

**NATIVE VEGETATION CLEARING PERMIT
APPLICATION
AGNEW GOLD MINE
HIDDEN SECRET EXPANSION PROJECT**

PREPARED FOR:

GOLD FIELDS AUSTRALIA PTY LTD



MAY 2023

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HIDDEN SECRET EXPANSION PROJECT CLEARING PERMIT APPLICATION

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1. INTRODUCTION

Agnew Gold Mining Company Pty Ltd (AGMC), a wholly owned subsidiary of Gold Fields Australia Pty Ltd (GFA), own and operate the Agnew Gold Mine (AGM), within the Northern Goldfields Region of Western Australia (WA). AGM is located approximately 26 km southwest of Leinster and 630 km northeast of Perth, WA (Figure 1). As AGM is spread over a relatively large area, the site is divided in to ten precincts: each representing a geographical region within the operation (Figure 2).

In order to assist in the continuation of mining at AGM, AGMC are proposing an expansion of the Hidden Secret operations in the Agnew Precinct (Figure 2) including:

- Cutback of the Hidden Secret open pit.
- Expansion of the waste rock landform (WRL West).
- Development of a WRL within TSF2.
- Installation of ancillary infrastructure for access, material stockpiles and water storage.

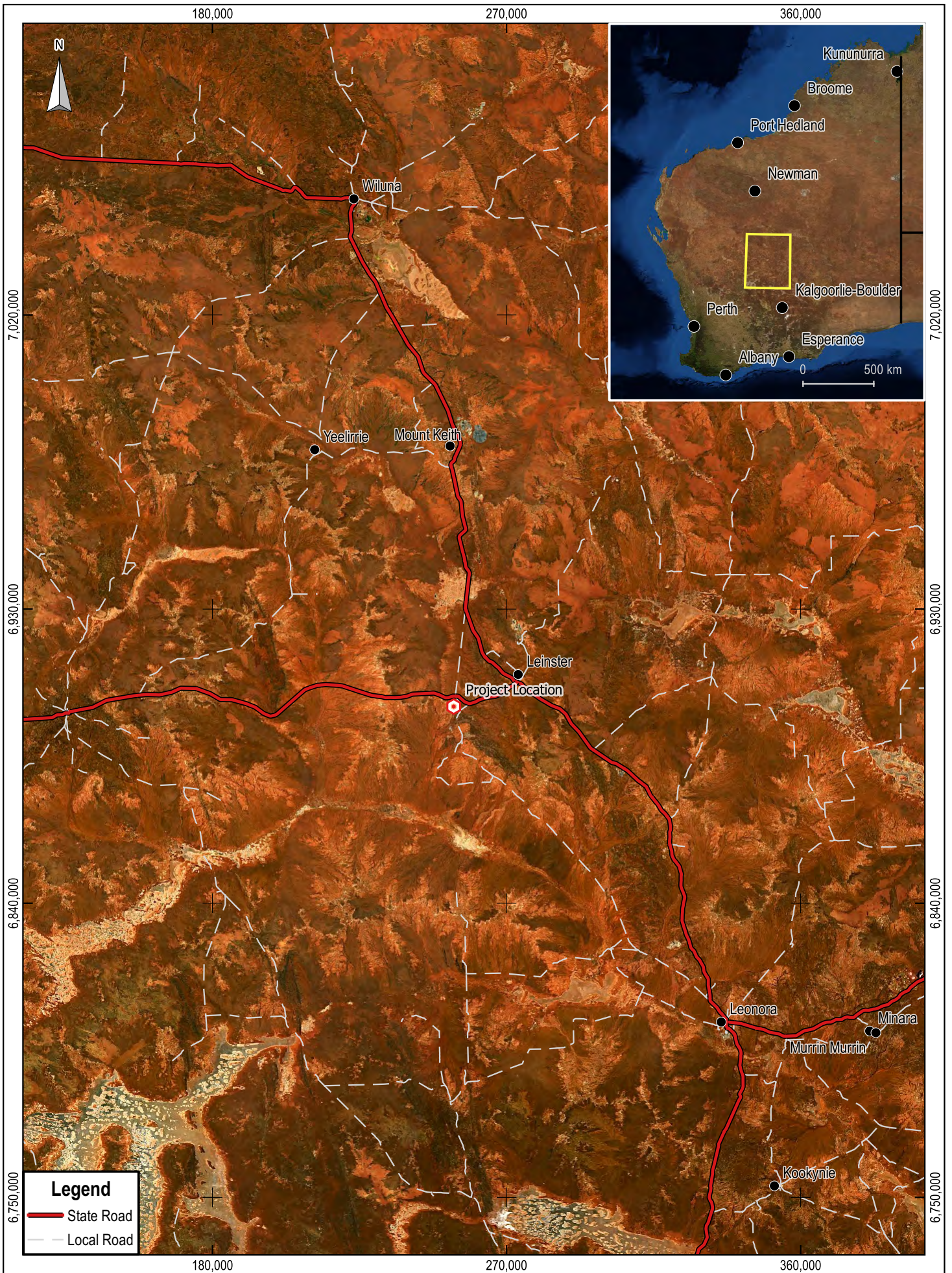
In order to undertake this proposal AGMC are submitting this application to clear native vegetation. The proposed Indicative Clearing Area and Purpose Permit Area are shown in Figure 3. The proposal will require the clearing of up to 35 ha of native vegetation within the 235.63 ha Purpose Permit Area which accounts for approximately 15% of the Purpose Permit Area, while up to 70% of the Purpose Permit Area has already been disturbed,

Under Section 51C of the *Environmental Protection Act 1986* (EP Act), clearing of any native vegetation requires an approved clearing permit, unless an exemption applies. This document has assessed the proposed vegetation clearing against the ten native vegetation clearing principles as required in Schedule 5 of the EP Act. This Native Vegetation Clearing Permit (NVCP) application has been prepared for the Department of Mines, Industry Regulation and Safety (DMIRS) to address this requirement.

In 2016 AGMC engaged Rapallo Group (Rapallo) to undertake a flora and fauna assessment within the Purpose Permit Area (excluding an area of approximately 55 ha comprising existing disturbance areas previously reported via the Mine Rehabilitation Fund (MRF) required under the *Mine Rehabilitation Fund Act 2012* (MRF Act)), as well as the surrounding land (Rapallo 2017; Appendix 1). This assessment included:

- Desktop review of flora and fauna.
- Level 1 reconnaissance flora and vegetation survey.
- Level 1 reconnaissance vertebrate fauna survey.

The Rapallo (2017) assessment has been used to assess the proposed vegetation clearing against the ten native vegetation clearing principles which covered approximately 75% of the total Purpose Permit Area. In addition, an earlier assessment by Jim's Seeds, Weeds & Trees (2004; Appendix 2) has also been used to provide supplemental information and context, and to cover minor areas of the Purpose Permit Area not covered by the Rapallo (2017) assessment. Whilst it is recognised the 2004 survey is outside the 7-year guideline preferred by regulators for currency of field surveys, the proposed works are surrounded by a heavily disturbed area used for current mining activities (approximately 70% of the Purpose Permit Area is previously disturbed) and the 2004 data is only applicable to small areas of the Purpose Permit Area. Further, to ensure the currency of potential Threatened and Priority species and communities, database searches including NatureMap interim data search and Protected Matters Search Tool (PMST) were undertaken for consideration in this assessment (DBCA 2022; DCCEEW 2022).



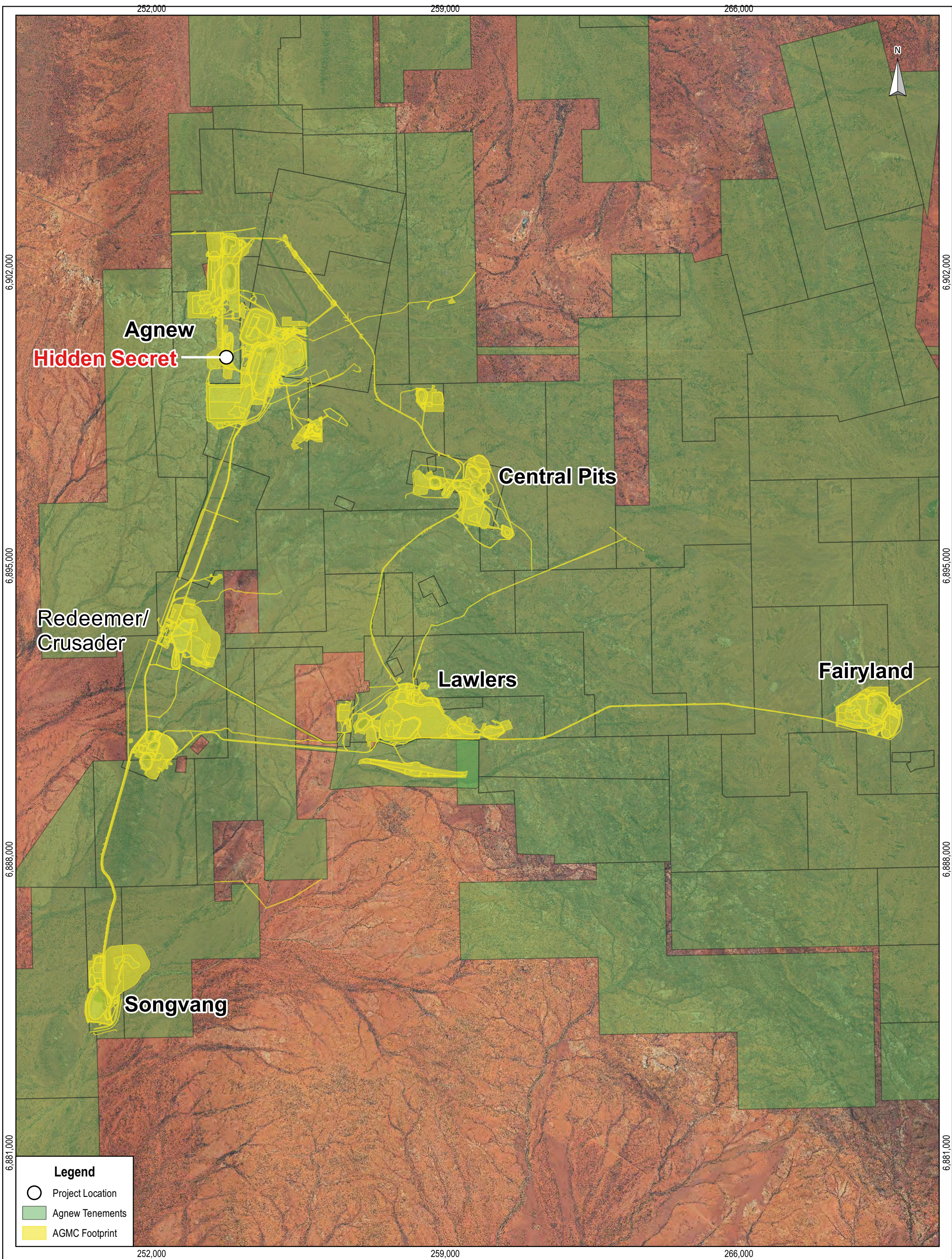
Scale: 1:1500000
 Original Size: A4
 Image: Copernicus Sentinel Data 2020
 Grid: GDA94 / MGA zone 51
 0 25 50 km

