



**Supporting Information for an Application
to Amend CPS 8152/4 for Inclusion of Lake
Cowan Mining Centre
Higginsville Gold Operation
April 2024**

Karora (Higginsville) Pty Ltd

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Table of Contents

1	BACKGROUND INFORMATION	1
1.1	Introduction	1
1.2	Overview of Operations	2
2	BASELINE ENVIRONMENTAL AND HERITAGE INFORMATION	7
2.1	Climate	7
2.2	Regional Setting	10
2.3	Soils	10
2.4	Geology	11
2.5	Hydrology	11
2.6	Flora and Vegetation	12
2.7	State Level Vegetation Associations	13
2.8	Terrestrial Fauna	25
2.9	Heritage	37
3	STATEMENT AGAINST EACH OF THE 10 CLEARING PRINCIPLES	38
3.1	Principle A	38
3.2	Principle B	39
3.3	Principle C	40
3.4	Principle D	40
3.5	Principle E	41
3.6	Principle F	41
3.7	Principle G	42
3.8	Principle H	42
3.9	Principle I	42
3.10	Principle J	43
4	REFERENCES	44

Figures

Figure 1. Regional Location of the Higginsville Gold Operation	3
Figure 2. Locality map for mines at the Higginsville Gold Operation	4
Figure 3: NVCP 8152/4 and proposed amendment	5
Figure 4: NVCP amendment area and site layout	6
Figure 5: Temperature and rainfall data Norseman (BOM Site 12009)	8
Figure 6: Surface hydrology of LCMC area.....	14
Figure 7. HGO and LCMC Vegetation Survey Coverage	15
Figure 8. Mapped Priority Flora LCMC	16
Figure 9. HGO and LCMC Broadscale Vegetation Mapping	17
Figure 10. HGO Vegetation Types.....	18
Figure 11. LCMC Vegetation Types.....	19

Tables

Table 1. Information on CPS 8152/4 and the proposed amendment.....	2
Table 2: BOM Climate data from Norseman (Station 12065) and Norseman Aero (Station 12009)	9
Table 3: Summary information for the flora and vegetation surveys conducted at LCMC....	20
Table 4: Summary information for the fauna surveys conducted in the HGO region	26

Attachments

Attachment A:	Karora (Higginsville) Pty Ltd Name Change
Attachment B:	Spatial Files
Attachment C:	Biological Reports
Attachment D:	Tenement Reports
Attachment E:	ACH Search Results
Attachment F:	Clearing Permit Reports
Attachment G:	Weed Control Reports

1 BACKGROUND INFORMATION

1.1 INTRODUCTION

Higginsville is a historical gold mining centre located approximately 110km south of Kalgoorlie in the Southern Goldfields region of Western Australia. In June 2019, Karora Resources (previously RNC Minerals) acquired the Higginsville Gold Operation (HGO) and associated companies from Westgold Resources Limited. Karora (Higginsville) Pty Ltd (previously Avoca Mining Pty Ltd: Attachment A) is now the site operator of the HGO and various associated mine sites that include the Lake Cowan Mining Centre (LCMC).

The regional location of HGO is displayed in Figure 1. The locality map for the HGO mine sites is provided as Figure 2. The HGO consists of the gold processing area at Higginsville and various pits and ore bodies that extend up to 22km from the gold processing plant including the LCMC area. The Higginsville area also contains the processing mill and tailings storage facilities (TSF), office, accommodation camp and other ancillary infrastructure. The mill at HGO also processes ore that is transported from other Karora owned operations in the region such as the Beta Hunt underground operation (BHO) in Kambalda.

Prior to August 2020, five separate NVCPs covered the wider Higginsville area including:

- CPS 6644/1;
- CPS 7673/1;
- CPS 7674/2;
- CPS 8062/1; and
- CPS 8152/2.

To improve the management and reporting of clearing activities at HGO these mining areas were amalgamated under a single NVCP (CPS 8152-3). CPS 8152-3 was amended in March 2023 to include an additional area for the future TSF footprint at HGO. The current NVCP (8152/4) remains valid until the 31 July 2025. Information on CPS 8152/4 and the proposed amendment area is provided in Table 1 and Figure 3.

The proposed amendment is specifically related to an extension to the clearing footprint at the LCMC on M15/1132 and M15/1133 for the purpose of mining the Atreides open pit project. The existing haul road on M15/351, M15/642, M15/665 and L15/346 has been included in this amendment to capture the existing historical disturbance and any future road maintenance that may be required on this route. The proposed amendment does not require an increase from the already approved 1082.81 ha and only an increase to the disturbance outline is being sought. Clearing for the haul road and historical mining infrastructure at the LCMC already exists and the NVCP footprint is being expanded to capture this existing cleared area and additional works for the upcoming mining on M15/1132 and M15/1133 (Figure 4). The total increase to the disturbance envelope is 448.9 ha with the original approved vegetation clearing allowance of 1082.81 ha remaining the same.

The amendment application includes a shapefile of the proposed amendment footprint (Attachment B).

Table 1. Information on CPS 8152/4 and the proposed amendment

CPS No:	CPS 8152/4	CPS 8152/5 (Proposed Amendment)
Permit holder:	Avoca Mining Pty Ltd	Karora (Higginsville) Pty Ltd
Permit type:	Purpose permit	Purpose Permit
Affected mining tenements:	General Purpose Leases 15/19, 15/26, 15/27, 15/29 Mining Leases 15/31, 15/231, 15/338, 15/348, 15/352, 15/375, 15/506, M15/507, 15/512, 15/528, 15/580, 15/581, 15/597, 15/610, 15/639, 15/640, 15/642, 15/655, 15/681, 15/748, 15/817, 15/1790, 15/1814. Miscellaneous Licences 15/347, 15/368, 15/382, 15/386, 15/389	Inclusion of Mineral Lease 15/351, 15/642, 15/665, 15/1132, M15/1133 and Miscellaneous Licence 15/346
Duration:	27 October 2018 to 31 July 2025	27 October 2018 to 31 July 2025
Purpose:	Clearing for the purpose of mineral production and associated activities	Clearing for the purpose of mineral production and associated activities
Area of clearing:	1082.81 ha	1082.81 ha (No increase required)

1.2 OVERVIEW OF OPERATIONS

The LCMC operates as a satellite project to the HGO mill located approximately 16 km north east on the shore of Lake Cowan (Figure 2 and Figure 3). South Kalgoorlie Mines commenced open cut gold mining operations in the LCMC during 2002. Open cut-pits included Josephine, Louis, Atreides, Brigitte and Sophia. From 2002 – 2013 the area had limited mining which was restricted to exploration work in the area. Metals X recommenced mining at Lake Cowan in early 2014 which included mining at Louis Pit, Josephine pit, Napoleon and additional haul road extensions. These works were undertaken under previous NVCPs that have since expired. A Mining Proposal was approved for a cutback to the Atreides pit in May 2016 (Reg ID:59305) but the project was suspended and the area was placed back into care and maintenance. A new Mining Proposal is being prepared for the Atreides project and will be submitted to DEMIRS with anticipated approval in May 2024.

Accessing the Atreides pit will require utilisation of the existing 18 km haul road which runs from central HGO to the LCMC. Clearing will be required in the LCMC area to facilitate an expansion to the existing open-cut pit, waste rock dump, ore stockpiles, laydown areas and haul roads. Other existing open-cut mines on M15/1132 are also being explored for feasibility and may be expanded in the future. A summary of the proposed infrastructure on M15/1132 and M15/1133 is shown in Figure 4.



Figure 1. Regional Location of the Higginsville Gold Operation

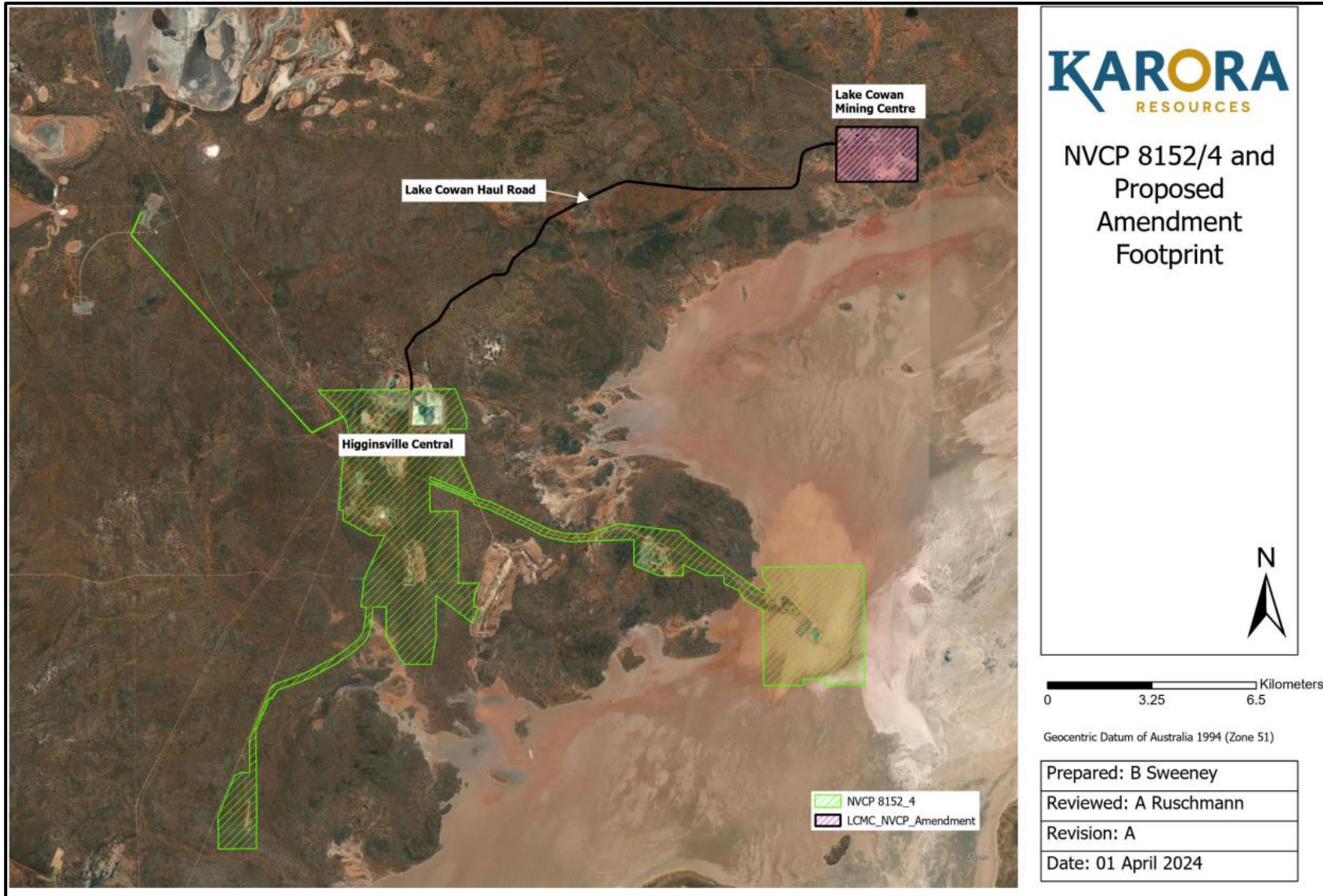
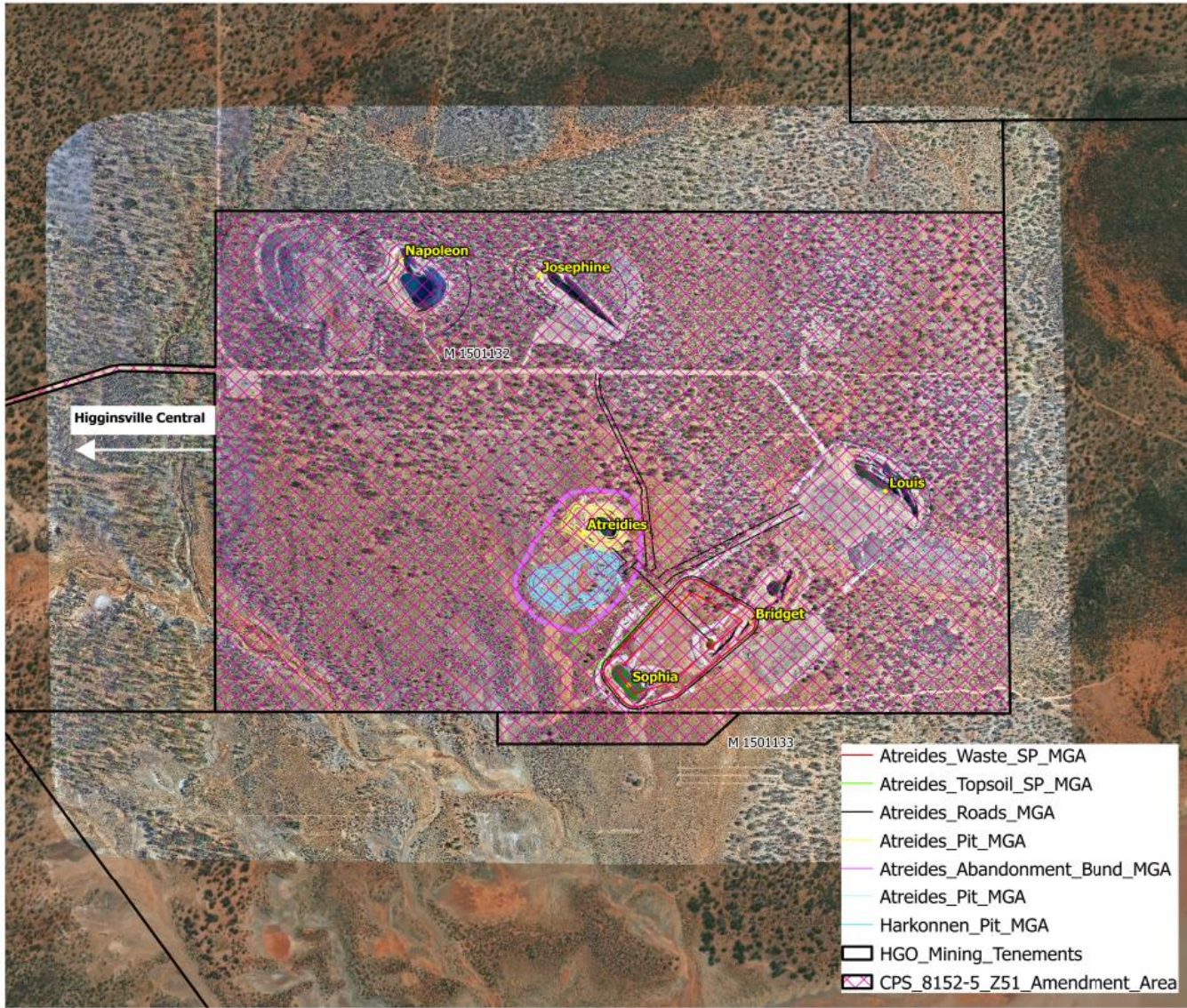
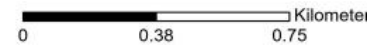


Figure 3: NVCP 8152/4 and proposed amendment



NVCP Amendment
Area and Site Layout



Geocentric Datum of Australia 1994 (Zone 51)

Prepared: B Sweeney
Reviewed: A Ruschmann
Revision: A
Date: 10 April 2024

Figure 4: NVCP amendment area and site layout

2 BASELINE ENVIRONMENTAL AND HERITAGE INFORMATION

2.1 CLIMATE

The nearest Bureau of Meteorology ('BOM') weather recording station is Norseman Aero Site 12009 which is located approximately 50 km south of HGO (BOM 2020). BOM Site 12009 has been in operation since 1999 and replaced BOM Site 12065 that commenced in 1897 and closed in 2012. Climate data from both sites is provided in Table 2 (BOM 2020). In general terms, the two data streams are similar. Data from the active BOM Site 12009 is deferred to in this discussion given its currency. Figure 5 displays the temperature and rainfall data from current BOM Site 12009.

