2020).

Date	Stakeholder	Consultation	Outcome
10-June-21	EPA Robert Hughes Natalie McAlpine	Pre-referral meeting with EPA to discuss New Morning Project which has reduced from 140 ha to 29 ha of clearing from that originally presented in 2018. Advice sought on assessment approach. EPA advised they would need to discuss with the legal department the option of submitting New Morning as a stand alone Project rather than a revised Spotted Quoll Project (the deposits are independent). EPA requested further information on greenhouse gas emissions and Aboriginal heritage. WSA advised EPA that an EPBC referral had been submitted. EPA acknowledged other Projects in region (Earl Grey, Parker Range) where offsets had been required by DAWE and advised they are better placed to deal with DAWE in relation to offsets (as an accredited assessment) rather than dealing with DMIRS (for a clearing permit).	
7-July-21	EPA Robert Hughes Natalie McAlpine	Email from WSA to EPA providing: • Summary of Aboriginal heritage engagement undertaken with the Ballardong people via the South West Aboriginal Land and Sea Council • Greenhouse gas footprint. WSA requested status for EPA obtaining legal advice re: stand alone or revised Project referral.	EPA acknowledged receipt and advised WSA to submit referral as stand-alone Project.
7-July-21	South West Land Sea Council and Ballardong People	WSA executed NHSC Heritage Agreement with Ballardong People for New Morning tenement M77/583.	Agreement couriered to SWALSC
12-July-21	South West Land Sea Council and Ballardong People	SWALSC fully executed the NHSC Heritage Agreement between WSA and Ballardong people and couriered executed Agreement copy to WSA.	Fully executed Agreement couriered to WSA.
21-July-21	South West Land Sea Council and Ballardong People	WSA emailed New Morning Activity Notice to SWALSC/Ballardong people requesting Aboriginal heritage survey over the New Morning development envelope.	Activity Notice provided to Ballardong people requesting Aboriginal heritage survey.

8 REFERENCES

ANZMEC/MCA (2000). Strategic Framework for Mine Closure. Australian and New Zealand Minerals and Energy Council and Minerals Council of Australia. Canberra, ACT.

Astron Environmental Services (2014). *Steedman's Gum Conservation Management Plan for Operational and Closure Stages of the Spotted Quoll Mine'*. Plan prepared for Western Areas Ltd, April 2014.

Barrett, G., A. Silcocks, S. Barry, R. Cunningham, and R. Poulter (2003). The new Atlas of Australian Birds. Royal Australasian Ornithologists Union.

Beard, J. S. (1990). *Plant Life of Western Australia,* Kangaroo press Pty Ltd, NSW

Bennelongia (2008). *Troglofauna Occurrence at Western Areas*. Letter prepared for Western Areas NL, November 2008.

Benshemesh, J. (2007). National Recovery Plan for Malleefowl Leipoa ocellata. Prepared for the Department for Environment and Heritage, South Australia.

Benshemesh, J. (2008). Advice to Regional Natural Resource Management Bodies Regarding Management and Monitoring of Malleefowl. Victorian Malleefowl Recovery Group and Mallee CMA, Victoria.

Biota Environmental Sciences (2006a). *Forrestania Fauna Survey: Fauna and Faunal Assemblages Report.* Unpublished report prepared for Western Areas NL.

Biota Environmental Sciences (2006b). *Forrestania Water Disposal Pipeline Fauna Survey.* Unpublished report prepared for Western Areas NL.

Biota Environmental Sciences (2007a). *Diggers South Fauna Survey – Phase 1.* Unpublished report prepared for Western Areas NL.

Biota Environmental Sciences (2007b). *Forrestania Fauna Monitoring Survey – Flying Fox Phases III and IV.* Unpublished report prepared for Western Areas NL.

Biota Environmental Sciences (2008a). *Summary of Field Activities for January 2008.* Letter report prepared for Western Areas NL.

Biota Environmental Sciences (2008b). *Carnaby's Cockatoo Habitat Assessment: Diggers South and Mossco, Forrestania.* Unpublished report prepared for Western Areas NL.

Biota Environmental Sciences (2009a). Forrestania Targeted Malleefowl Survey. Unpublished report prepared for Western Areas NL, April 2009.

Biota Environmental Sciences (2009b). *Summary of the Mygalomorph genetic studies with a focus on collections made at Spotted Quoll.* Letter report prepared for Western Areas NL 30 April 2009.