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 Agnew Gold Mine Hidden
 Secret Expansion

Figure 1
Regional Location

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Scale: 1: 80,000
 Original Size: A3
 Aerial Imagery: June 2022
 Grid: GDA94 / MGA zone 51 (EPSG:28351)

0 2 4 km

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Figure 2
Site Layout

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2. BACKGROUND

2.1 LOCATION

The AGM is located 630 km northeast of Perth and approximately 26 km southwest of Leinster in the Northern Goldfields of Western Australia. The closest towns to the AGM are Leinster (26 km northeast) and Wiluna (160 km northwest) as shown in Figure 1.

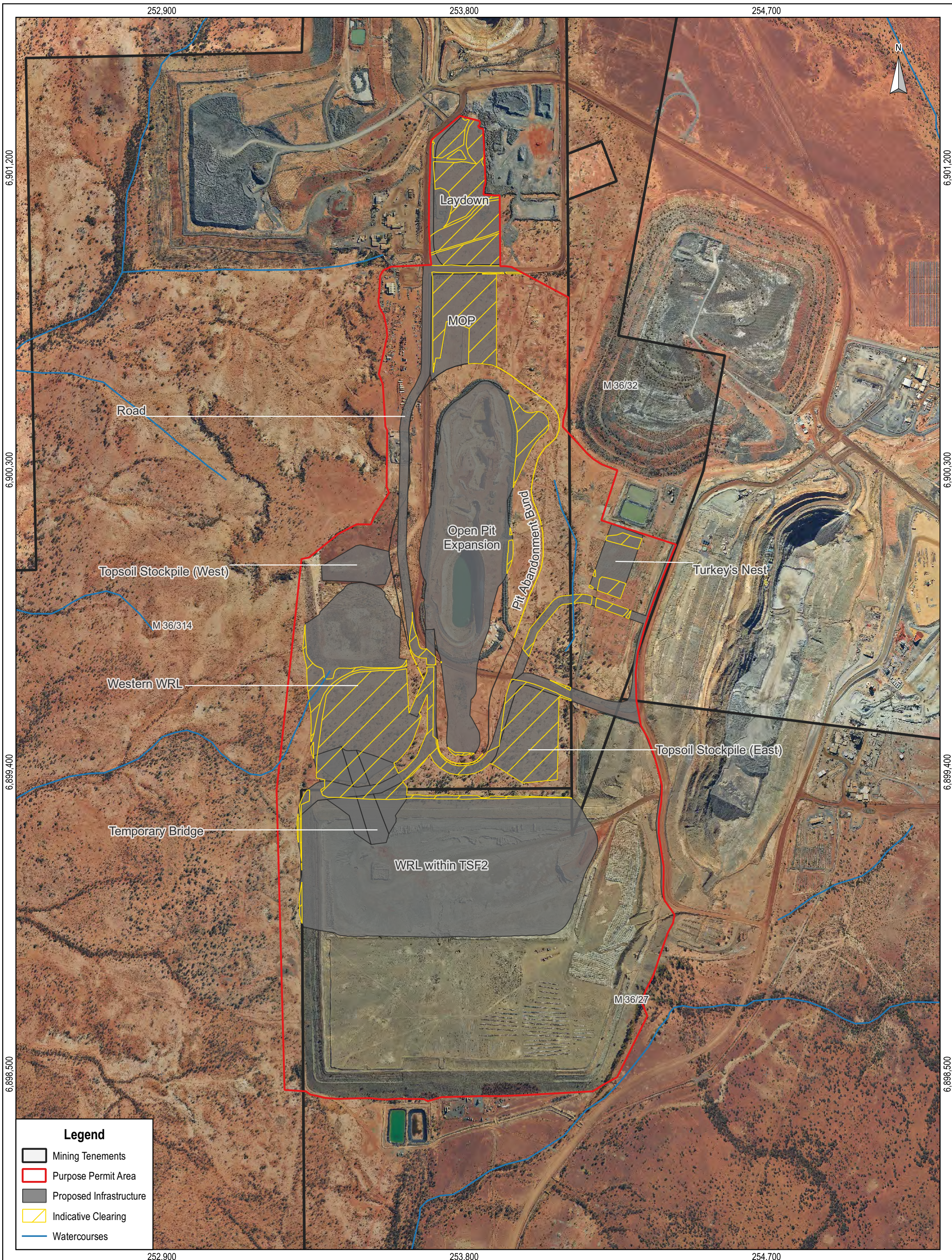
2.2 TENURE

The Purpose Permit Area is situated within three Mining Leases M36/314, M36/32 and M36/27 (Figure 3). A summary of the tenements applicable to this application is provided in Table 1. Evidence of tenure ownership is provided in Appendix 3.

Table 1: Hidden Secret PPA Tenements

Tenement	Tenement Holder	Area (ha)	Grant Date	Expiry Date
M36/314	Agnew Gold Mining Company Pty Limited	722.25	18/10/1994	17/10/2036
M36/32	Agnew Gold Mining Company Pty Limited	87.76	23/04/1986	22/04/2028
M36/27	Agnew Gold Mining Company Pty Limited	612.55	30/10/1985	29/10/2027

The proposal is located within the Shire of Leonora and although no pastoral leases overlay the Purpose Permit Area the Pinnacles Pastoral Stations sits approximately 1.2 km west and the Leinster Downs Pastoral Station is approximately 2.5 km to the north.



Scale: 1: 10,000
 Original Size: A3
 Aerial Imagery: June 2022
 Grid: GDA94 / MGA zone 51 (EPSG:28351)

0 250 500 m

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Figure 3

Purpose Permit Area and Indicative Clearing

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2.3 ENVIRONMENTAL SETTING

2.3.1 Climate

The AGM is located in the Northern Goldfields region which experiences a non-seasonal arid climate with hot and dry summers and cool winters. Leinster Aero (ID: 012314) is the closest representative Bureau of Meteorology (BoM) weather station (45 km to the south). The mean maximum temperatures range from 19.0 to 37.3°C, with mean minimum temperatures ranging from 6.2 to 23.2°C (Figure 4).

Precipitation is predominantly associated with sporadic summer cyclonic rainfall and thunderstorms. The yearly rainfall statistics from Leinster weather station are shown in Figure 4. The mean total annual rainfall for the area is 251.6 mm with January to March having the greatest number of rain days (BoM 2022). The lowest recorded annual rainfall was 102.6 mm in 2020 with the highest recorded at 439.4 mm in 1997 (BoM 2022). Low rainfall can occur within any of the months with summer rainfall dependent on cyclonic rainfall and thunderstorm events.

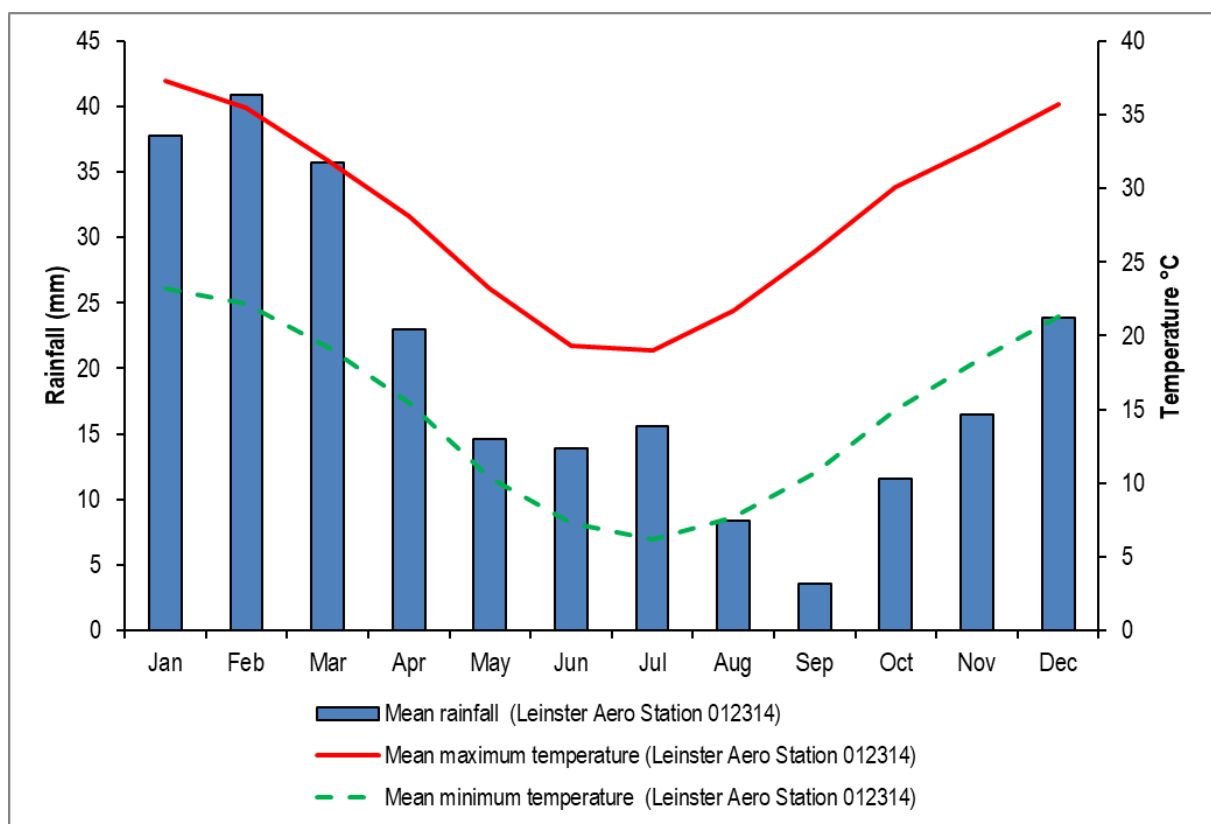


Figure 4: Climate Data for Leinster Aero (1994-2022) (BoM, 2022)