Norseman has a dry climate with hot summers and cool winters. The climate is strongly influenced by a band of high pressure known as the sub-tropical ridge. For much of the year this ridge is located to the south, allowing east to southeast winds to prevail. The ridge moves north during winter allowing the occasional cold front to pass over the Goldfields.

January is the hottest month with a mean maximum temperature of 32.6°C and the highest temperatures of >46°C. High summer temperatures can extend for many days that can then be followed by a cool change from the south and occasionally with thunderstorms.

July is the coolest month with a mean maximum temperature of 17.3°C and a mean minimum temperature of 4.1°C. Overnight temperatures fall below freezing about four times in a typical winter. Such events occur on clear nights following a day of cold southerly winds. The coldest recorded temperature was -6.0°C in June.

The annual mean rainfall is 298 mm with January being the wettest month with a mean of 36.5mm. The rainfall pattern is for the current BOM Site 12009 shows a general trend of a mid-year trough (**Error! Reference source not found.**) although the historical data from BOM Site 012065 has the opposite trend with a winter rainfall peak. Site observations have been that the most reliable rains occur in winter from cold fronts arriving from the west, and cloud bands from the northwest. Thunderstorms provide most of the summer rainfall, often producing heavy localised falls in short periods. Although rare, decaying tropical cyclones, originating off the northwest coast can move through the Goldfields, producing heavy rains and sometimes flooding.

Evaporation data is not available for Norseman so has been sourced from BoM monitoring site No. 012038 (Kalgoorlie-Boulder Airport) located approximately 110km from the Higginsville monitoring site. Average annual evaporation rate of between 2,400 and 2,500mm. The annual mean daily evaporation at Kalgoorlie-Boulder Airport (1966 to 2016) is 7.2mm, ranging from 2.6mm (June) to 12.5mm (January).

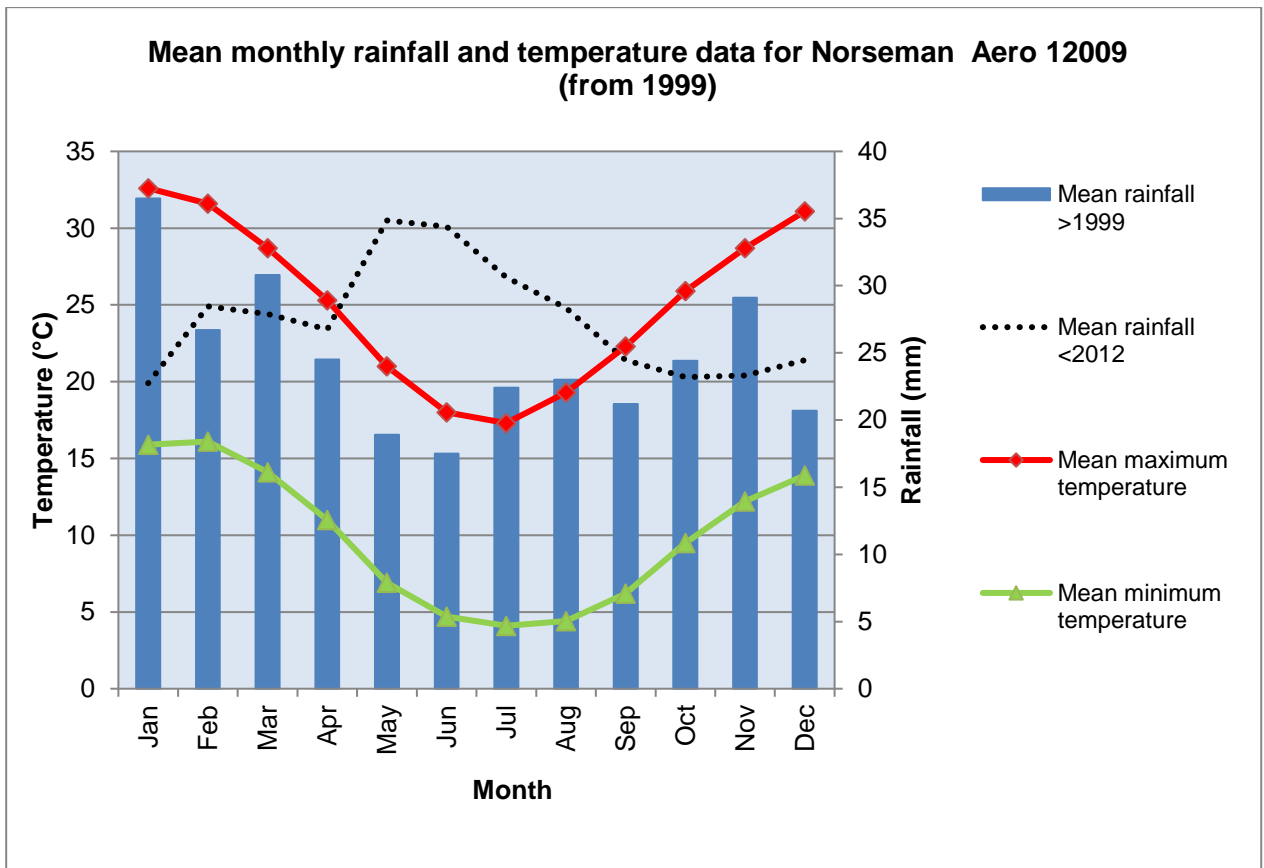


Figure 5: Temperature and rainfall data Norseman (BOM Site 12009)

Table 2: BOM Climate data from Norseman (Station 12065) and Norseman Aero (Station 12009)

BOM Station 12065: 1897 to 2012, BOM Station 12009: 1999 to present

Statistic Element	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean maximum temperature - end 2012 (°C)	32.6	31.3	28.8	24.6	20.4	17.5	16.8	18.5	21.6	25	28.1	30.7	24.7
Mean maximum temperature - start 1999 (°C)	32.6	31.6	28.7	25.3	21	18	17.3	19.3	22.3	25.9	28.7	31.1	25.2
Highest temperature - end 2012 (°C)	46	44.9	43.8	37	33.3	27.8	27.7	32.5	35.6	40	41.1	44.9	46
Highest temperature - start 1999 (°C)	46.5	44.8	43.5	37.7	32	28.2	25.1	32.9	36	39.6	42.4	45.1	46.5
Mean minimum temperature - end 2012 (°C)	15.8	15.9	14.5	11.6	8.5	6.3	5.1	5.4	7.3	9.7	12.3	14.1	10.5
Mean minimum temperature - start 1999 (°C)	15.9	16.1	14.1	11	6.9	4.7	4.1	4.4	6.2	9.5	12.2	13.9	9.9
Lowest temperature - end 2012 (°C)	6	6.3	3.3	0.6	-2.3	-4.6	-3.1	-2.2	-3	-0.7	2.2	3.6	-4.6
Lowest temperature - start 1999 (°C)	5.7	5.9	1.7	0.8	-2.1	-6	-4.4	-3.7	-4.3	-1.9	0.9	3	-6
Mean rainfall - end 2012 (mm)	19.9	24.9	24.4	23.4	30.5	30.1	26.8	24.8	21.4	20.3	20.4	21.4	288.9
Mean rainfall - start 1999 (mm)	36.5	26.7	30.8	24.5	18.9	17.5	22.4	23	21.2	24.4	29.1	20.7	298
Highest rainfall - end 2012 (mm)	116.4	202.6	188.7	111.8	136.6	104.4	80	94.9	75.2	87.2	86.9	150.8	623.6
Highest rainfall - start 1999 (mm)	93.6	136.8	149.8	71	47.6	54.8	55.2	48	71.8	82.8	92.2	79.8	454.2
Lowest rainfall - end 2012 (mm)	0	0	0	0	0	2.2	2.5	0.8	0.4	0	0	0	137.9
Lowest rainfall - start 1999 (mm)	0	0	0	0	1.2	1.4	6.2	7.4	0.4	1	0.6	0.8	183.4
Highest daily rainfall - end 2012 (mm)	67.4	163.6	86	66.3	42.4	43.8	32.8	38.6	58.8	45	48.3	54.1	163.6
Highest daily rainfall - start 1999 (mm)	53	50	76	39	30.4	17	21	23	55	43.8	42	71	76
Mean number of days of rain - end 2012	3.5	3.7	4.5	5.3	7.3	8.7	9.4	8.5	7	5.3	4.6	3.9	71.7
Mean number of days of rain - start 1999	5.8	5.3	5.8	6.6	7.2	8.7	10.9	10.5	7.8	6.6	6.9	4.5	86.6

2.2 REGIONAL SETTING

The HGO area is located in the Interim Biogeographic Regionalisation of Australia ('IBRA') Coolgardie 3 Eastern Goldfields subregion, described by Cowan (2001) as gently undulating plains on the Yilgarn Craton with calcareous soil being dominant. The subregion supports a diverse eucalypt woodland around the salt lakes, on the low ranges and in the broad valleys and mallee and Acacia thickets and shrub heaths on the plains (Cowan 2001). The sub-region is rich in endemic Acacias. The subregional area is 5,102,428ha (Cowan 2001).

The HGO locality is situated on a large peninsular on the western edge of Lake Cowan from the lakebed to the Goldfields to Esperance Highway, refer to Figure 2. The landforms range from extensive pediplains and stony plains, basalt and greenstone undulating rises and low hills, salt lakes with fringing sand plains and sand or gypsum dunes.

The NVCP amendment area is contained within the Great Western Woodlands, an internationally significant area of biological diversity and the largest remaining area of intact Mediterranean climate woodland on Earth, covering almost 16 million hectares (DEC 2010). It forms a continuous band of native vegetation that extends from the edge of the Wheatbelt through the Goldfields to the Nullarbor Plain. Notwithstanding its biological importance, the Great Western Woodlands occurrence at the HGO area and surrounds has been the subject of significant levels of mining and exploration disturbance for >100 years. It is not considered as being a good representation of intact Great Western Woodlands at the Higginsville locality. There are extensive areas of the Great Western Woodlands under DBCA managed land and the proposed clearing under this NVCP amendment is considered unlikely to have any impact on the overall conservation status of Great Western Woodlands.

The Higginsville locality has been examined under previous amendments to the NVCP. The spatial data available from Data WA (2020) shows:

- There are no Environmentally Sensitive Areas within 34km of the Higginsville area (*ClearingRegulations_EnvironmentallySensitiveAreasDWER_046.shp*).
- There are two Schedule 1 "Non-permitted area" pursuant to Schedule 1 of the Environmental Protection (Clearing of Native Vegetation) Regulations 2004 (*ClearingRegulations_EnvironmentallySensitiveAreasDWER_046.shp*). These two non-permitted areas are the corridors for the Coolgardie Esperance Highway and the Kalgoorlie Esperance Railway. The NVCP amendment area does not impact this area.
- There are no DBCA managed lands (National Parks, Nature Reserves, proposed conservation areas) occurring within the NVCP amendment area (*DBCA_LegislatedLandsandWatersDBCA_011.shp*). The closest DBCA managed land is the Binaronca Nature Reserve (Reserve 32552), located approximately 2.6km to the northwest of the main HGO NVCP area and within 1.7km of the Redcross powerline easement. The proposed developments under this NVCP amendment will not impact in any way on the Binaronca Nature Reserve.
- From the "data.wa" WMS Server there are no Threatened Ecological Communities ('TEC's) or Priority Ecological Communities ('PEC's) within 49km of HGO (*Threatened Ecological Communities DBCA-038.shp*).

2.3 SOILS

Soils in the goldfields region are typically alkaline with a pH range of 7 to 9, low soil fertility and electrical conductivity of 14mS/cm, indicating moderate soil salinity. Soils in the Higginsville mining area are typically characterised by red loamy earths and calcareous loamy earths on the plains, calcareous shallow loams and stony soils on low hills and rises and saline

soils on and near playa lakes. Soil fertility is generally low and soil salinity is locally higher. Various soil testing has taken place throughout the mining precinct including problematic areas such as the Palaeochannel mining area. Even when soil testing indicated saline, sodic and dispersive characteristics - monitoring, investigations and observational evidence has shown that topsoil and subsoil recovered during mining and clearing to be suitable for rehabilitation efforts, as vegetation has established within previously rehabilitated areas. This being considered, there appears to be no major limiting factors for plant growth from soils harvested at the proposed LCMC.

2.4 GEOLOGY

The Higginsville Gold Operation is situated between the gold mining centres of Norseman and St Ives. It lies to the west of the Zuleika Shear, towards the southern end of the Norseman-Wiluna Greenstone Belt of the Archaean Yilgarn Craton.

The province consists of Archaean greenstone basement rocks with a north-south strike and a steep westerly dip. This is overlain with granitic rocks and greenstone of the Yilgarn Craton that have been extensively weathered and laterised. State geology mapping (1:2,500,000) indicates that the Project area comprises:

- Archaean metamorphosed sedimentary and acid volcanic rocks.
- Archaean metamorphosed basic and ultrabasic volcanic and intrusive rocks
- Alluvial, shoreline and eolian deposits

Undulating plains containing hills, sand plains and salt lakes overlie the bedrock. Superficial deposits are typically made up of colluvial and alluvial sediments (GHD 2014).