Biota (2010). Spotted Quoll Haul Road Single Phase Fauna Survey. Unpublished report prepared for Western Areas, Biota Environmental Sciences, Western Australia.

Biota (2019). New Morning Project: Level 1 and targeted fauna survey. Report prepared for Western Areas Ltd, February 2019.

Botanica Consulting (2008). *Vegetation Survey of New Morning to Spotted Quoll Area within the Tenements M77/583 and M77/545*. Report prepared for Western Areas NL, June 2008.

Botanica Consulting (2009). *Spotted Quoll Exploration Area, Flora and Vegetation Survey, M77/583 & M77/584*. Report prepared for Western Areas NL, May 2009.

Botanica Consulting (2017). *Reconnaissance Flora and Vegetation Survey of the Greater New Morning/Spotted Quoll Area*.

Botanica Consulting (2021a). *Detailed Flora and Vegetation Survey and Targeted Flora Survey of the New Morning Project.* Report prepared for Western Areas Ltd, Version 2, June 2021.

Botanica Consulting (2021b). *Memorandum – New Morning Project-Targeted Flora Survey*. Memorandum prepared for Western Areas Ltd, 27 September 2021.

Bureau of Meteorology (BOM) (2022). Hyden Climate Statistics Summary. Climate statistics for Australian locations (bom.gov.au)

Coffey Environments Pty Ltd (2009). *Eucalyptus steedmanii Management Plan – Spotted Quoll Mine, Shire of Kondinin.* Report prepared for Western Areas Ltd, June 2009.

Department of Biodiversity, Conservation and Attractions (2018). *Threatened Ecological Community and Priority Ecological Community database search*. DBCA search results received 1 Aug 2018, Ref: 03-0818EC.

Department of Biodiversity, Conservation and Attractions (2019). *2018 Statewide Vegetation Statistics (formerly the CAR Reserve Analysis).* Department of Biodiversity, Conservation and Attractions.

Department of Biodiversity, Conservation and Attractions (2020a). *Guidelines for the survey of arid bronze azure butterfly (ABAB) in Western Australia.* Version 1.0 - September 2020, Department of Biodiversity, Conservation and Attractions.

Department of Biodiversity, Conservation and Attractions (2020b, September 11). *Arid bronze Azure Butterfly* [WWW Document]. Department of Biodiversity, Conservation and Attractions Threatened Animals, . Retrieved from https://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-andcommunities/ threatened-animals/562-arid-bronze-azure-butterfly#top.

DEC (2012). Chuditch (*Dasyurus geoffroii)* National Recovery Plan. Wildlife Management Program No. 54, Department of Environment and Conservation. Retrieved from

Department of Planning, Lands and Heritage (2018). Aboriginal Heritage Inquiry System. Database searched October 2018, https://maps.daa.wa.gov.au/AHIS/

Department of Mines and Petroleum and Environment Protection Authority (2015) Guidelines for Preparing Mine Closure Plans

DSEWPaC (2012a). EPBC Act referral guidelines for three threatened black cockatoo species: Carnaby's cockatoo (endangered), Calyptorhynchus latirostris; Baudin's cockatoo (vulnerable), Calyptorhynchus baudinii; Forest red-tailed black cockatoo (vulnerable), Calyptorhynchus banksii naso. Department of Sustainability, Environment, Water, Population and Communities.

EPA (2020). *Statement of Environmental Principles, Factors and Objectives*. Environmental Protection Authority, Western Australia. April 2020.

EPA and DEC. (2010). Technical Guide – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment. Perth: Technical Report for the Environmental Protection Authority and the Department of Environment and Conservation.

Environmental Protection Authority (EPA) (2016a) *Instructions on how to define the key characteristics of a Proposal.* EPA, Western Australia

EPA (2016b). *Environmental Factor Guideline - Flora and Vegetation,* Environmental Protection Authority Western Australia.

EPA (2016). *Environmental Factor Guideline: Subterranean Fauna,* Environmental Protection Authority Western Australia.

EPA (2016). *Environmental Factor Guideline: Terrestrial Fauna,* Environmental Protection Authority Western Australia.

EPA (2016). *Environmental Factor Guideline: Terrestrial Environmental Quality,* Environmental Protection Authority Western Australia.

EPA (2016c). *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment,* EPA, Western Australia.

EPA (2010). *Technical Guidance – Sampling Methods for terrestrial vertebrate fauna,* EPA, Western Australia.