2.3.2 Soils and Landscape

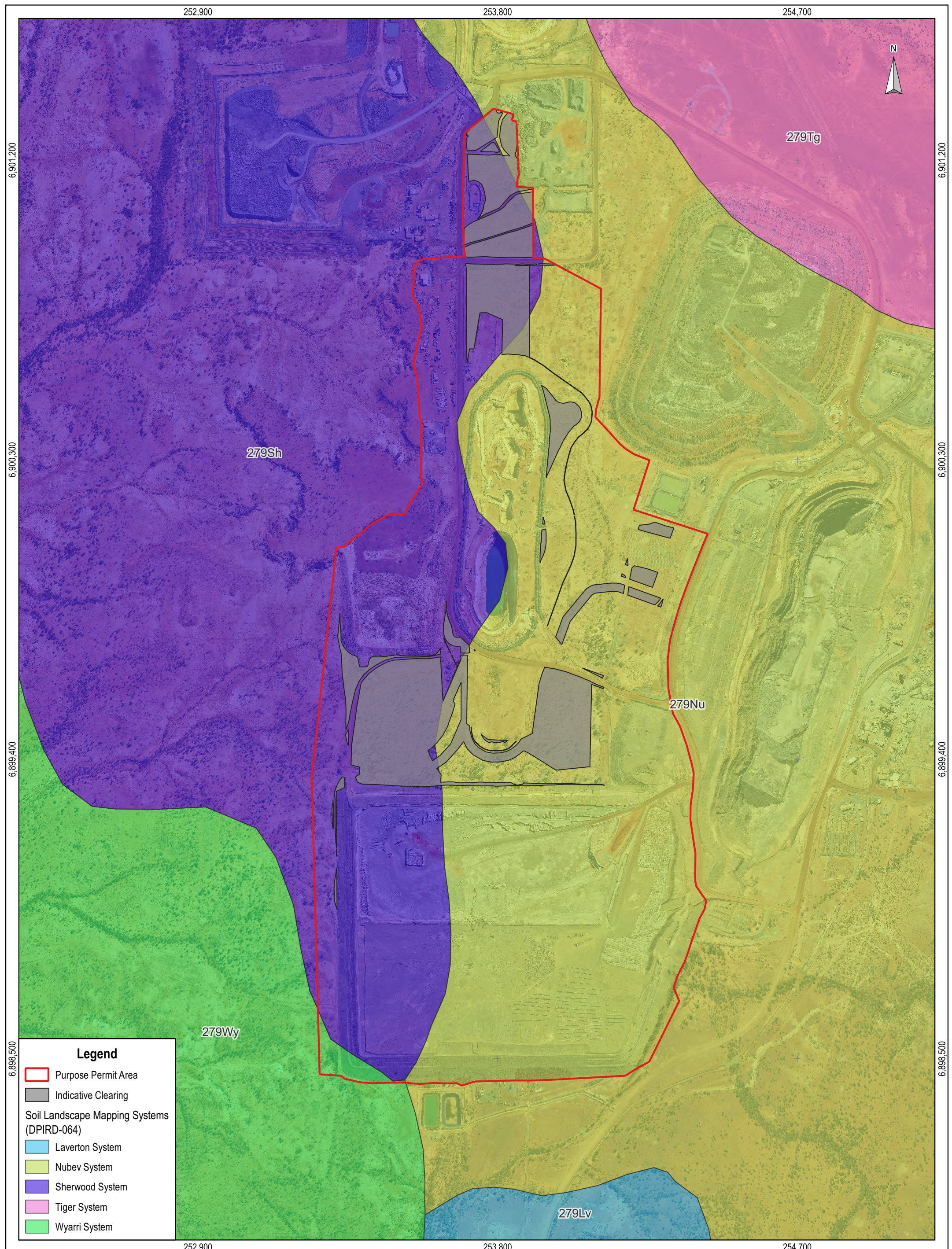
The Purpose Permit Area is located within the Salinaland Plains Zone of the Murchison Bioregion classified by the Interim Biogeographic Regionalisation of Australia (IBRA). The soil and landscape of the Bioregion is described by Tille (2006) as Sandplains with hardpan wash plains and some mesas, stony plains and salt lakes on granitic rocks and some greenstone of the Yilgarn Craton. The soils of the Salinaland Plains Zone are characterised by red sandy earths, shallow loams, red-brown hardpan shallow loams, salt lake soils and duplexes with mulga shrublands with spinifex grasslands and some halophytic shrublands and eucalypt woodlands.

The Department of Primary Industries and Regional Development (DPIRD) provides broad scale (1:250,000) landscape system mapping delineating the landscape patterns, landforms and associated major soil groups and vegetation types of WA.

Soil landscapes and land system mapping of WA identified soil units within the Purpose Permit Area (DPIRD, 2022). Specifically, the Purpose Permit Area occurs within as being the following two soil-landscape units described in Table 2 and shown in Figure 5 (DPIRD 2022).

Table 2: Soil and Landscape Units

Unit	Description
Nubev (279Nu)	Gently undulating stony plains, minor limonitic low rises and drainage floors supporting mulga and halophytic shrublands.
Sherwood (279Sh)	Breakaways, kaolinised footslopes and extensive gently sloping plains on granite supporting mulga shrublands and minor halophytic shrublands.



Legend

- Purpose Permit Area
- Indicative Clearing
- Soil Landscape Mapping Systems (DPIRD-064)
- Laverton System
- Nubev System
- Sherwood System
- Tiger System
- Wyarri System

Scale: 1: 10,000
 Original Size: A3
 Aerial Imagery: June 2022
 Grid: GDA94 / MGA zone 51 (EPSG:28351)

0 250 500 m

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Figure 5
 Soil Landscape Units

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2.3.3 IBRA Bioregionalisation

The Purpose Permit Area occurs within the Eastern Murchison subregion of the Murchison Bioregion. This subregion is characterised by internal drainage and extensive areas of elevated red desert sandplains with minimal dune development and salt lake systems associated with the occluded Paleodrainage system and broad plains of red-brown soils and breakaway complexes. The Purpose Permit Area lies within the Austin Botanical district of the Eremaean botanical province of WA, the vegetation within this province is dominated by Mulga woodlands often rich in ephemerals; hummock grasslands, saltbush shrublands and Halosarcia shrublands (Cowan 2001). The Hidden Secret Purpose Permit Area is situated on the boundary of the Wiluna and Laverton phytographic Subregions of the Austin Botanical District as mapped and described by Beard (1990).

2.3.4 Flora

A reconnaissance flora and vegetation survey across the larger Lawlers Gold Mine leases including the Hidden Secret project area was completed by Jim's Seeds, Weeds & Trees in September of 2004. Rapallo (2017) completed a Level 1 flora and vegetation survey of the Purpose Permit Area and surrounding land in September 2016 over an area of approximately 175 ha. Additionally, desktop assessments for the Purpose Permit Area were also recently completed to verify outcomes from both surveys were unchanged (DBCA 2022; DCCEEW 2022). The NatureMap Interim desktop assessment identified 182 plant species, of which 172 were dicot species, 2 fern species, 1 liverwort and 7 monocot species. The Reconnaissance and Level 1 surveys are attached as Appendix 1 and Appendix 2, respectively and the results from the database searches saved as Appendix 3.

2.3.4.1 Significant Flora Species

Rapallo (2017) undertook a desktop review of regional flora using multiple sources including database searches and review of previous environmental surveys completed on behalf of AGMC (see Section 3.3 of Appendix 1). Additional database searches were completed to support this clearing permit assessment to ensure any potential Threatened and Priority species listed under the *Biodiversity Conservation Act 2016* (WA) (BC Act) and/or the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) and identified in the regional area are current. Database searches using NatureMap (DBCA search request 7 September 2022) and the Department of Climate Change, Energy, the Environment and Water (DCCEEW) (2022) Protected Matters Search Tool (PMST) were undertaken to supplement the assessment undertaken by Rapallo (2017).

The Level 1 flora and vegetation survey of the Purpose Permit Area and the surrounding survey area undertaken by Rapallo (2017) identified 67 flora taxa from 22 families. The families Fabaceae (Acacias and Sennas) and Chenopodiaceae (saltbushes and Maireanas) were the most species-rich. Also, species-rich were the families of Asteraceae (Daisies) and Scrophulariaceae (Eremophilas). Rapallo (2017) noted that the quality of material available in the field was good, with 85% of taxa recorded, or 57 species. Approximately 67% of those species recorded for were collected, with specimens carrying either flowers, fruits, or seeds to assist with identification. Reproductive parts of the plant are important for species identification, and consequentially all specimens were able to be identified to species level, and to the level of subspecies, variety, or form. Jim's Seeds, Weeds & Trees (2004) recorded a similar level of diversity and plant species.