2.5 HYDROLOGY

Surface hydrology for the NVCP amendment area is displayed in Figure 6. The NVCP amendment area is contained within the 3,483,400ha Balladonia Catchment of the Salt Lake Basin (DWER 2020).

The Balladonia Catchment includes the Lake Cowan and Lake Dundas salt lake systems. Drainage lines in the NVCP amendment area flow to Lake Cowan. Drainage lines within the north of the NVCP amendment area are poorly defined and are only likely to flow following major rainfall events. Sheetflow may also occur on the alluvial plains adjacent to the salt lake system following periods of heavy rainfall. The incidence or intensity of flooding is not considered as being a high risk event due to the low rainfall (298mm annually), relatively flat land that is surrounded by woodlands and shrublands, no major watercourses, no lower lying flood plains associated with major water courses and mine runoff managed through containment.

Lake Cowan is one of the larger lakes in the Goldfields bioregion with an area of approximately 96,929ha. Although not recognised nationally or internationally as a wetland of conservation significance, it is listed as a wetland of subregional significance in the DBCA biodiversity audit for the Coolgardie 3 Eastern Goldfields subregion (Cowan 2001).

The lake represents part of a former palaeodrainage channel and is predominately dry for most of the year but may contain water following heavy rain. Water ponded in the lake is then rapidly lost to evaporation and seepage.

The groundwater in the HGO and the LCMC locality is hypersaline (typically 60,000 to 230,000 mg/L TDS), as recorded by Karora as part of their monitoring programs. Monitoring bores surrounding the TSF record lower TDS readings ranging from 50,000 to 100,000 mg/L with groundwater levels ranging from 7 – 13 m below ground level.

There are no Public Drinking Water Source Areas ('PDWSA's) within 120km of NVCP amendment area (DWER 2020).

2.6 FLORA AND VEGETATION

The general HGO locality has been covered by 13 flora and vegetation surveys that were conducted between 2006 to 2019 and discussed under previous NVCP applications. The HGO flora survey coverage map is provided in Figure 7 which includes sections of the the approved NVCP and proposed amendment footprint. A full list of flora surveys relevant to the LCMC area has been summarised in Table 3.

The LCMC has historical flora data from studies that date back to 2002. Recent vegetation and flora studies over the proposed NVCP amendment area and are summarised below. Broadscale vegetation mapping was undertaken by GHD (2014) which includes a 15 km x 15 km area over the LCMC. A summary of the key findings from the survey includes:

- Five broad vegetation associations were described within the Project area. Vegetation associations included three *Eucalyptus* low woodland/woodland and two tall/low shrubland associations.
- Desktop searches identified the presence/potential presence of nine conservation significant flora species within 10 km of the Project area. Previous surveys in the area identified a population of *Frankenia georgei* (P1).
- The total species count was a composite from previous surveys and consisted of at least 129 flora species from 25 families.

The second study that covers a portion of the proposed NVCP amendment area (as well as Harkonnen, another nearby prospect) was completed in by Jenny Borger Consulting (2021). The survey included a detailed vegetation and flora survey of the south western area at the LCMC and a targeted survey for *Frankenia georgei*. The assessment comprised of a desktop review and field survey. A summary of the key findings from the 2021 report are provided below:

- Twelve vegetation types and four sub-types have been described and mapped for LCMC and Harkonnen survey areas. Two other types – claypans (with no vegetation) and cleared areas (degraded) are also mapped.
- Most of the vegetation within LCMC and Harkonnen would be described as very good, with minor areas meeting requirements of excellent. Cattle were present during the survey at LCMC with most disturbances along the drainage lines. Historic mining impacts were present within both sites and presented as exploration access tracks and drill sites with some regrowth .
- The targeted survey in LCMC for *Frankenia georgei* found there were no *F. georgei* present, and the extent of the population of *F. glomerata*, which is superficially similar, was extensive. Several images and a few collections were made of *Frankenia* species during the survey to confirm identifications. It is highly likely that *F. glomerata* was misidentified as *F. georgei* in previous surveys.
- *Ptilotus rigidus* (P1) was recorded at one location (10 plants) at LCMC on rocky outcrop adjacent to a saline drainage line. Similar habitat was present in the south west of the survey area, but no plants were found.
- *Calandrinia lefroyensis* (P1) is likely to be quite common in the LCMC area. 18 plants were recorded. Some plants were in flower which made them easy to locate.

A targeted flora survey was also completed by Jenny Borger Consulting (2024) to determine priority species potentially occurring in the Atreides mining footprint, and within the proposed

NVCP amendment area. While this survey report has not been published yet, mapping of these priority species has been recorded with results available in Figure 8. The study determined that the population of *F. glomerata* was extensive with over 12,000 plants estimated in the local area. The priority species listed in the mining area and the NVCP amendment area include:

- *Calandrinia lefroyensis* (P1)
- *Ptilotus rigidus* (P1)
- *Frankenia glomerata* (P4)
- *Santalum spicatum* (no rating)

The planned mining operation will disturb approximately 110 *Frankenia glomerata*. With over 12,000 plants of this species being recorded in the direct surrounds, the impact on the species will be negligible. Mining infrastructure will be located strategically to avoid disturbance of any P1 flora with a minimum 30 m buffer zone placed around the P1 species.

Broadscale vegetation mapping has also been completed at HGO and the LCMC area (Figure 9). Vegetation types in these areas are mapped in Figure 10 and Figure 11.

Biological reports have been included in Attachment C.

2.7 STATE LEVEL VEGETATION ASSOCIATIONS

Shepherd et al. (2002) mapped vegetation associations based on broad scale mapping (1:250,00) completed by Beard (1974) at an association level. Harkonnen and most of LCMC are mapped as Pre-European vegetation type Binneringie – 9 which is described as medium woodland; coral gum (*Eucalyptus torquata*) and Goldfield's blackbutt (*E. lesouefii*), also some medium woodland – *E. transcontinentalis* and *E. flocktoniae*. The mapped extent of Binneringie – 9 was 240,509 (state wide/ Coolgardie Bioregion) ha of which 235,161 ha remains (97.78 %) in the bioregion and 229757 ha (97.75 %) within the Eastern Goldfields subregion and is ranked as least concern. A minor area of LCMC is mapped as Binneringie 125 – bare areas, salt lakes. The mapped extent of Binneringie 125 was 3485786 ha (state wide) and 303090 ha within the Eastern Goldfields subregion of which 300445.92 ha (99.13 %) remains and ranked as least concern.

Pursuant to Environmental Protection Authority's ('EPA') "*Environmental Protection of Native Vegetation in Western Australia, Clearing of Native Vegetation, Position Statement No. 2*" (EPA 2000), a vegetation type is considered underrepresented if there is less than 30% percent of its original distribution remaining. Position Statement No. 2 states that from a purely biodiversity perspective, and not taking into account any other land degradation issues, there are several key criteria applied to vegetation clearing.

- The "threshold level" below which species loss appears to accelerate exponentially at an ecosystem level is regarded as being at 30% of the pre-European / pre-1750 extent for the vegetation type.
- A level of 10% of the original extent is regarded as being a level representing Endangered.

Sub-association 9 vegetation located in the NVCP amendment area, post-clearing, is considered minimal and would be well above the 30% risk threshold.