EPA (2004). *Technical Guidance –Terrestrial fauna surveys,* EPA, Western Australia.

EPA (2009). *Technical Guidance –Sampling of short range endemic invertebrate fauna,* EPA, Western Australia.

EPA (2013). *Technical Guidance –Subterranean fauna survey,* EPA, Western Australia.

EPA (2007). *Technical Guidance – Sampling methods for subterranean fauna,* EPA, Western Australia.

EPA (2016a). *Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures.*

EPA (2016). *Environmental Factor Guideline – Flora and Vegetation.* Environmental Protection Authority Western Australia.

EPA (2016). *Environmental Factor Guideline – Social Surroundings.* Environmental Protection Authority Western Australia.

EPA (2016). *Environmental Factor Guideline – Terrestrial Fauna.* Environmental Protection Authority Western Australia.

EPA (2016). *Environmental Factor Guideline – Terrestrial Environmental Quality.* Environmental Protection Authority Western Australia.

EPA (2018). *Environmental Factor Guideline - Landforms,* Environmental Protection Authority Western Australia.

EPA (2018). *Environmental Factor Guideline – Inland Waters,* Environmental Protection Authority Western Australia.

EPA (2020a). Environmental Impact Assessment (Part IV Divisions 1 and 2) Procedures Manual. Environmental Protection Authority Western Australia. March 2020.

EPA (2020c). Statement of Environmental Principles, Factors and Objectives. Environmental Protection Authority Western Australia. April 2020.

EPA (2020c). Instructions for the referral of a proposal to the EPA under Section 38 of the EP Act. Environmental Protection Authority Western Australia. March 2020.

EPA (2020d). Instructions on how to prepare an Environmental Review Document. Environmental Protection Authority Western Australia. March 2020.

EPA (2020e). *Environmental Factor Guideline: Greenhouse Gas Emissions*. EPA, Western Australia. June 2020.

Government of Western Australian (2011) WA Environmental Offsets Policy

Government of Western Australian (2014) WA Environmental Offsets Guidelines. Government of Western Australia, August 2014.

Harvey, M. S. (2002). Short-Range Endemism Among the Australian Fauna: Some Examples from Non-Marine Environments. Invertebrate Systematics 16:555–570.

Jim's Seeds Weeds and Trees (2006) *Eucalyptus steedmanii* Management Plan.

Johnstone, R. E., and G. M. Storr (1998). Handbook of Western Australian Birds Volume I - Non Passerines (Emu to Dollarbird). Western Australian Museum, Perth.

Johnstone, R.E., Johnstone, C. and Kirby, T. (2008). *Assessment of Significant Habitat for Carnaby's Cockatoo, Western Rosella and Chuditch in the Spotted Quoll Mining Proposal, Forrestania*. Unpublished report prepared for Western Areas NL.

Johnstone, R. E., C. Johnstone, and T. Kirkby (2010). Carnaby's Cockatoo (Calyptorhynchus latirostris), Baudin's Cockatoo (Calyptorhynchus baudinii) and the Forest Red-tailed Black Cockatoo (Calyptorhynchus banksii naso) on the Swan Coastal Plain (Lancelin – Dunsborough), Western Australia. Studies on distribution, status, breeding, food, movements and historical changes. Department of Planning, Western Australia.

Johnstone, R.E. and Kirby, T. (2018). *Carnaby's Cockatoo Surveys and monitoring in south-eastern Wheatbelt and Great Western Woodlands 2012–2018.* Unpublished report prepared for Western Areas Ltd.

Johnstone, R.E. and Kirby, T. (2019). *Cockatoo Surveys at Western Areas, New Morning Project Forrestania.* Unpublished report prepared for Western Areas Ltd.

Keighery, B. J. (1994). *Bushland Plant Survey; A guide to plant community survey for the community.* Wildflower Society of Western Australia (Inc.), Nedlands.

Marchant, S., and P. J. Higgins (1993). Handbook of Australian, New Zealand and Antarctic Birds. Volume 2: Raptors to Lapwings. Oxford University Press, Melbourne.

Priddel, D., and R. Wheeler (2003). Nesting activity and demography of an isolated population of Malleefowl, Leipoa ocellata. Wildlife Research 30:451–464.

Rayner, K., Johnson, B., Morris K. & H. Mills (2009). *Progress Report for Western Areas – Ecology of Chuditch in semi-arid zones*. Draft letter report prepared for Western Areas NL.