The flora desktop survey completed by Rapallo (2017) identified a total of 74 conservation listed flora species (Appendix 1). The conservation significant flora species under the EPBC Act included four Threatened flora taxa, five Priority 1 taxa, forty-two Priority 3 taxa and six Priority 4 taxa. Neither Rapallo (2017) nor Jim's Seeds, Weeds & Trees (2004) recorded any Threatened or Priority listed species within the Purpose Permit Area; however, two Priority flora species were recorded, outside of the Indicative Clearing Area, approximately 250 m northwest of the Purpose Permit Area (Figure 6). These species included:

- *Thryptomene* sp. Leinster (B.J. Lepschi & L.A. Craven 4362) – Priority 3.
- *Eremophila pungens* – Priority 4.

Thryptomene sp. Leinster (B.J. Lepschi & L.A. Craven 4362) – Priority 3

Thryptomene sp. Leinster is a medium to tall shrub (0.5 - 2.5 m high) in the Myrtaceae family. The taxon only occurs in the Eastern Murchison subregion of the Murchison IBRA Region (Rapallo 2017). It was recorded at 130 localities on a rocky mesa approximately 250 m northwest of the Purpose Permit Area (Figure 6). Here it occurs in the same vegetation community as *Eremophila pungens*. The top of the mesa was degraded due to heavy grazing by cattle, but the slopes were in good condition.

Eremophila pungens – Priority 4

Eremophila pungens is a small shrub (0.5 - 1.5 m high) in the Scrophulariaceae family. It has purple-violet flowers, with the main flowering period in June to August. It grows on plains, ridges and breakaways. The taxon occurs in the Gascoyne, Great Victoria Desert, and Murchison IBRA Regions (Rapallo 2017). *Eremophila pungens* was recorded at 167 localities on a rocky mesa approximately 250 m northwest of the Purpose Permit Area (Figure 6). Here it occurs in the same vegetation community as *Thryptomene sp. Leinster*.

No additional conservation significant species to those assessed by Rapallo (2017) or Jim's Seeds, Weeds & Trees (2004) were identified from the updated database searches. A 10 km buffer of the coordinates -28.00340°S, 120.49453°E was used for both searches.

252,900

253,800

254,700

6,901,200

6,901,200

6,900,300

6,900,300

6,899,400

6,899,400

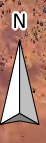
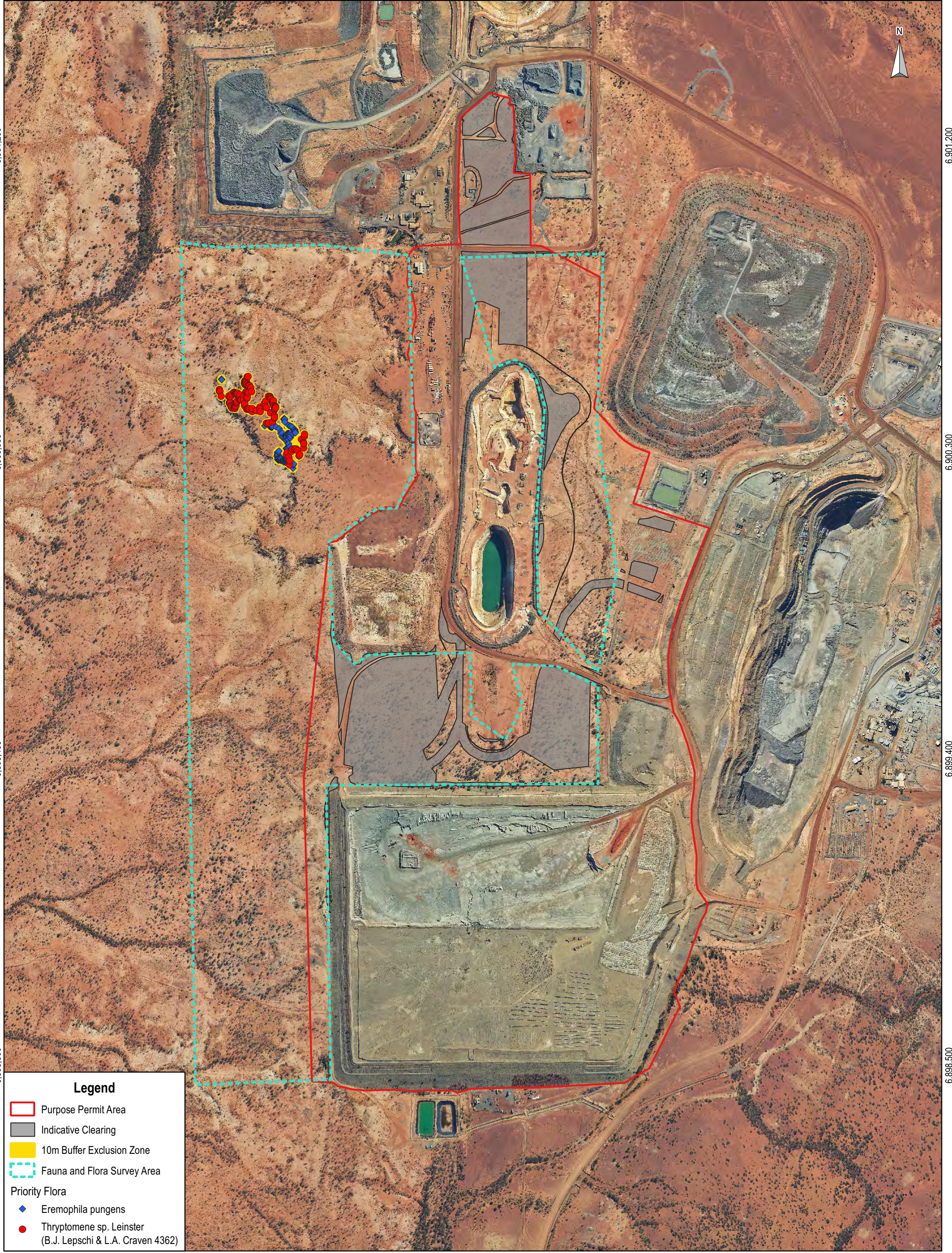
6,898,500

6,898,500

252,900

253,800

254,700



Legend

- Purpose Permit Area
- Indicative Clearing
- 10m Buffer Exclusion Zone
- Fauna and Flora Survey Area

Priority Flora

- ◆ Eremophila pungens
- Thryptomene sp. Leinster
(B.J. Lepschi & L.A. Craven 4362)

Scale: 1: 10,000
 Original Size: A3
 Aerial Imagery: June 2022
 Grid: GDA94 / MGA zone 51 (EPSG:28351)

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Figure 6

Conservation Significant Flora

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2.3.4.2 Introduced species

Although recent desktop assessments (DBCA 2022; DCCEEW 2022) identified ten weed species as potentially occurring within Purpose Permit Area and wider survey area, the Level 1 flora and vegetation survey completed by Rapallo (2017) only recorded two introduced species in the Hidden Secret Survey Area, namely:

- Maltese Cockspur (*Centaurea melitensis*); and
- Ruby Dock (*Rumex vesicarius*)

Ruby Dock was recorded colonising the breakaway slopes proximal to the mining operations, occurring in many scattered spots.

2.3.4.3 Beard's Vegetation and Pre-European Vegetation Extent

Pre-European vegetation types of WA were first mapped at a regional scale by Beard (1978) and categorised into broad vegetation associations (VAs). These VA's were later reinterpreted and redefined by Shepherd (*et al* 2002) to reflect national standards and the extensive clearing undertaken since the Beard mapping (1978). Based on this mapping at a scale of 1:1,000,000, DPIRD has compiled a list of vegetation extent and types across WA (Shepard *et al* 2002). Two vegetation associations have been mapped within the Purpose Permit Area:

- Wiluna 18: Low woodland; mulga (*Acacia aneura*); and
- Laverton 39: Shrublands; mulga scrub.

The area (ha) and percentage of Wiluna 18 and Laverton 39 vegetation associations within the Purpose Permit Area and Indicative Clearing Area are shown in Table 3 as a percentage of the total amount available within the Wiluna System of the Murchison IBRA Region (Government of WA 2018). Both associations retain high percentages of the pre-European extents with the Purpose Permit Area and Indicative Clearing Area representing negligible amounts of the current extent within the Wiluna System of the Murchison IBRA Region.

Table 3: Pre-European Vegetation and Extent

Vegetation association	Pre-European extent (ha) (Government of WA 2022)	Current extent (ha) (% remaining) ⁽¹⁾	Extent within the Purpose Permit Area (ha) (% of current extent)	Extent within the Indicative Clearing Area (ha) (% of current extent)
Wiluna 18	4,307,945.85	4,290,204.46 (99.59%)	20.65 (<0.01%)	7.88 (<0.01%)
Laverton 39	426,435.83	421,370.21 (98.81%)	50.96 (<0.01%)	15.77 (<0.01%)

(1) Government of WA 2022

2.3.4.4 Vegetation Communities

In total, 26 vegetation communities were identified across the 2017 and 2004 surveys, 16 of which were located within the Purpose Permit Area (Table 4, Figure 7) ranging in condition from Degraded to Excellent (Rapallo 2017). The majority of these vegetation communities were mixed Acacia woodlands or shrublands, many of which were dominated by species of Mulga (*Acacia aneura*, *A. aptaneura*, *A. caesaneura*, *A. fuscaneura*, *A. incurvaneura*, *A. mulganeura* and *A. craspedocarpa*). These mixed Acacia and Mulga communities were differentiated by the relative dominance of the different Mulga species, openness of vegetation, substrate, and understorey composition. Other communities included mixed shrublands dominated by species of saltbush, and one Melaleuca shrubland. Surveys within the Purpose Permit Area also identified areas without vegetation, comprising previously cleared areas, and a naturally bare quartz plain.

Vegetation communities identified by Rapallo (2017) in the Fauna and Flora Survey Area and refined for the Purpose Permit Area are shown in Figure 7, with detailed descriptions of each community described in Table 4. Areas not included in the Rapallo (2017) Survey have been updated with information from Jim's Weeds, Seeds & Trees (2004)

to provide a complete overview of vegetation communities within the Purpose Permit Area and areas of indicative clearing for proposed infrastructure.