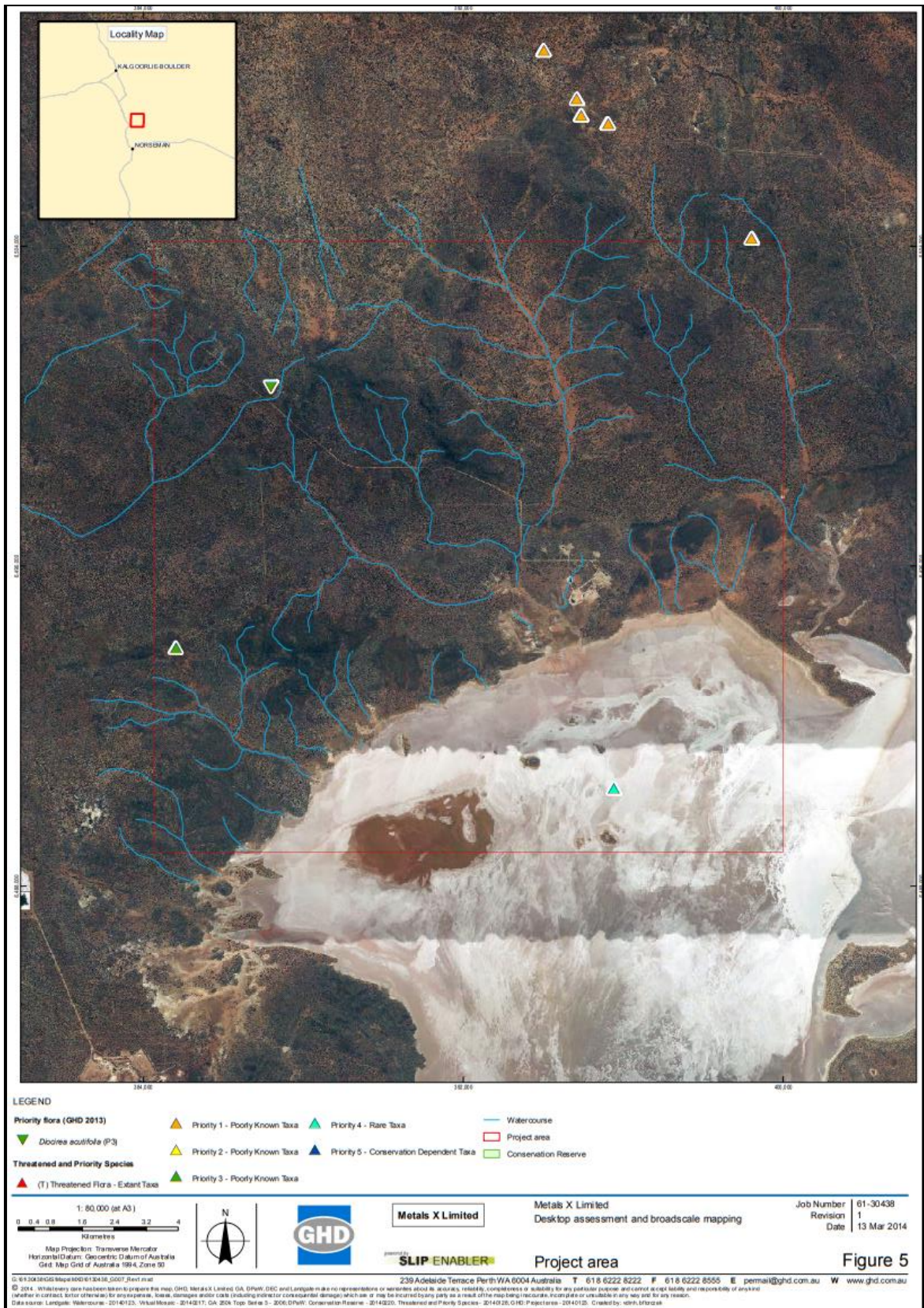


Figure 6: Surface hydrology of LCMC area

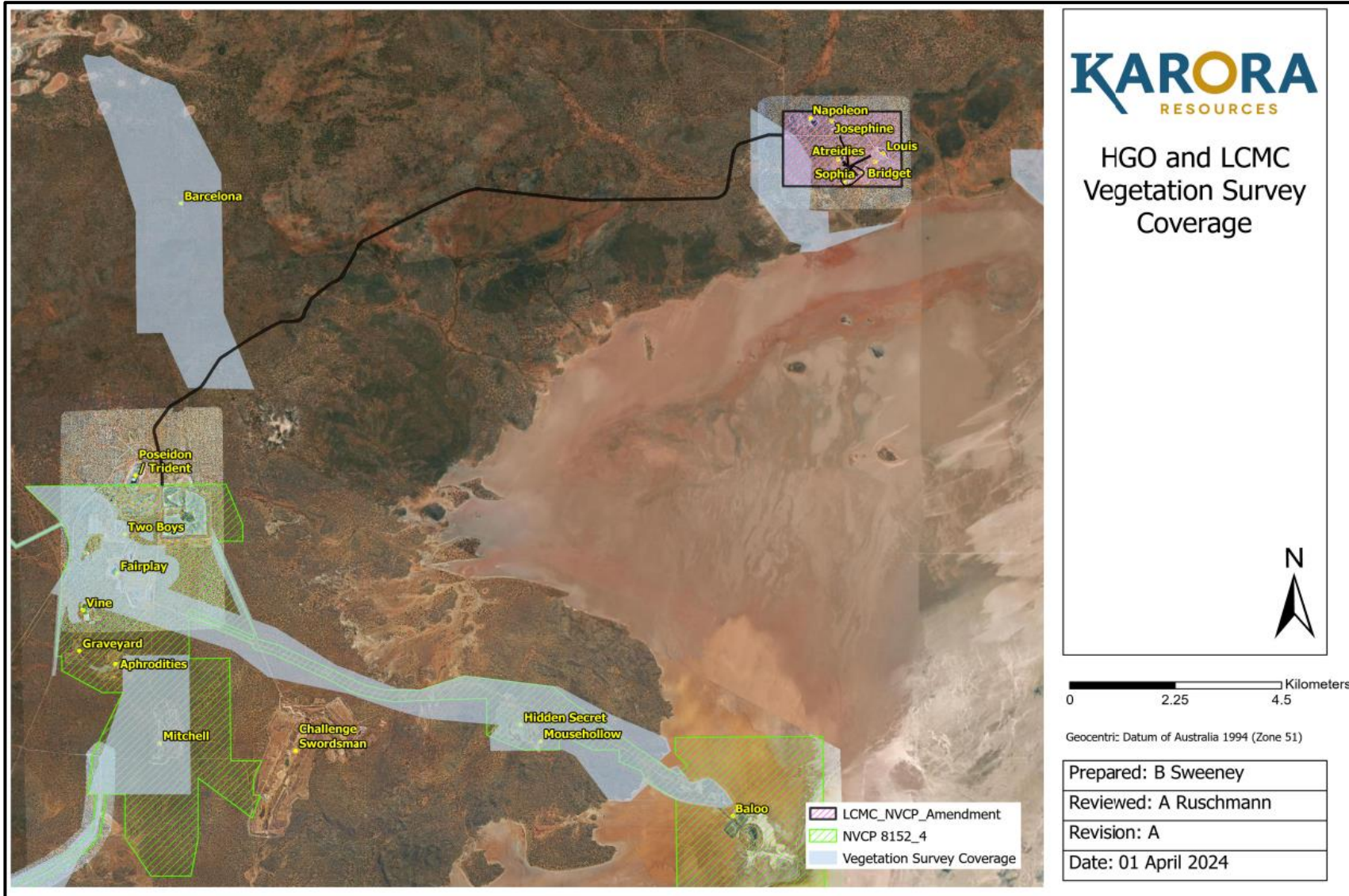


Figure 7. HGO and LCMC Vegetation Survey Coverage

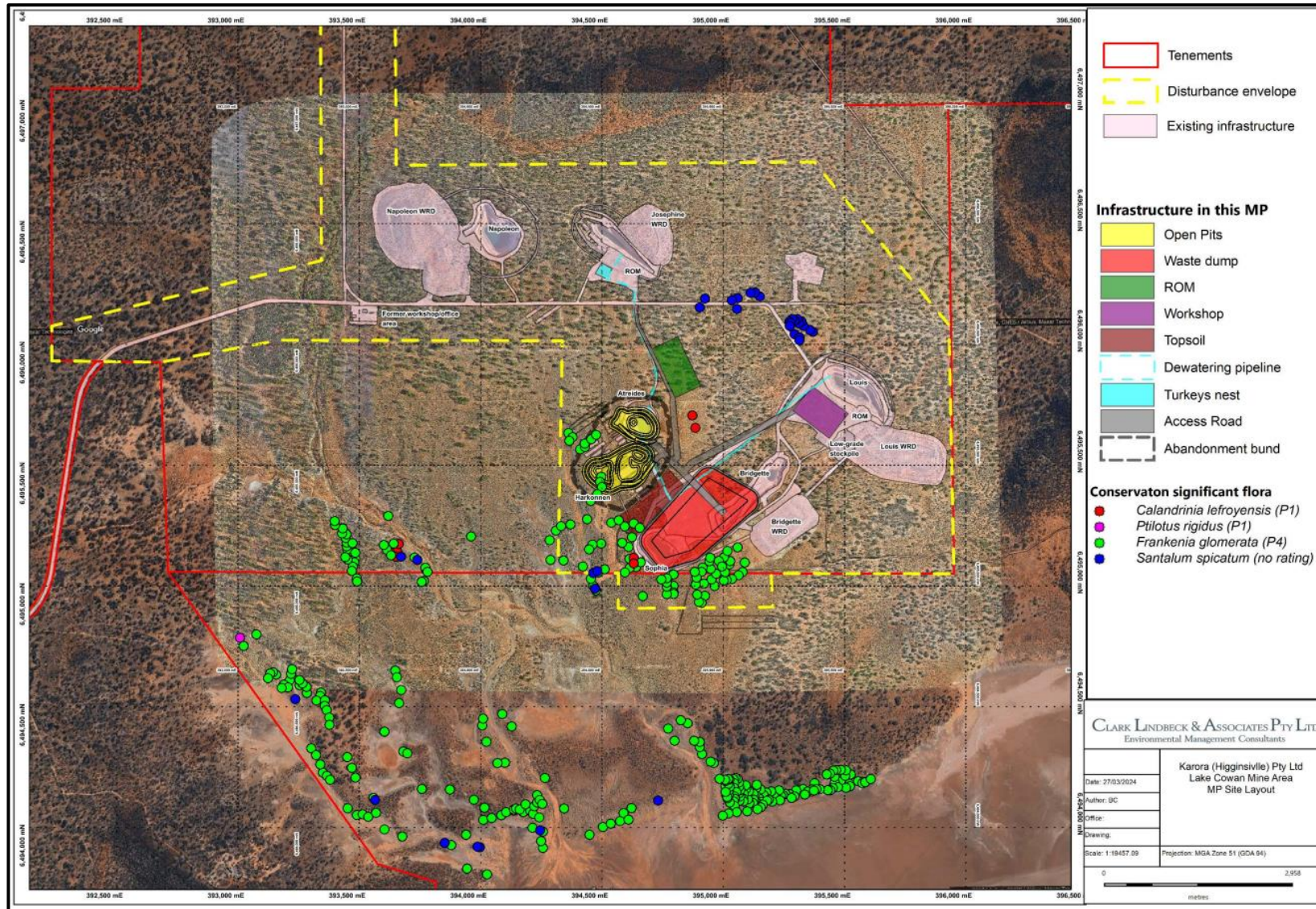


Figure 8. Mapped Priority Flora LCMC

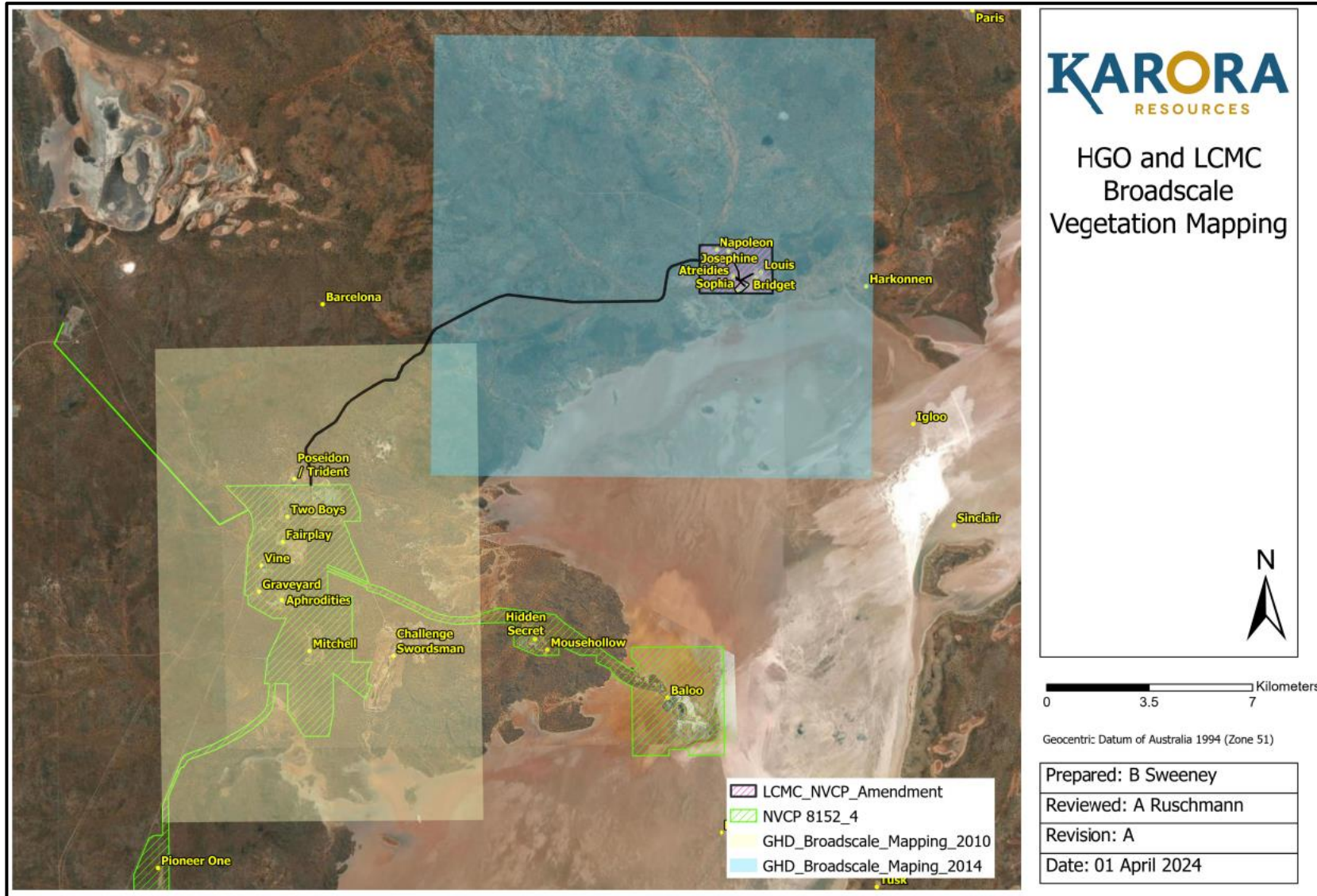


Figure 9. HGO and LCMC Broadscale Vegetation Mapping

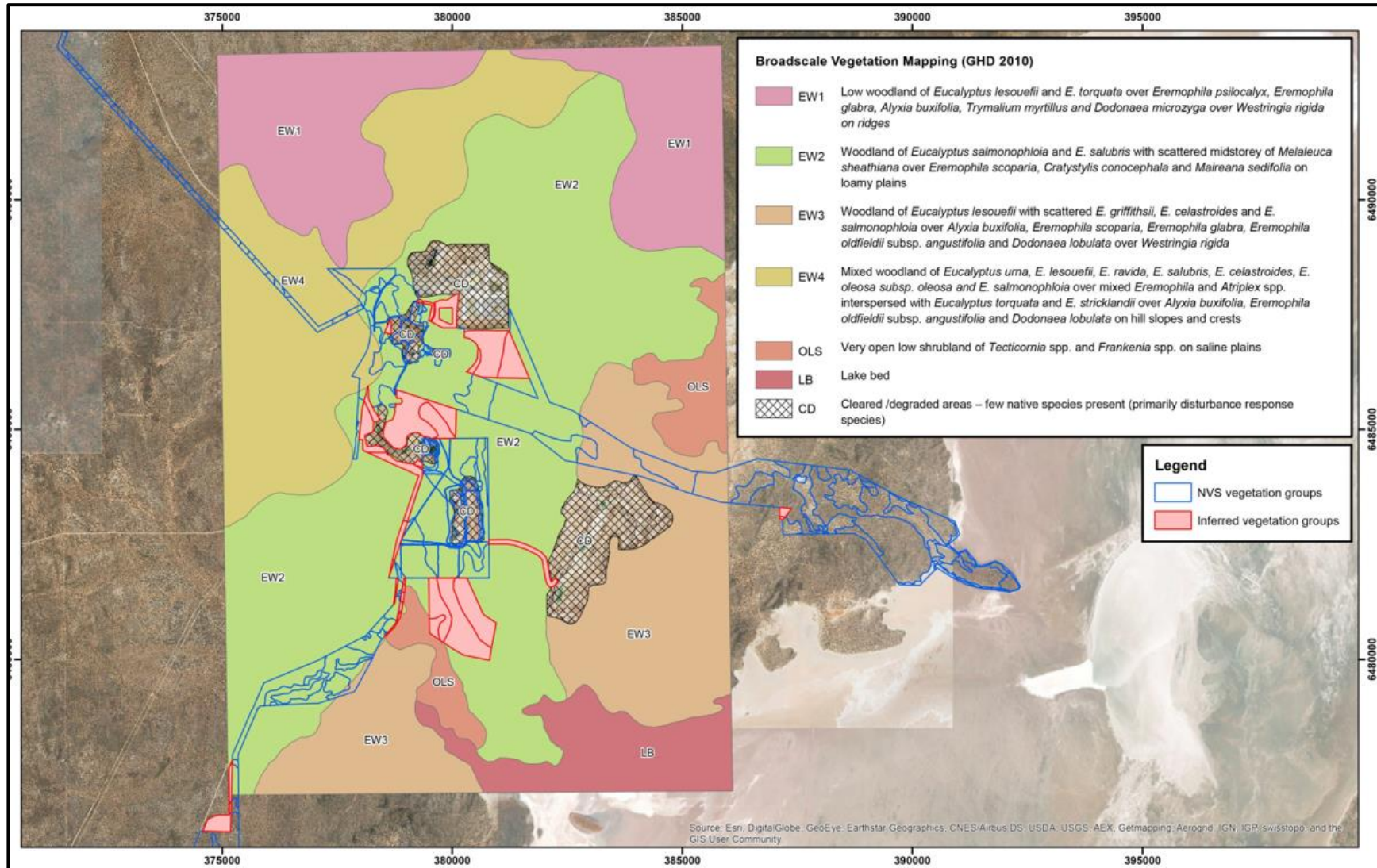


Figure 10. HGO Vegetation Types

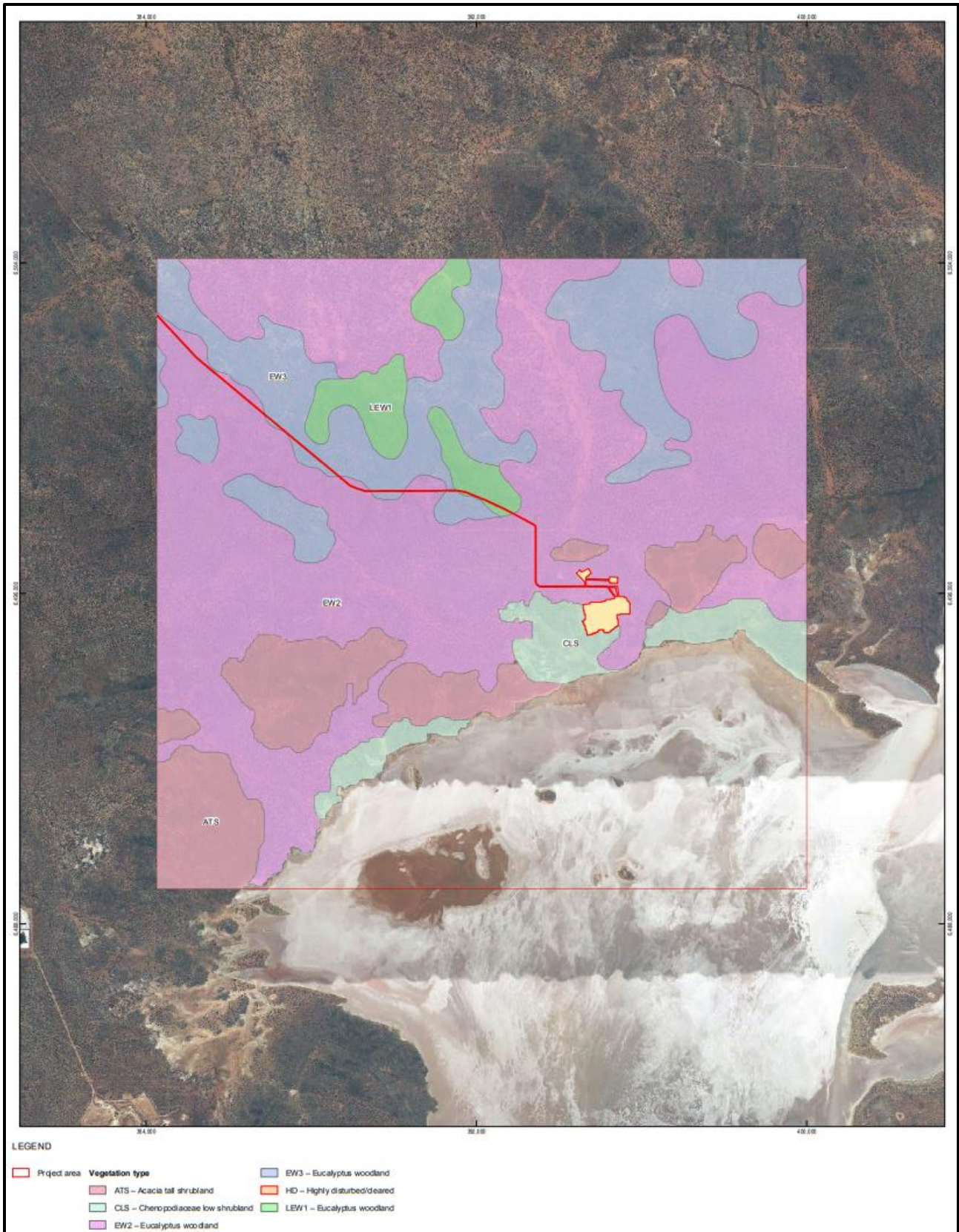


Figure 11. LCMC Vegetation Types

Table 3: Summary information for the flora and vegetation surveys conducted at LCMC