Rockwater (2008a). *Dewatering Assessment*. Report prepared for Western Areas NL, December 2008.

Rockwater (2008b). *Bore Completion and Test-Pumping Report*. Report prepared for Western Areas NL, December 2008.

Rockwater (2008c). *Preliminary Stygofauna Investigation*. Report prepared for Western Areas NL, December 2008.

Rockwater (2009a). *Spotted Quoll Deposit – Stygofauna Investigation, Results of Second Phase Sampling*. Report prepared for Western Areas NL, March 2009.

Rockwater (2009b). *Spotted Quoll Deposit – Regional Stygofauna Investigation*. Report prepared for Western Areas NL, May 2009.

Rockwater (2018a) *Forrestania Nickel Operation – Annual Groundwater Summary GWL 156549 – July 2017 to June* 2018. Report prepared for Western Areas Ltd, September 2018.

Rockwater (2018b) *Forrestania Nickel Operation – Surface Water Assessment*. Report prepared for Western Areas Ltd, November 2018.

Rockwater (2021). *New Morning Project Subterranean Fauna Investigation*. Report for Western Areas NL, February 2021.

Saunders, D. A., P. Mawson, and R. Dawson (2011). The impact of two extreme weather events and other causes of death on Carnaby's Black Cockatoo: a promise of things to come for this species? Pacific Conservation Biology 17:141–148. doi: https://doi.org/10.1071/PC110141.

Saunders, D. A., R. Dawson, A. Doley, J. Lauri, A. Le Souef, P. R. Mawson, K. Warren, and N. White (2014a). Nature conservation on agricultural land: a case study of the endangered Carnaby's

Cockatoo Calyptorhynchus latirostris breeding at Koobabbie in the northern wheatbelt of Western Australia. Nature Conservation 9:19–43.

Saunders, D. A., P. R. Mawson, and P. R. Dawson (2014b). Use of tree hollows by Carnaby's Cockatoo and the fate of large hollow-bearing trees at Coomallo Creek, Western Australia 1969– 2013. Biological Conservation 177:185–193. doi: https://doi.org/10.1016/j.biocon.2014.07.002.

Southern Ecology (2018). *Phytophthora boodjera* Occurrence Map. Report prepared for Western Areas, November 2018.

Strategen Environmental Consultants Pty Ltd (2020). *Forrestania Nickel Operations* – Rehabilitation and Mine Closure Plan. Prepared for Western Areas Ltd, April 2020.

Strategen Environmental Consultants Pty Ltd (2016b). *Stakeholder Engagement Strategy, Consultative Review and Gap Analysis*. Prepared for Western Areas Ltd, September 2016.

Terrestrial Ecosystems (2008). *Spotted Quoll Fauna Assessment*. Letter report prepared for Coffey Environments on behalf of Western Areas NL.

Tille, P (2006). *Soil-Landscape Zones of the WA Rangelands and Interior.*

Van Dyck, S., and R. Strahan (Eds.) (2008). The Mammals of Australia, 3rd edition. Reed New Holland, Sydney.

Western Areas Limited (2017). *MS 808 2016-2017 Compliance Assessment Report*. Report prepared for submission to the EPA, October 2017.

Western Areas Limited (2018). *MS 808 2017-2018 Compliance Assessment Report*. Report prepared for submission to the EPA, October 2018.

Western Areas Limited (2020). *MS 808 2019-2020 Compliance Assessment Report*. Report prepared for submission to the EPA, October 2020.

Western Areas Limited (2021). Steedmans Gum Management Plan, Version 2. Management Plan prepared by WSA, 19 November 2021.

APPENDICES (attached separately)

Appendix 1: Vegetation Survey (Botanica 2021a)

Appendix 2: Targeted Flora Survey (Botanica 2021b)

Appendix 3: Eucalyptus steedmanii Management Plan (WSA 2021)

Appendix 4: Eucalyptus steedmanii Population Census (Botanica 2019)

Appendix 5: E. steedmanii Monitoring Report 2019-2020

Appendix 6: Dieback Management Plan

Appendix 7: Dieback Management Procedure

Appendix 8: Surface Water Assessment (Rockwater 2018)

Appendix 9: Level 1 and Targeted Fauna Survey (Biota 2019)

Appendix 10: Targeted Fauna Survey - Carnaby's Cockatoo (Johnstone & Kirkby 2019)

Appendix 11: Targeted Fauna Survey - Arid Bronze Azure Butterfly (Biota 2021)