Although the Rapallo Survey (2017) identified a variation in vegetation due to a greater variation in ground geological conditions, including mesa crests, breakaways, and plains, due to design of the Hidden Secret expansion, the Purpose Permit Area avoids areas with greatest variety in vegetation communities.

Table 4: Vegetation Communities

Vegetation Community	Description	Mapped Extent Within Survey Area (ha)	Mapped Extent Within Purpose Permit Area (ha)	Mapped Extent Within Indicative Clearing Area (ha)
1	<u>Acacia-Hakea woodland / shrubland. quartz</u> <i>Acacia aptaneura</i> / <i>Hakea preissii</i> open low woodland trees over <i>Eremophila galeata</i> / <i>Acacia tetragonophylla</i> sparse medium shrubs, over <i>Ptilotus obovatus</i> / <i>Eremophila galeata</i> / mixed chenopod shrubs on a quartz gravel plain.	14.94	14.94	11.58
2	<u>Acacia / Hakea red stony plain</u> <i>Acacia</i> / <i>Hakea</i> sparse mixed shrubland on red stony plain.	1.62	1.62	0.09
3	<u>Acacia / Sheoak / Hakea drainage line</u> Mixed Mulga/Acacia with Sheoak (<i>Casuarina pauper</i>) and Hakea tall shrubland / low woodland. Drainage line.	0.79	-	-
4	<u>Acacia-Eremophila shrubland. Gravel</u> <i>Acacia</i> spp. sparse mid shrublands with <i>Eremophila</i> spp. shrubs. Gravel.	5.23	-	-
5	<u>Degraded. Scattered Acacia shrubs.</u> Degraded. Scattered Acacia shrubs.	1.79	0.24	-
6	<u>Mixed Mulga open shrubland on rocky breakaways</u> Mixed Mulga sparse to open tall shrubland (<i>Acacia incurvaneura</i> , <i>A. aneura</i> , <i>A. caesaneura</i> , <i>A. craspedocarpa</i>), over <i>Ptilotus obovatus</i> and other mixed shrubs, grasses and herbs on rocky breakaway slopes of mesa	1.88	-	-
7	<u>Mixed mid-dense Mulga on mesa slopes</u> Mixed mid-dense Mulga tall shrubland (<i>Acacia incurvaneura</i> , <i>A. caesaneura</i> , <i>A. aneura</i>), over other mixed shrubs on southern mesa slopes.	0.40	-	-
8	<u>Mulga / Acacia / Eremophila. Rocky breakaways</u> Mixed Mulga / Acacia (<i>A. incurvaneura</i> , <i>A. aptaneura</i> , <i>A. quadrimarginea</i>), over sparse to open shrubs of <i>Eremophila pantonii</i> / <i>Eremophila latrobei</i> , with scattered plants such as <i>Lepidium platypetalum</i> . Rocky breakaway slopes of sandstone mesa.	2.52	-	-
9	<u>Mulga / Acacia / Hakea drainage line</u> <i>Acacia aptaneura</i> / <i>A. craspedocarpa</i> / <i>Hakea preissii</i> open tall shrublands along drainage lines.	5.58	0.31	-
10	<u>Mulga / Acacia sparse shrubs. Stony hillcrest</u>	7.82	-	-

Vegetation Community	Description	Mapped Extent Within Survey Area (ha)	Mapped Extent Within Purpose Permit Area (ha)	Mapped Extent Within Indicative Clearing Area (ha)
	Mulga (<i>Acacia incurvaneura</i>) / <i>Acacia</i> spp. sparse mid-shrubland, over sparse low shrubs on a stony hillcrest.			
11	Mulga / Eremophila sparse shrubland. Stony rise <i>Acacia incurvaneura</i> / <i>Eremophila</i> spp. sparse shrubland. Stony rise.	4.27	-	-
12	Mulga / mixed shrubs on gravel Mulga / mixed sparse medium to low shrubs on sandstone gravels.	10.49	-	-
13	Mulga 1 / Eremophila / chenopods quartz plain (degraded) <i>Acacia aptaneura</i> scattered low trees over <i>Eremophila galeata</i> / <i>Acacia tetragonophylla</i> sparse medium shrubs, over <i>Ptilotus obovatus</i> / mixed chenopod sparse low shrubland.	24.80	23.5	5.19
14	Mulga 1 / Hakea / Ptilotus / chenopods <i>Acacia aptaneura</i> sparse low woodland / tall shrubland, over <i>Hakea preissii</i> sparse tall shrubs, over <i>Ptilotus obovatus</i> / chenopod open low shrubs.	8.48	8.48	3.83
15	Mulga 2 sparse woodland/shrubland. Mesa plateau. <i>Acacia incurvaneura</i> scattered to sparse low woodland/tall shrubs, over <i>Thryptomene</i> sp. <i>Leinster</i> (B.J. Lepschi & L.A. Craven 4362) (Priority 3 flora) and/or other scattered medium to low shrubs (such as <i>Eremophila pungens</i> - Priority 4 flora). Mesa plateau.	11.18	-	-
16	Mulga low trees on a low rocky outcrop Mulga sparse low trees, over scattered shrubs of <i>Sida ectogama</i> / <i>Senna</i> / <i>Ptilotus obovatus</i> on a low rocky outcrop.	4.58	2.2	0.48
17	Mulga trees - Eremophila pantonii shrubs. Quartz. <i>Acacia incurvaneura</i> sparse low woodland, over <i>Eremophila pantonii</i> open low shrubland with <i>Scaevola spinescens</i> . Stony quartz rise.	0.73	0.4	0.04
18	Melaleuca tall shrubland on mesa slopes <i>Melaleuca interioris</i> sparse / open mid shrubland on mesa slopes.	1.14	-	-
19	Dense Mulga/Melaleuca. Rocky gully. Dense Mulga (<i>Acacia</i> spp.) / <i>Melaleuca interioris</i> / <i>Psyrax</i> dense tall shrubland in small rocky gullies.	0.12	-	-
20	Mixed chenopod low shrubland. Quartz gravel Mixed chenopod open low shrubland of <i>Tecticornia doliiformis</i> / <i>Maireana</i> spp. / <i>Sclerolaena</i> / <i>Frankenia laxiflora</i> .	47.06	0.9	0.19
21	Maireana glomerifolia / Chenopod shrubs. Quartz <i>Maireana glomerifolia</i> / mixed chenopod sparse low shrubland on low quartz slopes.	1.30	0.2	-
22	Tecticornia - Frankenia dwarf shrubland	0.29	-	-

Vegetation Community	Description	Mapped Extent Within Survey Area (ha)	Mapped Extent Within Purpose Permit Area (ha)	Mapped Extent Within Indicative Clearing Area (ha)
	<i>Tecticornia doliiformis</i> - <i>Frankenia laxiflora</i> open dwarf shrubland			
23	<u>Tecticornia (samphire) shrubland</u> <i>Tecticornia doliiformis</i> (samphire) sparse to open dwarf shrubland on quartz gravel.	0.28	0.23	-
24	<u>Frankenia / Sclerolaena / Maireana shrubland</u> <i>Frankenia laxiflora</i> / <i>Sclerolaena spp.</i> / <i>Maireana spp.</i> sparse dwarf shrubland.	10.42	2.7	-
GSFJWS	<u>Granite Sand Flats (Jim's Seeds, Weeds & Trees, 2004)</u> Flat stretching plains of coarse red granite sand with sparse vegetation consisting mainly of ground hugging shrubs and some <i>Acacia aneura</i> over 2 metres in height and ground hugging plants including <i>Helipterum craspedioides</i> and <i>Ptilotus aevoides</i> .	13.62	12.6	8.64
Q	<u>Naturally bare ground (no native vegetation)</u> Quartz stony/gravel plain	0.51	-	-
X	<u>Cleared areas</u>	121.5	119.34	1.51
	Total	303.3	187.75	31.57

252,900 253,800 254,700

6,901,200

6,901,200

6,900,300

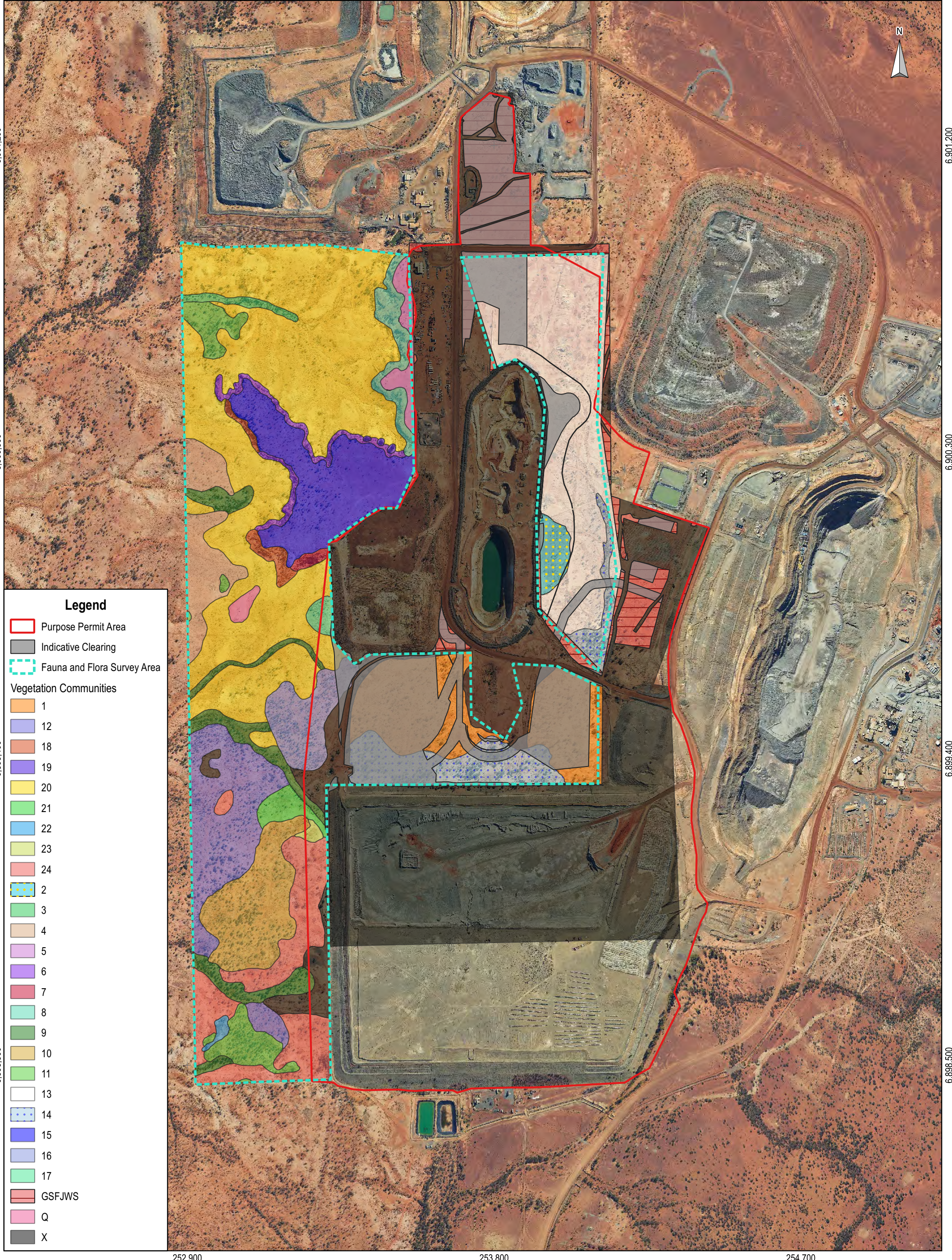
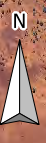
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


