Year	Report Title	Company	Summary
2002	Vegetation and Aquatic Survey on Tenements M15/1132 and M15/1133 OES (2002a)	Outback Ecology	<p>Six vegetation groups were recorded:</p> <ul style="list-style-type: none"> • Open shrubland of <i>Eremophila scoparia</i> over a sparse chenopod shrubland. • Sparse shrubland of <i>Dodonaea viscosa</i> over an open chenopod shrubland. • Open woodland of <i>Eucalyptus lesouefii</i> over an open chenopod shrubland • Open woodland of <i>Eucalyptus lesouefii</i>, <i>E. salmonophloia</i> and <i>E. salubris</i> over an open <i>Eremophila scoparia</i> shrubland • Open woodland of <i>Eucalyptus lesouefii</i>, <i>E. salmonophloia</i> and <i>E. longicornis</i> over a sparse shrubland of <i>Cratystylis conocephalus</i> and <i>Eremophila scoparia</i> • Open woodland of <i>Eucalyptus lesouefii</i> and <i>E. longicornis</i> over an open shrubland of <i>Acacia tetragonophylla</i> and <i>Dodonaea lobulate</i> <p>A total of 17 families, 28 genera and 50 plant species were identified during the vegetation survey.</p> <p>The survey identified the presence of <i>Frankenia georgei</i> within the Project area. This taxon was listed as a Priority 3 species at the time but has since been delisted and its conservation status is now 'not threatened' (it has since been re-listed).</p> <p>No invasive flora species were recorded within the survey area</p>
2002	<i>Frankenia georgei</i> targeted survey OES (2002b)	Outback Ecology	<p>Key findings:</p> <ul style="list-style-type: none"> • The population of <i>F. georgei</i> within M15/1132 and M15/1133 was estimated to be approximately 13 000 plants. Four additional populations of this species were recorded outside of the tenement boundary. It was estimated that in excess of 30 000 <i>F. georgei</i> plants were present between these populations • <i>Frankenia georgei</i> appears to favour drainage areas adjacent to salt lakes (including Lake Cowan) within this region. <i>Cratystylis subspinescens</i> dominated these areas. This companion species is easily recognisable and may be used to identify possible population locations of <i>F. georgei</i> in future surveys.
2014	Desktop Assessment and Broadscale Mapping, Lake Cowan Project Area GHD (2014)	GHD	<p>Five broad vegetation associations were described within the Project area based on field observations. The associations included three Eucalyptus low woodland/woodland and two tall/low shrubland association including:</p>

Year	Report Title	Company	Summary
			<ul style="list-style-type: none"> • <i>Eucalyptus torquata</i>, <i>E. lesouefii</i> low woodland over <i>Alyxia buxifolia</i>, <i>Santalum acuminatum</i> tall sparse shrubland over <i>Westringia rigida</i>, <i>Dodonaea microzyga</i>, <i>Eremophila psilocalyx</i> open/low open shrubland on upper slopes and crests of hills. • <i>Eucalyptus salmonophloia</i>, <i>E. salubris</i> woodland over <i>Melaleuca sheathiana</i> tall sparse shrubland over <i>Cratystylis conocephala</i>, <i>Eremophila scoparia</i>, <i>Maireana sedifolia</i>, <i>Olearia muelleri</i> open/low open shrubland on loamy plains and valley. • <i>Eucalyptus lesouefii</i>, <i>E. ravida</i>, <i>E. salubris</i>, <i>E. salmonophloia</i> woodland over <i>Melaleuca sheathiana</i>, <i>Santalum acuminata</i> tall isolated shrubs over <i>Eremophila scoparia</i>, <i>E. glabra</i> var. <i>glabra</i>, <i>Tecticornia</i> spp., <i>Atriplex nummularia</i> subsp. <i>spathulata</i>, <i>Cratystylis conocephala</i> open/low open shrubland on low rises and plains. • <i>Acacia quadrimarginea</i>, <i>Acacia</i>. sp. narrow phyllode tall open shrubland with scattered <i>Eucalyptus websteriana</i> subsp. <i>websteriana</i> over <i>Dodonaea microzyga</i>, <i>D. lobulata</i>, <i>Prostanthera grylloana</i> open/low open shrubland over isolated tussock grasses on rocky hills. • <i>Eremophila glabra</i> var. <i>glabra</i>, <i>Dodonaea viscosa</i>, <i>Scaevola spinescens</i> sparse shrubland over <i>Tecticornia</i> spp., <i>Frankenia</i> spp., <i>Atriplex vesicaria</i>, <i>Maireana sedifolia</i> low open shrubs on saline plains. This vegetation association can have isolated overstory taxa of <i>Callitris columellaris</i> and <i>Melaleuca lateriflora</i>. • Highly disturbed/cleared areas such as old mining areas e.g. Sophia pit. These areas have few native species present (primarily disturbance response species). <p>Desktop searches of the EPBC Act PMST (DotE 2014) and DPaW's NatureMap database identified the presence/potential presence of nine conservation significant flora species within 10 km of the Project area. This includes:</p> <ul style="list-style-type: none"> • Two EPBC Act-listed taxa • Two Priority 1 taxa • Four Priority 3 taxa • One Priority 4 taxon
2014	Level 1 flora and fauna survey of the proposed Lake Cowan haul road NVS (2014)	NVS	Six vegetation groups were recorded: <ul style="list-style-type: none"> • Transitional <i>Eucalyptus</i> Woodland Community • Mixed <i>Eucalyptus</i> woodland over <i>sclerophyll shrubland</i> • <i>Acacia</i> sp. narrow <i>phyllode</i> over mixed <i>sclerophyll shrubland</i>

Year	Report Title	Company	Summary
			<p>A total of 94 species from 25 families were recorded within the survey area. No weed species were recorded within the survey area.</p> <p>No DRF or Priority Flora were recorded in the survey area.</p>
2021	<p>Detailed Vegetation and Flora Survey of Lake Cowan Mining Centre and Harkonnen Areas for Karora Resources, Including a Targeted Survey for <i>Frankenia georgei</i>. JB (2021)</p>	Jenny Borger Consulting	<p>Twelve vegetation types and four sub-types were described and mapped for LCMC and Harkonnen survey areas. Two other types – claypans (with no vegetation) and cleared areas (degraded) are also mapped.</p> <ul style="list-style-type: none"> • <i>Eucalyptus salubris</i>, <i>E. salmonophloia</i>, <i>E. oleosa</i> woodland over <i>Santalum acuminatum</i>, <i>Eremophila scoparia</i>, <i>Exocarpos aphyllus</i> open shrubland over <i>Cratystylis conocephala</i>, <i>Olearia muelleri</i>, <i>Atriplex vesicaria</i>, <i>Santalum acuminatum</i> low open shrubland • <i>Eucalyptus griffithsii</i>, <i>Myoporum platycarpum</i> subsp. <i>platycarpum</i> open woodland over <i>Eremophila scoparia</i>, <i>E. oppositifolia</i> subsp. <i>angustifolia</i>, <i>Myoporum platycarpum</i> subsp. <i>platycarpum</i>, <i>Acacia hemiteles</i> sparse shrubland over <i>Atriplex vesicaria</i>, <i>A. nummularia</i>, <i>Scaevola spinescens</i> low sparse shrubland with <i>Melaleuca sheathiana</i> patches • <i>Eucalyptus salubris</i>, <i>E. salmonophloia</i>, <i>E. oleosa</i> woodland over <i>Santalum acuminatum</i>, <i>Eremophila scoparia</i>, <i>Exocarpos aphyllus</i> open shrubland over <i>Cratystylis conocephala</i>, <i>Olearia muelleri</i>, <i>Atriplex vesicaria</i>, <i>Santalum acuminatum</i> low open shrubland • <i>Eucalyptus griffithsii</i>, <i>Myoporum platycarpum</i> subsp. <i>platycarpum</i> open woodland over <i>Eremophila scoparia</i>, <i>E. oppositifolia</i> subsp. <i>angustifolia</i>, <i>Myoporum platycarpum</i> subsp. <i>platycarpum</i>, <i>Acacia hemiteles</i> sparse shrubland over <i>Atriplex vesicaria</i>, <i>A. nummularia</i>, <i>Scaevola spinescens</i> low sparse shrubland with <i>Melaleuca sheathiana</i> patches • <i>Eucalyptus griffithsii</i>, <i>E. lesouefii</i>, <i>E. salubris</i> low woodland over <i>Acacia acuminata</i> tall shrubland over <i>Eremophila ionantha</i>, <i>Senna artemisioides</i> subsp. <i>filifolia</i>, <i>Dodonaea viscosa</i> subsp. <i>angustissima</i> shrubland over <i>Atriplex codonocarpa</i>, <i>A. vesicaria</i> low open shrubland • <i>Eucalyptus griffithsii</i> low open woodland over <i>Acacia quadrimarginea</i>, <i>Acacia tetragonophylla</i> tall open shrubland over <i>Dodonaea lobulata</i>, <i>Acacia quadrimarginea</i>, <i>Eremophila decipiens</i> subsp. <i>decipiens</i>, <i>Acacia tetragonophylla</i>, <i>Senna artemisioides</i> subsp. <i>filifolia</i> open shrubland over <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>, <i>Atriplex vesicaria</i> low isolated ferns and low shrubs • <i>Eucalyptus lesouefii</i>, <i>Melaleuca sheathiana</i> open forest over <i>Santalum acuminatum</i>, <i>Bossiaea culcullata</i>, <i>Melaleuca sheathiana</i> low open woodland over <i>Scaevola spinescens</i>, <i>Santalum acuminatum</i>, <i>Myoporum platycarpum</i> subsp.

Year	Report Title	Company	Summary
			<p><i>platycarpum</i>, <i>Acacia hemiteles</i> sparse shrubland over <i>Ptilotus obovatus</i>, <i>Olearia</i> sp. <i>Eremicola</i>, <i>Myoporum platycarpum</i> subsp. <i>platycarpum</i>, <i>Scaevola spinescens</i>, <i>Rhagodia drummondii</i> low open shrubland</p> <ul style="list-style-type: none"> • <i>Eucalyptus virella</i> (9 – 12 m) open woodland over <i>Eremophila scoparia</i> open shrubland over <i>Eremophila scoparia</i>, <i>Exocarpos aphyllus</i>, <i>Olearia muelleri</i>, <i>Atriplex vesicaria</i>, <i>Cratystylis conocephala</i> low open shrubland • <i>Acacia acuminata</i>, <i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> low open forest or tall shrubland over <i>Ptilotus aervoides</i>, <i>Solanum lasiophyllum</i>, <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>, <i>Euphorbia drummondii</i>, <i>Solanum hoplopetalum</i> low isolated forbs and shrubs <i>Westringia rigida</i> low shrubs were present in the broader area but many were dead • <i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> isolated mallee trees over <i>Acacia acuminata</i>, <i>Eremophila alternifolia</i> tall sparse shrubland over <i>Acacia acuminata</i>, <i>Eremophila alternifolia</i>, <i>Atriplex nummularia</i>, <i>Senna artemisioides</i> subsp. <i>filifolia</i> sparse shrubland over <i>Maireana sedifolia</i>, <i>Senna artemisioides</i> subsp. <i>filifolia</i> low isolated shrubs over <i>Streptoglossa liatroides</i>, <i>Ptilotus exaltatus</i>, <i>Sida</i> sp., grass tussocks (grazed), <i>Sclerolaena diacantha</i> low open forbland • <i>Myoporum platycarpum</i> subsp. <i>platycarpum</i> isolated low trees over <i>Cratystylis subspinescens</i>, <i>Senna artemisioides</i> subsp. <i>filifolia</i>, <i>Scaevola spinescens</i>, <i>Eremophila scoparia</i>, <i>Lycium australe</i> open shrubland over <i>Maireana sedifolia</i>, <i>Senna artemisioides</i> subsp. <i>filifolia</i>, <i>Cratystylis subspinescens</i>, <i>Atriplex vesicaria</i>, <i>Westringia rigida</i> low open shrubland • <i>Rhagodia drummondii</i>, <i>Eremophila scoparia</i>, <i>E. alternifolia</i>, <i>Exocarpos aphyllus</i>, <i>Dodonaea viscosa</i> subsp. <i>angustissima</i> isolated shrubs over <i>E. scoparia</i>, <i>E. decipiens</i> subsp. <i>decipiens</i>, <i>Rhagodia drummondii</i>, <i>Maireana amoena</i>, <i>Atriplex vesicaria</i> low open chenopod shrubland over <i>Frankenia glomerata</i>, <i>F. cinerea</i>, <i>F. pauciflora</i>, <i>Maireana glomerifolia</i>, <i>M. amoena</i>, <i>Tecticornia triandra</i> low shrubland • <i>Callitris columellaris</i> low open woodland over <i>Dodonaea viscosa</i> subsp. <i>angustissima</i>, <i>Bossiaea culcullata</i>, <i>Lycium australe</i> open shrubland over <i>Maireana amoena</i>, <i>Lycium australe</i>, <i>Atriplex vesicaria</i>, <i>Olearia</i> sp. <i>Eremicola</i>, <i>Frankenia glomerata</i> P4, <i>F. pauciflora</i> low open shrubland • <i>Dodonaea viscosa</i> subsp. <i>angustissima</i>, <i>Santalum spicatum</i>, <i>Callitris columellaris</i>, <i>Acacia collegialis</i> tall sparse shrubland over <i>Dodonaea viscosa</i> subsp. <i>angustissima</i>, <i>Olearia</i> sp. <i>Eremicola</i>, <i>Alyxia buxifolia</i>, <i>Scaevola spinescens</i>, <i>Ptilotus obovatus</i>, <i>Exocarpos aphyllus</i>, <i>Eremophila alternifolia</i>, <i>E. glabra</i> subsp. <i>glabra</i> open shrubland over <i>Dodonaea viscosa</i> subsp. <i>angustissima</i>, <i>Frankenia glomerata</i>, <i>Ptilotus obovatus</i>, <i>Grevillea acuaria</i>, <i>Olearia</i> sp. <i>Eremicola</i>, <i>Rhagodia</i>