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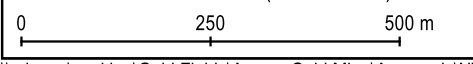
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Legend

-  Purpose Permit Area
-  Indicative Clearing
-  Fauna and Flora Survey Area
- Vegetation Communities**
-  1
-  12
-  18
-  19
-  20
-  21
-  22
-  23
-  24
-  2
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-  15
-  16
-  17
-  GSFJWS
-  Q
-  X

Scale: 1: 10,000
 Original Size: A3
 Aerial Imagery: June 2022
 Grid: GDA94 / MGA zone 51 (EPSG:28351)



Gold Fields Australia Pty Ltd
 Agnew Gold Mine Hidden Secret Expansion

Figure 7
Vegetation Communities

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2.3.4.5 *Threatened and Priority Ecological Communities*

No State or Federally listed Threatened or Priority Ecological Communities were identified during the field survey conducted by Rapallo (2017). Department of Biodiversity Conservation and Attractions (DBCAs) database searches completed by Rapallo (2017) identified one Threatened Ecological Community (TEC) and seven Priority Ecological Communities (PECs) listed under the BC Act within 50 km of the Purpose Permit Area. These TECs and PECs included:

- Lake Depot Springs stygofauna community – Vulnerable.
- Miranda east calcrete groundwater assemblage types on Carey palaeodrainage on Yakabindie Station – Priority 1.
- Lake Miranda west calcrete groundwater assemblage types on Carey palaeodrainage on Yakabindie Station – Priority 1.
- Pinnacles calcrete groundwater assemblage type on Raeside palaeodrainage on Pinnacles Station – Priority 1.
- Yakabindie calcrete groundwater assemblage type on Carey palaeodrainage on Yakabindie Station – Priority 1.
- Yandal calcrete groundwater assemblage type on Carey palaeodrainage on Yandal Station – Priority 1.
- Violet Range (Perseverance Greenstone Belt) vegetation complexes (banded ironstone formation) – Priority 1. The absence of Banded Iron Formations in the Purpose Permit Area indicates that the likelihood of the Violet Range vegetation complex occurring within the Site is very low.

None of the above communities overlap with the Purpose Permit Area and none are within close proximity (Rapallo 2017). Furthermore, the TEC and six PECs are stygofauna communities or groundwater assemblages. The absence of calcretes or other geologies supportive of subterranean fauna in the Purpose Permit Area means that the likelihood of finding groundwater or stygofauna communities in the Purpose Permit Area is low (Rapallo 2017).

No further TECs or PECs were identified from updated database searches (DBCAs 2022; DCCEE 2022).

2.3.4.6 *Environmentally Sensitive Areas*

Environmentally sensitive areas (ESAs) are classes or areas of native vegetation where the exemptions for clearing vegetation under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* (Clearing Regulations) do not apply.

There are no Environmentally Sensitive Areas (ESAs) or DBCA conservation estate within close proximity to the Purpose Permit Area. The nearest ESA is approximately 37 km to the west and the Wanjarri Nature reserve is approximately 57 km to the north of the Purpose Permit Area.

2.3.4.7 *Groundwater Dependant Ecosystems*

No potential Groundwater Dependant Ecosystems (GDEs) have been identified within proximity to the Purpose Permit Area (Rapallo 2017, AECOM 2022) and no riparian vegetation is present within the Purpose Permit Area. When considering GDEs, the current groundwater level is between 31 and 37.6 metres below ground level (mbgl) (AECOM 2022). This depth is considered too deep to be a reliable water source for the local vegetation (Cook 2018), it is therefore unlikely to support the occurrence of GDEs.

Furthermore, due to dewatering occurring at various AGM pits over several decades, the current groundwater levels are likely to be in a quasi-steady state, whereby abstraction rates are balanced with recharge in the local catchment. The interpreted ecological risk from further groundwater abstraction and potentially drawdown is therefore considered to be low (Rapallo 2017, AECOM 2022).

2.3.5 Terrestrial Fauna and Habitats

Rapallo (2017) undertook a desktop review of regional fauna using multiple sources including database searches, a review of previous environmental surveys and, an assessment of likelihood for threatened fauna (see Section 3.3 of Appendix 1). Database searches using NatureMap interim data search (DBCAs search request 7 September 2022) and PMST search (DCCEEW 2022) were undertaken to supplement the assessment undertaken by Rapallo (2017) and verify the conservation status of species potentially occurring in the area.

The Rapallo desktop assessment (2017) identified 29 species of fauna protected under EPBC Act and / or BC Act. These included eight species of Threatened fauna, one species of Other Specially Protected Fauna, 13 species of birds protected under an International Agreement, and seven Priority fauna species.

Of the 29 species three were identified as having a high likelihood of occurrence (Rapallo 2017) of which none were recorded during the survey. These included:

- Peregrine Falcon (*Falco peregrinus*) – The Peregrine Falcon is considered likely to occur over the survey areas while hunting. However, the absence of nesting habitat means it is unlikely to be affected by project activities.
- Rainbow Bee-eater (*Merops ornatus*) – The Purpose Permit Area contains suitable habitat for Rainbow Bee-eaters, however suitable habitat is also available in surrounding areas. Project activities are unlikely to affect the species as they are not sensitive to disturbance and are likely to adapt.
- Oriental Plover (*Charadrius veredus*) – the Oriental Plover is considered likely to occur in the Purpose Permit Area, but only for short periods of the year and not during the breeding season. Project developments are unlikely to significantly affect this species' foraging habitat, which is extensive both inside and outside the Agnew Gold project area.

The 2022 desktop assessment identified no additional species from Rapallo's assessment in 2017. None of these species were ranked as having a 'high' likelihood of occurring in the Purpose Permit Area as determined by Rapallo and therefore are not discussed any further.

The Rapallo 2017 assessment included a Level 1 (reconnaissance) vertebrate fauna field survey which recorded 32 vertebrate fauna including 17 bird species, 2 reptile species, 8 native mammal species and 5 introduced mammal species. The Oriental Plover was recorded during the survey; however it was an opportunistic sighting and not recorded within the Purpose Permit Area. Scat evidence of DBCA listed Priority 4 species Long-tailed Dunnart (*Sminthopsis longicaudata*) was observed within the Level 1 survey area, however absence of suitable habitat means that the species is unlikely to occur in the survey areas, or be impacted by project developments (Rapallo 2017).

2.3.5.1 Fauna Habitat

The fauna survey recorded nine broad fauna habitats as detailed in Table 5 and shown in Figure 8. The habitats are dominated by a sandstone breakaway surrounded by stony plains and rises. Minor runoff drainage comes off the breakaway area and stony rises and flows predominantly southwest into larger drainage tributaries. Vegetation associations are varied; however, the majority are typical mulga woodland or shrubland habitats with some saltbush shrublands. Small gullies and shallow caves occur within the breakaway slopes. Much of the breakaway slopes are south-westerly facing, however the height of the breakaway did not allow for cool shaded habitats and the areas investigated did not present deep accumulations of litter and cool soil that could indicate the potential of short range endemic terrestrial invertebrates such as trapdoor spiders or scorpions. Fauna habitats are typical for the East Murchison IBRA subregion (Rapallo 2017).

The Purpose Permit Area occurs within the Nubev and Sherwood Land Systems. It was noted by Rapallo (2017) that the breakaway habitat types (signified by specific sub-habitat types of BP and BS described in Table 5) represented relatively uncommon landforms in the wider region, potentially supporting fauna species not recorded elsewhere. However, design of the project avoids this area and any potential impacts to these habitat types.