Year	Report Title	Company	Summary
			<p><i>drummondii</i>, <i>Maireana amoena</i>, <i>Frankenia pauciflora</i>, <i>Atriplex vesicaria</i>, <i>Maireana glomerifolia</i>, low sparse shrubland</p> <ul style="list-style-type: none"> • <i>Melaleuca lateriflora</i> sparse to open shrubland over <i>Frankenia glomerata</i>, <i>F. pauciflora</i>, <i>Maireana glomerifolia</i>, <i>Frankenia cinerea</i>, <i>Eremophila ionantha</i>, <i>Grevillea acuaria</i>, <i>Tecticornia triandra</i>, <i>T. pergranulata</i>, <i>Disphyma crassifolium</i> low sparse shrubland • <i>Frankenia pauciflora</i>, <i>F. cinerea</i>, <i>Tecticornia halocnemoides</i> subsp. <i>halocnemoides</i>, <i>T. disarticulata</i> low sparse shrubland • <i>Acacia hemiteles</i>, <i>Frankenia glomerata</i>, <i>Tecticornia syncarpa</i>, <i>Santalum spicatum</i>, <i>Frankenia cinerea</i> (lower edges, channel), <i>F. pauciflora</i>, <i>Heliotropium curassavicum</i> low open shrubland <p>94 taxa were recorded from the LCMC survey area from 27 families and 47 genera, with the most diverse families being Chenopodiaceae (19 species from 8 genera), Scrophulariaceae (11 species from 2 genera), Fabaceae (9 species from 4 genera) and Myrtaceae (9 species from 2 genera).</p> <p>Three priority species were recorded – <i>Calandrinia lefroyensis</i> P1 (LCMC), <i>Frankenia glomerata</i> P4 (LCMC and Harkonnen) and <i>Ptilotus rigidus</i> P1 (LCMC). <i>F. glomerata</i> is locally abundant in the southern areas of LCMC.</p>
2024	Targeted Priority Flora Survey of LCMC JB (2024)	Jenny Borger Consulting	<p>Full report yet to be published. Population of <i>F. glomerata</i> estimated at over 12,000 plants in the area. Priority flora has been mapped with the following species recorded in the NVCP amendment area:</p> <ul style="list-style-type: none"> • <i>Calandrinia lefroyensis</i> (P1) • <i>Ptilotus rigidus</i> (P1) • <i>Frankenia glomerata</i> (P4) • <i>Santalum spicatum</i> (no rating)

2.8 TERRESTRIAL FAUNA

The HGO region has been covered by nine fauna surveys that have been conducted over a 14 year period. The combined fauna survey coverage approximates the vegetation survey areas at HGO (Figure 7). Fauna records were also reviewed at part of the GHD Lake Cowan Project Area Desktop Assessment (2014). Information from these fauna surveys is provided in Table 4 and summarised briefly below:

- As reviewed in Terrestrial Ecosystems for in the Eundynie report (Terrestrial Ecosystems 2019), dozens of fauna surveys have been conducted in the HGO locality and regionally. The accumulated data is considered as being adequate to assess which vertebrate fauna would occur in the HGO region and the potential impacts on fauna from mining.
- The large number of local and regional surveys provides an accurate representation of the assemblages of conservation significant species that could occur in the HGO region.
- Most of the regionally listed conservation significant species that appear in database searches have a low probability of occurring in the HGO region based on a lack of local and/or recent occurrence records, and poor habitat suitability.
- As the potential impact area is small relative to the undisturbed similar habitat in the adjacent areas and the broader region, the probability of significantly impacting on conservation listed species is low.
- A search of DPaW's NatureMap was undertaken for the LCMC by GHD (2014). The NatureMap records indicate that 50 birds, 27 reptiles, 1 amphibian and 5 mammals and have been recorded within 10 km of the Project area
- Most of the conservation significant species are mobile and have to ability to move away from areas being cleared.

On the basis of the above dot points and the many surveys conducted nearby, clearing associated with the LCMC project is considered as having a low probability of significantly impacting on conservation significant species.

1.1.1 Vertebrate Conservation Significant Fauna

As discussed in the Terrestrial Ecosystem reports, the following taxa could potentially occur in the HGO region:

- Malleefowl – *BC Act 2016* and *EPBC Act 1999* Threatened (Vulnerable).
- Western Rosella (inland) - Priority 3 DBCA. Not *EPBC Act 1999* listed.
- Central Long-eared Bat - Priority 3 DBCA. Not *EPBC Act 1999* listed.
- Oriental Plover - *BC Act 2016* Migratory. *EPBC Act 1999* Marine and Migratory.
- Fork-tailed Swift - *BC Act 2016* Migratory. *EPBC Act 1999* Marine and Migratory.
- Peregrine Falcon – Other specially protected fauna *BC Act 2016*. Not *EPBC Act 1999* listed. Southern Death Adder – Priority 3 DBCA. Not *EPBC Act 1999* listed.

Table 4: Summary information for the fauna surveys conducted in the HGO region

* = no longer conservation listed by DBCA.

Year	Report Title	Company	Summary
2006	<p>Vertebrate Fauna Assessment Avoca Resources, Version 1. October 2006, Report No: 2006/209. Prepared for Avoca Resources / Jim's Seeds, Weeds and Trees by ATA Environmental, October 2006.</p> <p>ATA Environmental (2006)</p>	ATA Environmental	<p>Same area as vegetation survey "HGO North JWST 2006", refer to Figure 6. A Level 1 survey was undertaken that drew upon numerous other regional surveys. The survey area is just north of the NVCP amendment.</p> <p>A single fauna habitat was reported that was described as "open Eucalypt Woodland with a chenopod and acacia shrubland understorey.</p> <p>The desktop review listed a possible 154 bird species, 39 mammal species and 49 species of reptiles.</p> <p>No conservation listed fauna were recorded during the survey although the following species were considered as having possibility of using the project area:</p> <ul style="list-style-type: none"> • Malleefowl – <i>BC Act 2016</i> and <i>EPBC Act 1999</i> Threatened (Vulnerable). • Slender-billed Thornbill* – Currently not conservation listed by DBCA. Not <i>EPBC Act 1999</i> listed. • Rainbow Bee-eater* - Currently not conservation listed by DBCA. <i>EPBC Act 1999</i> Marine. • Bush Stone Curlew* - Currently not conservation listed by DBCA. Not <i>EPBC Act 1999</i> listed. • Australian Bustard* - Currently not conservation listed by DBCA. Not <i>EPBC Act 1999</i> listed. • Crested bellbird* - Currently not conservation listed by DBCA. Not <i>EPBC Act 1999</i> listed. • Peregrine Falcon – Other specially protected fauna <i>BC Act 2016</i>. Not <i>EPBC Act 1999</i> listed. • Shy Heathwren* - Currently not conservation listed by DBCA. Not <i>EPBC Act 1999</i> listed. • White-browed Babbler* - Currently not conservation listed by DBCA. Not <i>EPBC Act 1999</i> listed. • Fork-tailed Swift - <i>BC Act 2016</i> Migratory. <i>EPBC Act 1999</i> Marine and Migratory. • Carpet Python* - Currently not conservation listed by DBCA. Not <i>EPBC Act 1999</i> listed.

Year	Report Title	Company	Summary
			<ul style="list-style-type: none"> Greater Long-eared Bat* - Not listed under NatureMap for WA. <i>EPBC Act 1999</i> Threatened (Vulnerable) (occurs in the Eastern States). <p>It should be noted that many of the above species from 2006 denoted by the asterisk (*) are no longer conservation listed by DBCA in 2020.</p> <p>ATA Environmental's assessment is that the proposed clearing of this site is unlikely to have any significant impact on the overall conservation status of these species due to individual mobility and many square kilometres of similar habitat in the adjacent area. This ecosystem was considered a having no special conservation significance as it common locally (on the presumption and subject to no Malleefowl occurring in the area).</p>
2010	Avoca Resources Limited, Report for Higginsville Project Area, Desktop Biological Assessment and Broad Scale Vegetation Mapping, February 2010. Unpublished report prepared for Avoca Resources Limited. GHD (2010)	GHD	<p>The broadscale survey area is displayed in Figure 19.</p> <p>No threatened fauna species were recorded in the survey area (1 day on site).</p> <p>The vegetation structure within the survey area was largely intact, giving it good habitat value.</p> <p>Habitats present within the survey area were consistent with those recorded for similar eucalypt woodlands in the region. The majority of the project area is surrounded by relatively unaltered vegetation and is not considered to contain any significant breaks to habitat linkages.</p>
2012	Honey Possum (<i>Tarsipes rostratus</i>) Habitat Assessment, Version 2. Unpublished report prepared for Alacer Gold Corporation, March 2012. Harewood (2012)	Greg Harewood	<p>The objective was to determine the likelihood of honey possums (<i>Tarsipes rostratus</i>) actually being present in the HGO area and to identify any issues relating to potential impacts on its conservation status from mining and exploration activities.</p> <p>The results suggest that the species is unlikely to be found in the HGO area despite previous reports of its presence. This conclusion was based on:</p> <ul style="list-style-type: none"> HGO is 136km north of the closest "official" documented location. The HGO vegetation and landforms do not match the documented habitat requirements of the Honey Possum. Previous reports of its occurrence in the area could well have been due to misidentification with the Pygmy Possum.
2014	Lake Cowan Project Area, Desktop Assessment and Broadscale Mapping GHD (2014)	GHD	<p>A search of DPaW's NatureMap was undertaken for the Project area. The NatureMap records indicate that 50 birds, 27 reptiles, 1 amphibian and 5 mammals and have been recorded within 10 km of the Project area.</p>

Year	Report Title	Company	Summary
2015	<p>Level 1 Vertebrate Fauna Risk Assessment for the Baloo Project Area. Unpublished report for Polar Metals Pty Ltd, June 2015.</p> <p>Terrestrial Ecosystems (2015a)</p>	Terrestrial Ecosystems	<p>A Level 1 survey was undertaken over the same area as the NVS Baloo flora and vegetation survey (NVS 2015a), refer to Figure 6.</p> <p>The Baloo fauna survey data was assessed in conjunction with 15 other surveys in the bioregion with the conclusion that there is sufficient information to provide an adequate indication of the fauna assemblages likely to be encountered in the project area. These datasets were considered as being adequate to assess potential impacts on the vertebrate fauna potentially found in the project area.</p> <p>There were four broad fauna habitats in the project area:</p> <ul style="list-style-type: none"> • <i>Tecticornia</i> low dense shrubland. • Sclerophyll shrubland. • Mixed <i>Eucalyptus</i> woodland over mixed sclerophyll shrubland with a sparse understory. • Sclerophyll and chenopod shrubland <p>Fauna habitat condition for most of the project area is good to very good. The project area currently does not provide any important ecological linkages or fauna movement corridors.</p> <p>The desktop review listed a possible 127 bird species, 37 mammal species, 94 species of reptiles and 9 amphibian species.</p> <p>No conservation significant vertebrate fauna were assessed as likely to be significantly impacted by the potential development on the basis of:</p> <ul style="list-style-type: none"> • As the potential impact area is small relative to the available similar habitat in the adjacent areas and the broader region, therefore the probability of significantly impacting on any of these species is low. • Low probability of many conservation significant species occurring in the project area. • Ability of conservation significant species that could occur in the project area of moving away from areas being cleared. <p>There was a very low possibility that the area supports the following conservation significant species (conservation listed in 2015):</p> <ul style="list-style-type: none"> • Carpet Python*. • Southern Death Adder – Priority 3 DBCA. Not <i>EPBC Act 1999</i> listed. • Major Mitchell's Cockatoo*.

Year	Report Title	Company	Summary
			<ul style="list-style-type: none"> • Western Rosella (inland) - Priority 3 DBCA. Not <i>EPBC Act 1999</i> listed. • Peregrine Falcon. • Bush Stone-curlew*. • Australian Bustard*. • Malleefowl. • Fork-tailed Swift. • Great Egret* - Currently not conservation listed by DBCA. <i>EPBC Act 1999</i> Marine. • Cattle Egret* - Currently not conservation listed by DBCA. <i>EPBC Act 1999</i> Marine. <p>The potential impact on any of these species was assessed as low on the basis of their unlikely occurrence in the project area.</p> <p>The following conservation significant species could occur in the project area but are likely to readily move once vegetation clearing commences, so any impacts would be insignificant:</p> <ul style="list-style-type: none"> • Crested Bellbird*. • Shy Heathwren*. • Rainbow Bee-eater. <p>The Hooded Plover (Priority 4 DBCA, <i>EPBC Act 1999</i> Marine) may potentially inhabit the shore of Lake Cowan during flood events, so appropriate management strategies would need to be implemented during these periods. All other avian species potentially found in the project area are mobile and will readily move to adjacent areas if disturbed.</p> <p>An impact summary was provided in the report that stated:</p> <ul style="list-style-type: none"> • “Based on the available information, it is Terrestrial Ecosystems’ view that clearing of the vegetation to establish a small mine site and upgrade existing access tracks, and construct a haul road will not significantly impact on conservation significant species listed under the Commonwealth <i>EPBC Act 1999</i> or WA <i>Wildlife Conservation Act 1950</i>. Fauna will be lost during the clearing process, but this impact is unlikely to be significant, as similar fauna habitat supporting similar fauna assemblages are abundant in adjacent areas.”
2015	Level 1 Vertebrate Fauna Risk Assessment for the Fairplay Pit and Waste Landform Expansion and	Terrestrial Ecosystems	A Level 1 survey was undertaken over the same area as the NVS Fairplay flora and vegetation survey (NVS 2015b), refer to Figure 6. The results were similar to the Baloo fauna survey, see above.

Year	Report Title	Company	Summary
	<p>Development. Unpublished report for Native Vegetation Solutions on behalf of Metals X limited, July 2015.</p> <p>Terrestrial Ecosystems (2015b)</p>		<p>Fauna survey data from other projects in the bioregion were reviewed and provided an adequate indication of the fauna assemblages likely to be encountered in the project area. These datasets were considered adequate to assess potential impacts on the vertebrate fauna potentially found in the project area.</p> <p>The project area has been degraded by previous exploration and mining activity and has numerous exploration tracks. The project area had a single fauna habitat of mixed eucalyptus woodland over mixed sclerophyll shrubland with or without chenopods with a sparse understory that was assessed as in poor to good condition. The project area currently does not provide any important ecological linkages or fauna movement corridors.</p> <p>The desktop review listed a similar assemble to that of the Baloo (127 birds, 37 mammal, 92 reptiles and 9 amphibians).</p> <p>No conservation significant vertebrate fauna were assessed as likely to be significantly impacted by vegetation clearing within the project area.</p> <p>There is a very low possibility that the project area supports:</p> <ul style="list-style-type: none"> • Carpet Python*. • Southern Death Adder. • Major Mitchell’s Cockatoo*. • Western Rosella (inland). • Peregrine Falcon. • Bush Stone-curlew* • Australian Bustard*. • Malleefowl. • Fork-tailed Swift. • Great Egret*. • Cattle Egret*. <p>The following conservation significant species could occur in the project area but are likely to readily move once vegetation clearing commences, so any impacts would be insignificant:</p> <ul style="list-style-type: none"> • Crested Bellbird*. • Shy Heathwren*. • Rainbow Bee-eater*.

Year	Report Title	Company	Summary
			<p>All other conservation listed avian species potentially found in the project area are mobile and will readily move to adjacent areas if disturbed.</p> <p>As the proposed impact area is small relative to the available similar habitat in the adjacent areas and the broader region, the probability of significantly impacting on any conservation significant species is low</p> <p>The same impact summary as for Baloo was given:</p> <ul style="list-style-type: none"> • “Based on the available information, it is Terrestrial Ecosystems’ view that clearing of the vegetation for exploration or development will not significantly impact on conservation significant species listed under the Commonwealth <i>EPBC Act 1999</i> or WA <i>Wildlife Conservation Act 1950</i>. Fauna will be lost during the clearing process, but this impact is unlikely to be significant, as similar fauna habitat supporting similar fauna assemblages are abundant in adjacent areas.”
2017	<p>Level 1 Vertebrate Fauna Risk Assessment for the proposed Higgsinsville infrastructure corridor development. Unpublished report for Native Vegetation Solutions on behalf of Westgold Resources Limited, Version 3, July 2017.</p> <p>Terrestrial Ecosystems (2017a)</p>	Terrestrial Ecosystems	<p>A Level 1 survey was undertaken over the same area as the NVS Two Boys Fairplay flora and vegetation survey (NVS 2017b), refer to Figure 6. The results were similar to the previous two Terrestrial Ecosystems surveys (Baloo and Fairplay, see above).</p> <p>Fauna survey data from other projects in the bioregion provided an adequate indication of the fauna assemblages likely to be encountered in the project area. These datasets were adequate to assess potential impacts on the vertebrate fauna potentially found in the project area and a Level 2 vertebrate fauna survey was not considered as being required.</p> <p>The project area had two broad fauna habitat types:</p> <ul style="list-style-type: none"> • Mixed <i>Eucalyptus</i> woodland over mixed chenopod and sclerophyll scrubland. • Low <i>Eucalyptus</i> woodland over dense sclerophyll scrubland. <p>Fauna habitats in the project area are rated as degraded to good. The project area currently does not provide any important ecological linkages or fauna movement corridors. The desktop review listed a possible 117 bird species, 36 mammal species, 95 species of reptiles and 9 amphibian species</p> <p>No conservation significant vertebrate fauna were assessed as likely to be significantly impacted by the proposed development.</p> <p>There is a very low possibility that the project area supports:</p> <ul style="list-style-type: none"> • Southern Death Adder. • Western Rosella (inland). • Peregrine Falcon.

Year	Report Title	Company	Summary
			<ul style="list-style-type: none"> • Malleefowl. • Fork-tailed Swift. • Great Egret*. <p>The Rainbow Bee-eater may potentially inhabit the project area on a seasonal basis but are unlikely to be significantly impacted by further vegetation clearing. All other conservation listed avian species potentially found in the project area are mobile and will readily move to adjacent areas if disturbed. As the proposed impact area is small relative to the available similar habitat in the adjacent areas and the broader region, the probability of significantly impacting on any of these species is low.</p> <p>The same impact summary as for Baloo and Fairplay (above) was given:</p> <ul style="list-style-type: none"> • “Based on the available information, it is Terrestrial Ecosystems’ view that clearing of the vegetation for exploration or development will not significantly impact on conservation significant species listed under the Commonwealth <i>EPBC Act 1999</i> or WA <i>Wildlife Conservation Act 1950</i>. Fauna will be lost during the clearing process, but this impact is unlikely to be significant, as similar fauna habitat supporting similar fauna assemblages are abundant in adjacent areas.”
2017	<p>Level 1 Vertebrate Fauna Risk Assessment for the proposed Mitchell project area. Unpublished report for Native Vegetation Solutions on behalf of Westgold Resources Limited, Version 2, May 2017.</p> <p>Terrestrial Ecosystems (2017b)</p>	Terrestrial Ecosystems	<p>A Level 1 survey was undertaken over the same area as the NVS Mitchell flora and vegetation survey (NVS 2017a), refer to Figure 6. The results were similar to the previous Terrestrial Ecosystems surveys (Baloo, Fairplay and Two Boys, see above).</p> <p>Fauna survey data from other projects in the bioregion provided an adequate indication of the fauna assemblages likely to be encountered in the project area. These datasets were adequate to assess potential impacts on the vertebrate fauna potentially found in the project area and a Level 2 vertebrate fauna survey was not considered as being required.</p> <p>The project area had two broad fauna habitat types:</p> <ul style="list-style-type: none"> • Mixed <i>Eucalyptus</i> woodland over mixed chenopod and sclerophyll scrubland. • Low <i>Eucalyptus</i> woodland over dense sclerophyll scrubland. <p>Fauna habitats in the project area are rated as degraded to good. The project area currently does not provide any important ecological linkages or fauna movement corridors with the exception that mining pits and waste dumps provide a movement barrier for small vertebrates.</p> <p>The desktop review listed a possible 126 bird species, 36 mammal species, 91 species of reptiles and 9 amphibian species</p>

Year	Report Title	Company	Summary
			<p>No conservation significant vertebrate fauna were assessed as likely to be significantly impacted by the proposed development.</p> <p>There is a very low possibility that the project area supports:</p> <ul style="list-style-type: none"> • Southern Death Adder. • Western Rosella (inland). • Peregrine Falcon. • Malleefowl. • Fork-tailed Swift. <p>The Rainbow Bee-eater may potentially inhabit the project area on a seasonal basis but are unlikely to be significantly impacted by further vegetation clearing.</p> <p>Terrestrial Ecosystems concluded that there is a very low possibility that the area supports Southern Death Adder, Western Rosella, Peregrine Falcon, Malleefowl and the Fork-tailed Swift. The Rainbow Bee-eater* is probably in the area on a seasonal basis. All avian species potentially found in the project area are mobile and will readily move to adjacent areas if disturbed. As the proposed impact area is small relative to the available similar habitat in the adjacent areas and the broader region, the probability of significantly impacting on any of these species is low.</p> <p>The same impact summary as with the previous Terrestrial Ecosystems reports was provided</p> <ul style="list-style-type: none"> • “Based on the available information, it is Terrestrial Ecosystems’ view that clearing of the vegetation for exploration or development will not significantly impact on conservation significant species listed under the Commonwealth <i>EPBC Act 1999</i> or WA <i>Wildlife Conservation Act 1950</i>. Fauna will be lost during the clearing process, but this impact is unlikely to be significant, as similar fauna habitat supporting similar fauna assemblages are abundant in adjacent areas.”
2018	Level 1 Vertebrate Fauna Risk Assessment for the proposed Higginsville powerline. Unpublished report for Native Vegetation Solutions on behalf of Westgold Resources Limited, Version 1, January 2018.	Terrestrial Ecosystems	<p>A Level 1 survey was undertaken over the same area as the NVS Redcross Powerline flora and vegetation survey (NVS 2018), refer to Figure 6. The results were similar to the previous Terrestrial Ecosystems surveys (see above).</p> <p>Fauna survey data from other projects in the bioregion provided an adequate indication of the fauna assemblages likely to be encountered in the project area. These datasets were adequate to assess potential impacts on the vertebrate fauna potentially found in the project area and a Level 2 vertebrate fauna survey was not considered as being required.</p> <p>The project area had five broad fauna habitat types:</p>

Year	Report Title	Company	Summary
	Terrestrial Ecosystems (2018)		<ul style="list-style-type: none"> • Open eucalypt woodland over chenopods, mostly on a red clayey substrate. • Open eucalypt woodland over low shrubs on a stony, red clayey substrate. • Open eucalypt woodland over tall shrubs mostly on a stony red clay soils. • Low trees with limited understorey of shrubs on red clayey substrate. • Low trees with a dense understorey of low shrubs on red clayey and often stony substrate. <p>Fauna habitats in the project area are rated as good with small patches of disturbance. The project area currently does not provide any important ecological linkages or fauna movement corridors with the exception that mining pits and waste dumps provide a movement barrier for small vertebrates.</p> <p>The desktop review listed a possible 129 bird species, 36 mammal species, 82 species of reptiles and 9 amphibian species</p> <p>No conservation significant vertebrate fauna were assessed as likely to be significantly impacted by the proposed development.</p> <p>There is a very low possibility that the project area supports:</p> <ul style="list-style-type: none"> • Southern Death Adder. • Western Rosella (inland). • Peregrine Falcon. • Malleefowl. • Fork-tailed Swift. <p>The Rainbow Bee-eater* may potentially inhabit the project area on a seasonal basis but are unlikely to be significantly impacted by further vegetation clearing.</p> <p>As with the previous Mitchell report, Terrestrial Ecosystems concluded that there is a very low possibility that the area supports Southern Death Adder, Western Rosella, Peregrine Falcon, Malleefowl and the Fork-tailed Swift. The Rainbow Bee-eater* is probably in the area on a seasonal basis. All avian species potentially found in the project area are mobile and will readily move to adjacent areas if disturbed.</p> <p>The same impact summary as with the previous Terrestrial Ecosystems reports was provided</p> <ul style="list-style-type: none"> • “Based on the available information, it is Terrestrial Ecosystems’ view that clearing of the vegetation for exploration or development will not significantly impact on conservation significant species listed under the Commonwealth <i>EPBC Act 1999</i> or

Year	Report Title	Company	Summary
			<p>WA <i>Wildlife Conservation Act 1950</i>. Fauna will be lost during the clearing process, but this impact is unlikely to be significant, as similar fauna habitat supporting similar fauna assemblages are abundant in adjacent areas.”</p>
2019	<p>Level 1 Vertebrate Fauna Risk Assessment for the Eundynie Project. Unpublished report for Native Vegetation Solutions on behalf of RNC Minerals Limited, Version 1, July 2019.</p> <p>Terrestrial Ecosystems (2019)</p>	<p>Terrestrial Ecosystems</p>	<p>A Level 1 survey was undertaken over the same area as the NVS Eundynie flora and vegetation survey (NVS 2019a), refer to Figure 6. The Eundynie survey area was a small extension south from the Baloo area. The results were similar to the Baloo survey (see above) with the difference being that many of the species listed in Baloo were no longer conservation significant.</p> <p>Fauna survey data from other HGO project areas and in the bioregion in general provided an adequate indication of the fauna assemblages likely to be encountered in the project area. These datasets were adequate to assess potential impacts on the vertebrate fauna potentially found in the project area and a Level 2 vertebrate fauna survey was not considered as being required.</p> <p>There were three broad fauna habitats identified in the project area:</p> <ul style="list-style-type: none"> • Open Salmon Gum woodland over sparse chenopods. • Eucalypt woodland over mixed shrubland and chenopod over scattered grasses of varying densities on a sandy-clay substrate. • Mixed sclerophyll shrubland. <p>No threatened ecological fauna communities were identified in the project area. The fauna habitat quality varies from degraded to good with the more degraded areas due to historical and recent exploration activity. As much of the project area has been highly disturbed by previous mining or exploration activity, the vertebrate fauna assemblage would have been depleted. The area has also been grazed by cattle with evident degradation. The project area does not provide an important ecological linkage or fauna movement corridor.</p> <p>The desktop review listed a possible 130 bird species, 36 mammal species, 106 species of reptiles and 9 amphibian species.</p> <p>The following conservation significant fauna were assessed as having a likelihood of occurring in the project area:</p> <ul style="list-style-type: none"> • Malleefowl. • Western Rosella (inland). • Central Long-eared Bat - Priority 3 DBCA. Not <i>EPBC Act 1999</i> listed. • Oriental Plover - <i>BC Act 2016</i> Migratory. <i>EPBC Act 1999</i> Marine and Migratory.

Year	Report Title	Company	Summary
			<ul style="list-style-type: none"> • Fork-tailed Swift. • Peregrine Falcon. <p>No Malleefowl or mounds were recorded in the project area.</p> <p>Terrestrial Ecosystems concluded that that fauna habitats present in the project area are abundant in adjacent areas. It is therefore likely that the fauna assemblage in the project area is similar to the many square kilometres of similar habitat in adjacent areas and the bioregion. And secondly, that the proposed project is unlikely to significantly impact on a conservation significant species</p>

2.9 HERITAGE

A search of the Western Australian Aboriginal Heritage Inquiry System (AHIS) confirmed that no Registered Sites are located on tenements L15/346, M15/351, M15/642, M15/665, M15/1132 and M15/1133. The AHIS search results are provided in Attachment D.

During 2014, an archaeological site assessment was carried out on M15/1132 and L15/346 and the report was prepared for the Goldfields Land and Sea Council by consulting Archaeologist Joe Dortch. The report covered an archaeological site assessment and haul road survey conducted by 4 nominated Ngadju field assistants as well as previous heritage survey reports. Following the 2014 site assessment Metals X then submitted an application to the Minister for Aboriginal Affairs for permission to use the place under the terms of section 18 of the Aboriginal Heritage Act 1972. However the Department of Aboriginal Affairs advised Metals X that, according to the assessment of the Aboriginal Cultural Materials Committee (ACMC), neither place was a site under the terms of s5 of the Act, and therefore no permit was necessary. Despite this advice, Metals X agreed with the Ngadju People to salvage the heritage materials from Site ID No19798 on M15/1132. During May 2015 consulting Archaeologist Joe Dortch, Ngadju representatives and Metals X representatives salvaged heritage materials from the site. The aim of the salvage and site excavation was to provide scientific dating of the stone quarry and promote Ngadju heritage.