Table 5: Terrestrial Fauna Habitat Types

Habitat Code	Description	Mapped Extent Within Survey Area (ha)	Mapped Extent Within Purpose Permit Area (ha)	Mapped Extent Within Indicative Clearing Area (ha)
BP	Breakaway top - Sparse Mulga shrubland on stony skeletal soil	11.18	0.02	-
BS	Open Melaleuca Shrubland and Open Tall Mulga Shrubland on Breakaway Slopes	5.93	0.02	-
MD	Open Tall Mulga / Hakea /Acacia shrubland on minor drainage	6.37	0.31	-
RG	Dense Mulga/Melaleuca. Rocky gully	0.12	-	-
SP	Sparse Mulga/Acacia/Eremophila/Hakea shrublands on stony plains with quartz and rocky outcrops.	62.16	42.26	17.35
SP (Chenopods)	Sparse chenopod dominated and Mulga shrubland on low quartz slopes and plains	67.26	12.28	4.03
SP (Samphire)	Open Samphire shrubland on stony plain	0.57	0.23	-
SR	Sparse Mulga/Eremophila on stony rise with quartz	12.81	0.45	0.04
GSFJWS	Flat stretching plains of coarse red granite sand, sparse vegetation consisting of shrubland and <i>Acacia aneura</i>	14.12	12.66	8.65
Dist	Disturbed land	122.76	119.53	1.51
Total		303.3	187.76	31.58

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253,800

254,700

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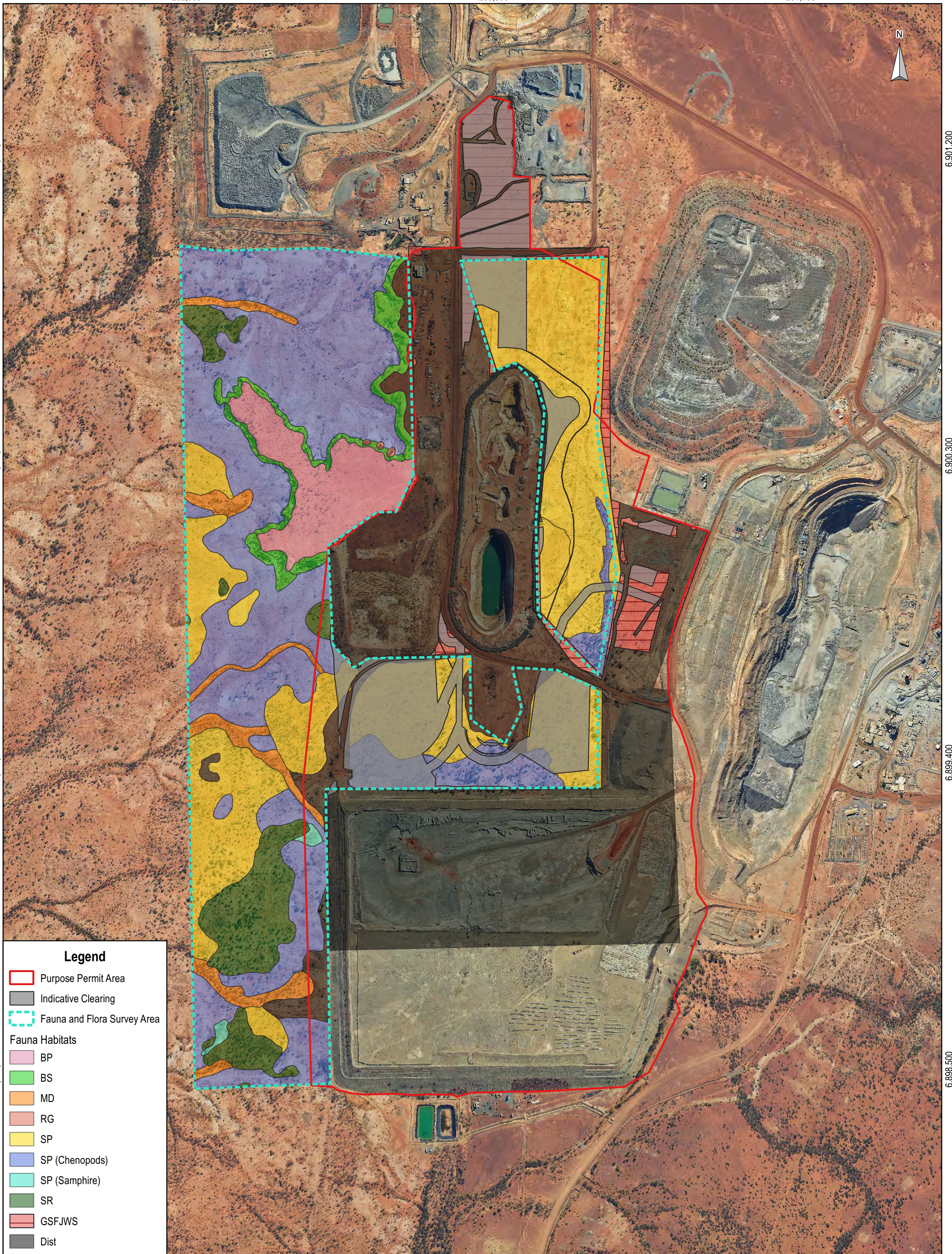
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252,900

253,800

254,700



Legend

- Purpose Permit Area
- Indicative Clearing
- Fauna and Flora Survey Area
- Fauna Habitats**
- BP
- BS
- MD
- RG
- SP
- SP (Chenopods)
- SP (Sapphire)
- SR
- GSFJWS
- Dist

Scale: 1: 10,000
 Original Size: A3
 Aerial Imagery: June 2022
 Grid: GDA94 / MGA zone 51 (EPSG:28351)

Gold Fields Australia Pty Ltd
 Agnew Gold Mine Hidden Secret Expansion

Figure 8

Fauna Habitats

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2.3.5.2 Significant Fauna

The desktop fauna assessment by Rapallo (2017) identified 29 species of conservation significant fauna as potentially occurring within 50 km of the Survey Area. These included eight species of Threatened fauna, one species of Other Specially Protected Fauna, thirteen species of Birds protected under an International Agreement, and seven DBCA Priority fauna species. The likelihood of these species occurring within the Survey Area was also assessed by Rapallo (2017). Of the 29 species identified, ten were assessed as having a likelihood of occurring ranging from possible to high including:

- Oriental Plover (*Charadrius veredus*) – Marine/Migratory species under EPBC Act and BC Act.
- Rainbow Bee-eater (*Merops ornatus*) – Marine species under EPBC Act.
- Peregrine Falcon (*Falco peregrinus*) – Specially Protected under BC Act.
- Common Greenshank (*Tringa nebularia*) – Marine/Migratory species under EPBC Act and BC Act.
- Fork-tailed Swift (*Apus pacificus*) – Marine/Migratory species under EPBC Act and BC Act.
- Sharp-tailed Sandpiper (*Calidris acuminata*) – Marine/Migratory species under EPBC Act and BC Act.
- Wood Sandpiper (*Tringa glareola*) – Marine/Migratory species under EPBC Act and BC Act.
- Carnaby's Cockatoo (*Calyptorhynchus latirostris*) – Endangered under EPBC Act and BC Act.
- Malleefowl (*Leipoa ocellata*) – Vulnerable under EPBC Act and BC Act.

All remaining fauna species were considered to have a low likelihood of occurrence within the Survey Area and are therefore not further discussed.

Marine/Migratory birds

Although these species were noted as having a high and potential likelihood of occurrence, they are likely only to be temporary visitors within the vicinity of the Purpose Permit Area given their migratory nature and extensive habitat both regionally and outside of the region. Vehicle strike is considered the greatest risk to these species; however, this can be mitigated through the enforcement of operational speed limits and education of personnel.

Carnaby's Cockatoo

No suitable feeding or breeding habitat was present in Survey Area (Rapallo 2017). Given regional records there is some potential for the Carnaby's Cockatoo to occasionally visit the Purpose Permit Area during migration but given the lack of feeding and breeding habitat any visits are likely to be infrequent.

Malleefowl

The Purpose Permit Area is located within the species range and the contains superficially suitable habitat (i.e., scrubland and woodland dominated by mallee and Acacia species). However, the DBCA nearest record is from Yeelirrie (2000), which is approximately 50 km away and Rapallo (2017) did not find any evidence of Malleefowl mounds. Although there is potential for malleefowl to occur across the larger mining area generally, given no evidence of malleefowl was recorded and the proximity to existing mining infrastructure, it is considered unlikely that malleefowl would occur within the Purpose Permit Area.

Arid Bronze Azure Butterfly (*Ogyris subterrestris petrina*)

The arid bronze azure butterfly (ABAB) is listed due to its severely fragmented distribution with only two extant subpopulations being recorded in Western Australia. These subpopulations are at Barbalin Nature Reserve (BNR), and at a second site ~100 km from Barbalin. A third subpopulation (the first discovered, in the 1980s) occurred near Lake Douglas, 12 km SW of Kalgoorlie, but is now locally extinct and no ABAB have been recorded there since 1993. The ABAB has an obligate association with a sugar ant *Camponotus* sp. nr. *terebrans*. The ABAB's larvae live entirely within the ant's nest during their development. The host ant colonies occur at the base of mature smooth-barked eucalypts. A survey to detect the ABAB is only required if a large colony of host ants is detected. The vegetation communities present within the Survey Area or Purpose Permit Area do not contain smooth bark

eucalypt species and are largely Mulga/Acacia vegetation communities. Therefore, the host ant and subsequently the ABAB are highly unlikely to occur.

Chuditch (Dasyurus geoffroi)

Most Chuditch are found in varying densities throughout the jarrah forest and south coast of Western Australia. They also occur at lower densities in the goldfields and wheatbelt, as well as in Kalbarri National Park. Chuditch use a range of habitats including forest, mallee shrublands, woodland and desert. The most dense populations have been found in riparian jarrah forest. Chuditch require adequate numbers of suitable den and refuge sites, such as horizontal hollow logs or earth burrows, and sufficient prey biomass (large invertebrates, reptiles and small mammals) to survive. The habitats of the Survey Area and Purpose Permit Area are not the preferred habitat for the Chuditch as they are dominated by a sandstone breakaway surrounded by stony plains and rises and vegetation associations which are typical mulga woodland or shrubland habitats with some saltbush shrublands. Furthermore, the fauna survey did not identify any habitat features (horizontal hollow logs or earth burrows) that would be suitable as den sites for the species. Therefore, the Chuditch is considered unlikely to occur within the Purpose Permit Area.

2.3.5.3 Subterranean Fauna

As discussed in Section 2.3.3 there is an absence of calcretes or other geologies supportive of subterranean fauna in the Survey Area and Purpose Permit Area which indicates that the likelihood of finding groundwater or stygofauna communities in the survey area is low.