Agreements are currently in place between Karora and the native title claimants; the Ngadju People administered by the Ngadju Native Title Aboriginal Corporation (NNTAC). This agreement allows mining operations to continue whilst ensuring the protection and interests of the Ngadju People. Karora conducts heritage surveys with NNTAC prior to any disturbance from mining operations. Ngadju will be consulted for this project and will be invited to conduct a heritage survey over the area before any clearing works commence.

3 STATEMENT AGAINST EACH OF THE 10 CLEARING PRINCIPLES

3.1 PRINCIPLE A

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

The LCMC project area is located in the IBRA Coolgardie 3 - COO03 Eastern Goldfields subregion, described by Cowan (2001) as gently undulating plains on the Yilgarn Craton with calcareous soil being dominant. The subregion supports a diverse eucalypt woodland around the salt lakes, on the low ranges and in the broad valleys and mallee and Acacia thickets and shrub heaths on the plains (Cowan 2001). The sub-region is rich in endemic Acacias. The subregional area is 5,102,428 ha (Cowan 2001).

The project area is part of the Great Western Woodlands, an internationally significant area of biological diversity and the largest remaining area of intact Mediterranean climate woodland on Earth, covering almost 16 million hectares (DEC 2010). It forms a continuous band of native vegetation that extends from the edge of the Wheatbelt through the Goldfields to the Nullarbor Plain. Notwithstanding its biological importance, the Great Western Woodlands occurrence at the LCMC area and immediate surrounds (various HGO mining operations) has been the subject of significant levels of mining and exploration disturbance for >100 years and is not considered as being a good representation intact woodland environment. There is also extensive areas of the Great Western Woodlands under DBCA managed lands.

Broad-scale vegetation mapping was undertaken by GHD in 2014 which included a 15 km x 15 km area over the LCMC. A summary of the key findings from the survey includes:

- Five broad vegetation associations were described within the Project area. Vegetation associations included three *Eucalyptus* low woodland/woodland and two tall/low shrubland associations.
- Desktop searches identified the presence/potential presence of nine conservation significant flora species within 10 km of the Project area. Previous surveys in the area identified a population of *Frankenia georgei* (P1).
- The total species count was a composite from previous surveys and consisted of at least 129 flora species from 25 families.

The second study that covers a portion of the proposed NVCP amendment area (as well as Harkonnen, another nearby prospect) was completed in 2021 by Jenny Borger Consulting. The survey included a detailed vegetation and flora survey of the south western area at the LCMC and a targeted survey for *Frankenia georgei*. The assessment comprised of a desktop review and field survey. A summary of the key findings from the 2021 report are provided below:

- Twelve vegetation types and four sub-types have been described and mapped for LCMC and Harkonnen survey areas. Two other types – claypans (with no vegetation) and cleared areas (degraded) are also mapped
- Most of the vegetation within LCMC and Harkonnen would be described as very good, with minor areas meeting requirements of excellent. Cattle were present during the survey at LCMC with most disturbances along the drainage lines. Historic mining impacts were present within both sites and presented as exploration access tracks and drill sites with some regrowth.

- The targeted survey in LCMC for *Frankenia georgei* found there were no *F. georgei* present, and the extent of the population of *F. glomerata*, which is superficially similar, was extensive. Several images and a few collections were made of *Frankenia* species during the survey to confirm identifications. It is highly likely that *F. glomerata* was misidentified as *F. georgei* in previous surveys.
- *Ptilotus rigidus* (P1) was recorded at one location (10 plants) at LCMC on rocky outcrop adjacent to a saline drainage line. Similar habitat was present in the south west of the survey area, but no plants were found.
- *Calandrinia lefroyensis* (P1) is likely to be quite common in the LCMC area. 18 plants were recorded. Some plants were in flower which made them easy to locate
- No threatened or priority ecological communities are located near the survey area.

The follow up survey conducted by Jenny Borger (2024) determined further populations of the previously recorded priority species in the LCMC area. These have been recorded and mapped.

On the basis of the lack of PECs, TECs and unique or restricted vegetation groups, it is considered that there is sufficient vegetation community knowledge in the LCMC locality to predict that clearing under this amendment will not have any impact on any ecologically significant communities.

Assessed Outcome: Based on the above, the proposed clearing is not at variance with Principle A (biological diversity).

3.2 PRINCIPLE B

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

The HGO locality has extensive fauna surveys that have been conducted over a 14 year period.

The results of the previous surveys in the HGO region are summarised in Table 4. In summary:

- As reviewed in Terrestrial Ecosystems for in the Eundynie report (Terrestrial Ecosystems 2019), 46 fauna surveys have been conducted in the HGO locality and regionally. The accumulated data is considered as being adequate to assess which vertebrate fauna would occur in the HGO area and the potential impacts on fauna from vegetation clearing.
- The large number of local and regional surveys provides an accurate representation of the assemblages of conservation significant species that could occur in the HGO region.
- Most of the regionally listed conservation significant species that appear in database searches have a low probability of occurring in the HGO area based on a lack of local and/or recent occurrence records, and poor habitat suitability.
- As the potential impact area is small relative to the undisturbed similar habitat in the adjacent areas and the broader region, the probability of significantly impacting on conservation listed species is low.

- Most of the conservation significant species are mobile and have the ability to move away from areas being cleared.

On the basis of the above points and the many surveys conducted nearby, clearing associated with the LCMC project is considered as having a low probability of significantly impacting fauna habitat.

Assessed Outcome: Based on the above, the proposed clearing is not at variance with Principle B (significant fauna habitat).

3.3 PRINCIPLE C

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

No rare flora have been recorded in the proposed NVCP amendment footprint.

As discussed under Principle A, there are three priority species that occur in the area, these are:

- *Frankenia glomerata* (P4). The extent of the population of *F. glomerata* is extensive in the LCMC area.
- *Ptilotus rigidus* (P1). Recorded at LCMC on rocky outcrops adjacent to saline drainage lines. Similar habitat was present in the south west of the survey area.
- *Calandrinia lefroyensis* (P1) is likely to be quite common in the LCMC area. Over 18 plants were recorded. Some plants were in flower which made them easy to locate.

Only minor disturbance to *Frankenia glomerata* will occur under the proposed mining operations. It is estimated that over 12,000 individual plants occur in the area of which approximately 110 will be disturbed as part of the mining operation.

No disturbance to P1 species will occur.

Assessed Outcome: Based on the above, the proposed clearing is not at variance with Principle C (existence of rare flora).

3.4 PRINCIPLE D

Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a threatened ecological community

The HGO and LCMC locality has extensive vegetation surveys that have been conducted over a 14 year period, in summary:

- There are no ESAs, DBCA managed lands, TECs or PECs occurring at the NVCP amendment area.
- The buffer for the Fraser Range Vegetation Complex PEC encroaches into the HGO locality. However, NVS has reported that from their site assessments, that the vegetation groups within the HGO survey areas did not match the DBCA description of the Fraser Range Vegetation Complex.
- The absence of PECs and TECs is corroborated by the “data.wa” WMS Server. There are no TECs or PECs within 49km of HGO (Data WA 2022).

Assessed Outcome: Based on the above, the proposed clearing is not at variance with Principle D (conservation areas).

3.5 PRINCIPLE 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

As discussed in section 2.7, most of the LCMC area is mapped as Pre-European vegetation type Binneringie – 9 which is described as medium woodland; coral gum (*Eucalyptus torquata*) and Goldfield's blackbutt (*E. lesouefii*), also some medium woodland – *E. transcontinentalis* and *E. flocktoniae*. The mapped extent of Binneringie – 9 was 240,509 (state wide/ Coolgardie Bioregion) ha of which 235,161 ha remains (97.78 %) in the bioregion and 229757 ha (97.75 %) within the Eastern Goldfields subregion and is ranked as least concern. A minor area of LCMC is mapped as Binneringie 125 – bare areas, salt lakes. The mapped extent of Binneringie 125 was 3485786 ha (state wide) and 303090 ha within the Eastern Goldfields subregion of which 300445.92 ha (99.13 %) remains and ranked as least concern.

Sub-association 9 vegetation located in the NVCP amendment area, post-clearing, is considered minimal and would be well above the 30% risk threshold.

Assessed Outcome: Based on the above, the proposed clearing is not at variance with Principle D (remnant areas).

3.6 PRINCIPLE F

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

The surface hydrology is discussed in Section 2.5 and displayed in Figure 6.

A drainage line is located within the central of the project area and is only likely to flow towards Lake Cowan following major rainfall events. Sheetflow may also occur on the alluvial plains adjacent to the salt lake system following periods of heavy rainfall. There are no major watercourses or wetlands in the NVCP amendment area.

All mining areas have internal catchments confined by drains and bunds such that incident rainfall and spillages are contained to within the site or managed with via settlement dams for runoff overflow. Runoff and drainage generated within mining areas is controlled to minimise the impact on local surface water flows and is considered during the design and planning phase of infrastructure. The natural drainage of the landscape will be considered during the design of the TSF and avoided or mitigated with appropriate controls as required to ensure both the infrastructure is protected and natural drainage is controlled and re-instated as necessary.

Lake Cowan is one of the larger lakes in the Goldfields bioregion with an area of approximately 96,929ha. Although not recognised nationally or internationally as a wetland of conservation significance, it is listed as a wetland of subregional significance in the DBCA biodiversity audit for the Coolgardie 3 Eastern Goldfields subregion (Cowan 2001). Lake Cowan is not listed in the Directory of Important Wetlands in Australia (DWIA) Spatial Database (DOEE 2018). Mining impacts on Lake Cowan are also mitigated under relevant Mining Proposals for the project.

Assessed Outcome:

Based on the above, the proposed clearing is not at variance with Principle F (watercourse or wetland).

3.7 PRINCIPLE G

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

All mining disturbances that could potentially cause land degradation are controlled by the DMIRS regulatory systems (Mining Proposals, Mine Closure Plans, Annual Environmental Reports, Mine Rehabilitation Fund) and are managed on site by the Environmental Department, Mining Engineers and the Registered Manager.

The LCMC is planned to operate for approximately 1 year between Q3 2024 to Q2 2025. Post closure, the disturbed areas are required by DMIRS to be covered and revegetated with ongoing monitoring and maintenance including flood mitigation and drainage control, groundwater quality, structural integrity of landforms and pollution control until relinquishment.

All other cleared area within the project footprint (topsoil stockpiles, hardstand and infrastructure) will be returned to pre-mining ground levels, covered with topsoil and have ripping on the contour. These areas will be restored with native vegetation that is similar to the pre-mining types. The Mining Proposal for the infrastructure will be accompanied by an update to the Mine Closure Plan which will outline the schedule and performance criteria for the project.

Assessed Outcome: Based on the above (and subject to environmental controls and progressive rehabilitation), the proposed clearing is not at a variance with Principle G (appreciable land degradation).

3.8 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

As discussed in Section 2.2, there are no National Parks, Nature Reserves, other DBCA Managed Lands, ESAs, TECs or PECs occurring near the NVCP amendment area. The closest DBCA managed land is the Binaronca Nature Reserve (Reserve 32552), located approximately 17 km to the west of the main LCMC area.

Assessed Outcome: Based on the above, the proposed clearing is not at variance with Principle H (conservation areas).

3.9 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 120km of NVCP amendment area (DWER 2020).

The HGO region receives an average annual rainfall of approximately 298mm (Table 2: BOM Climate data from Norseman (Station 12065) and Norseman Aero (Station 12009). The average annual evaporation rate is between 2,400 and 2,500mm. Any surface flows are therefore likely to be short lived.

Drainage lines for the LCMC locality are displayed in Figure 6. The NVCP amendment area is contained within the Balladonia catchment with drainage flowing to Lake Cowan. Lake Cowan is a salt lake that remains dry for most of the year. Drainage from mining areas is restricted from entering the natural flow lines as discussed below.

All mining areas, have internal catchments confined by drains and bunds such that incident rainfall and spillages are contained to within the site or managed with via settlement dams for runoff overflow. Runoff and drainage generated within mining areas is controlled to minimise the impact on local surface water flows.

The groundwater in the locality is hypersaline (typically 60,000 to 230,000mg/L TDS). Higginsville lies within the Eastern Goldfields Region of the Archaean Yilgarn Craton. The geology is characterised by northwest trending granite-greenstone belts that display low to medium grade metamorphism, which have been intruded by eastwest dolerite dykes of Proterozoic age. The greenstone belts comprise metamorphic, igneous and sedimentary assemblages and are highly sheared and fractured. The granites tend to be relatively massive, except for locally sheared margins or joints. The tightness of shears and fractures results in very low groundwater transmissivities. Thus, if surface water percolates down it is unlikely to alter existing groundwater quality.

The mining infrastructure is regulated by DMIRS and DWER which includes the requirement to manage and monitor dewatering works and pit water quality during the life of the infrastructure as well as post closure. The proposed infrastructure will include dewatering pipelines which will be bunded and inspected daily during operations.

Assessed Outcome: Based on the above, the proposed clearing is not at variance with Principle I (surface and ground water).

3.10 PRINCIPLE J

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

The HGO locality is situated on a large peninsular on the western edge of Lake Cowan from the lakebed to the Goldfields to Esperance Highway, refer to Figure 2 and Figure 3. The landforms range from extensive pediplains and stony plains, basalt and greenstone undulating rises and low hills, salt lakes with fringing sand plains and sand or gypsum dunes.

The incidence or intensity of flooding is not considered as being a high risk event due to the low rainfall (298mm annually), relatively flat land that is surrounded by woodlands and shrublands, no major watercourses, no lower lying flood plains associated with major water courses and mine runoff managed through containment.

From a regional perspective, the NVCP amendment area is located within the Balladonia catchment. Given that no increase in the disturbance footprint is proposed (1082.81 ha) in relation to the size of the DWER stated catchment area (3,483,400ha), the proposed clearing is not likely to increase the potential of flooding at a catchment scale.

Therefore, the proposed clearing is not likely to alter the incidence or intensity of flooding within the Project area or surrounds.

Assessed Outcome: Based on the above, the proposed clearing is not at variance with Principle J (flooding).

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