2.3.6 Surface Water and Groundwater

2.3.6.1 Groundwater

The Hidden Secret pit void has a long, complex history of pit water abstraction and dewatering storage (AECOM 2022). Two significant aquifer systems have been identified in the Agnew – Hidden Secret area:

- Vuggy, siliceous bedrock aquifers developed through preferential secondary weathering of specific underlying rocks. The porosity is secondary, following breakdown of minerals within the rock. The aquifers are of limited area and are typically confined by low permeability material. Recharge to the aquifers is low and water is being removed (mined) from storage due to continued local dewatering from the New Holland open pit and underground development and the nearby Waroonga mine.
- Fractured rock aquifers associated with structural features, such as faults, joints, and shear zones particularly in metasediments. These deep fractured rock aquifers are typical in mines that require dewatering. The deeper fractured rock aquifer material appears to have little or no hydraulic connection to the overlying/adjacent bedrock aquifer.

The current groundwater level is between 31 mbgl and 37.6 mbgl with local groundwater quality of sodium-chloride type with TDS concentrations ranging between 2,000 and 2,700 mg/L (AECOM 2022).

2.3.6.2 Surface water

The Purpose Permit Area is within the Raeside-Ponton Catchment. There are no significant surface water bodies in close proximity to the Purpose Permit Area with the closest being Lake Miranda approximately 30 km north. The regional topography is relatively low, with plains rising from around 445 m Australian Height Datum (AHD) at Songvang to the south, 480 to 500 mAHD at Lawlers and Fairyland Agnew, and approximately 460 mAHD at Cams to the north. Project domains and features are generally located close to local catchment divides and as a result, catchments draining to the various project domains are generally small. Catchments drain mainly via ephemeral gullies and drainage lines, generally with poorly defined channels. The areas undulating geomorphology, shallow soil profile and sporadic nature of rainfall, results in the formation of sheet flow (AGMC 2020).

Rapallo (2017) described the drainage of the Survey Area as being characterised by minor runoff drainage from breakaway areas and stony rises, flowing predominantly to the southwest into larger drainage tributaries. Broadscale mapping shows one unnamed ephemeral, minor surface water drainage line within the Purpose Permit Area and

Indicative Clearing Area (Figure 2); however, based on the Rapallo (2017) site assessment, no drainage lines will be directly impacted by the proposed infrastructure or Indicative Clearing Area. Drainage lines and their respective vegetation types were characterised by vegetation communities 3 and 9 (Table 4) which fall predominantly outside of the Purpose Permit Area to the north and west (Figure 7).

The overarching surface water management approach by AGMC is focused on strategically placed flow control structures, channels and controlled discharge points aimed at diverting surface water runoff away from operational areas whilst maintaining natural surface water flows, minimising flood risk, and preventing erosion and sediment discharge to the receiving environment (AGMC 2020).

3. PROPOSED CLEARING AND MANAGEMENT

In order to assist in the continuation of mining at AGM, AGMC are proposing an expansion of their Hidden Secret operations including:

- Cutback of the Hidden Secret open pit.
- Expansion of the Waste Rock Landform (WRL West).
- Development of a WRL within TSF2.
- Installation of ancillary areas for access, material stockpiles and water storage.

In order to undertake this proposal AGMC are submitting this application to clear native vegetation. The proposed Indicative Clearing Area and Purpose Permit Area is shown in Figure 2. The proposal will require the clearing of up to 35 ha of native vegetation within the 235.63 ha Purpose Permit Area.

AGM have stringent environmental management measures that will be applied at all stages of the proposal to avoid, prevent and reduce environmental impacts arising from vegetation clearing. These will include but are not limited to the following:

- Ground disturbance will only be undertaken via the AGM Surface disturbance permitting process to ensure close oversight by of land clearing activities.
- Clearing areas will be clearly demarcated and clearing will be kept to a minimum to allow the proposal to be implemented.
- All Priority flora species with the avoided (located approximately 250 m northwest of the Purpose Permit Area).
- In the event Priority flora has been identified, locations will be clearly marked on site and GIS database, and employees educated so as to reduce the risk of accidental damage to these species.
- Where vegetation is cleared, the topsoil will be appropriately stockpiled for reuse later and returned directly to disturbed areas during progressive rehabilitation operations.
- Areas no longer being utilised will be progressively rehabilitated during the life of the operation.
- The potential impacts of clearing and construction, such as land degradation from erosion and sedimentation, will be managed by standard avoidance and mitigation measures including the installation of toe drains on the WRL and appropriate bunding around the pit and access roads. In addition, direct impacts to drainage lines will be avoided. Indirect impacts will be minimised through incorporation of strategically placed flow control structures, channels and controlled discharge points aimed at minimising flood risk and to reduce erosion and sediment discharge to the receiving environment (AGMC 2020).
- Common dust suppression management practices will be used to sufficiently manage dust from impacting adjacent vegetation including water cart sprays, operating machinery during favourable wind conditions and regulating traffic speeds.
- Operational speed limits will also be enforced to mitigate the risk of fauna and vehicle interactions.
- AGM have management processes in place to adequately manage feral animals and introduced flora species (weeds); these will be implemented during clearing activities and more broadly operationally across the Hidden Secret project area.

In addition to the above management measures Section 5 details the roles and responsibilities that AGM have allocated to ensure appropriate environmental management is implemented throughout all phases on the project.

4. ASSESSMENT OF CLEARING PRINCIPLES

Clearing applications are assessed against 10 principles outlined in Schedule 5 of the *Environmental Protection Act 1986* (EP Act). These principles aim to ensure that all potential impacts resulting from removal of native vegetation are assessed in an integrated way and apply to all lands throughout Western Australia.

The following sections provide an assessment of the impacts of the proposed clearing against the clearing principles. A summary of the outcomes of the assessment against the 10 Clearing Principles is provided in Table 6.

Table 6: Summary of Clearing Assessment Against Clearing Principle

Principle	Clearing Principle	Outcome
a	Native vegetation should not be cleared if it comprises a high level of biological diversity.	Not likely to be at variance
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.	Not likely to be at variance
c	Native vegetation should not be cleared if it includes, or is necessary, for the continued existence of rare flora.	Not likely to be at variance
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 (TEC).	Not likely to be at variance
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.	Not at variance
f	Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.	Not likely to be at variance
g	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	Not likely to be at variance
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 areas.	Not at variance
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.	Not at variance
j	Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding.	Not likely to be at variance

4.1 CLEARING PRINCIPLE A – BIODIVERSITY

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

Rapallo (2017) and Jim's Seeds, Weeds & Trees (2004) have previously undertaken flora and vegetation surveys of the Purpose Permit Area to determine its composition, condition and value. No Threatened flora or fauna species or TECs are present within the Purpose Permit Area.

The extent of clearing for each of the vegetation communities identified within the Purpose Permit Area are detailed in Table 4. From this it can be seen that the proposed disturbance to any individual mapped vegetation unit does not exceed 20%, with the exception of the vegetation community (1) Acacia-Hakea woodland / shrubland. quartz which will experience approximately 78% clearing of the mapped vegetation community within the Purpose Permit Area (Figure 7). Considering this native vegetation type does not comprise a high level of biodiversity, as its condition within the PPA ranged from poor to degraded and reflect of the majority of vegetation communities on site (Jim's Seeds, Weeds & Trees 2004), it is unlikely to be at variance with the principle.

4.1.1 Potential Impacts

Impacts to the biological diversity of native vegetation associated with clearing for the project expansion are limited to localised flora/habitat loss from clearing in the project area as well as the potential spread of existing weed species and the introduction of new weed species into the area.

4.1.2 Management and Mitigation

Clearing of vegetation will be kept to the minimum required for the project.

Managing clearing via an internal Land Clearing Procedure.

- Clearly delineating the clearing area to ensure only that required for a safe working area is cleared.
- Implement a procedure to record the amount of clearing undertaken and report the cumulative total in the Annual Environmental Report (AER) and Mine Rehabilitation Fund (MRF) reporting.
- Vehicle and equipment hygiene procedures will be implemented to minimise entry of weed and soil borne diseases.
- Site weed control will be conducted as required.

Given the widespread and common nature of vegetation communities in the region, absence of Threatened species or TECs in the proposed Purpose Permit Area the project area is not considered to comprise a high level of biological diversity. Therefore, the proposed clearing is considered unlikely to be at variance with Clearing Principle A.

4.2 CLEARING PRINCIPLE B – SIGNIFICANT FAUNA HABITAT

Principle (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.

A desktop fauna assessment by Rapallo (2017) identified 29 species of conservation significant fauna as potentially occurring within 50 km of the Survey Area. (2017). Of the 29 species identified, ten were assessed as having a likelihood of occurring ranging from possible to high.

Although these species were noted as having varied potential likelihood of occurrence, they were found either to be temporary visitors, or there was no suitable (or superficial) feeding and breeding habitats recorded within the proposed Purpose Permit Area.

4.2.1 Potential Impacts

The fauna survey identified nine broad fauna habitats within the project area as detailed in Table 5. The fauna habitats were considered typical for the East Murchison IBRA subregion (Rapallo 2017). It was noted by Rapallo (2017) that the breakaway habitat types (signified by specific sub-habitat types of BP and BS described in Table 5) represented relatively uncommon landforms in the wider region, potentially supporting fauna species not recorded elsewhere. However, these habitats were not identified by Rapallo (2017) as being significant for any conservation significant fauna and design of the project avoids any potential impacts to these habitat types.

4.2.2 Management and Mitigation

The main risk to fauna and habitat is loss or fragmentation through clearing activities.

Management measures to reduce impacts on fauna and habitat comprise:

- Clearing of vegetation will be kept to the minimum required for the project.
- Utilising existing disturbed areas and locating roads and infrastructure to avoid fauna habitat where possible.
- Managing clearing via an internal Land Clearing Procedure.
- Clearly delineating the clearing area to ensure only that required for a safe working area is cleared.
- Implement a procedure to record the amount of clearing undertaken and report the cumulative total in the Annual Environmental Report (AER) and Mine Rehabilitation Fund (MRF) reporting.
- Progressively rehabilitating disturbed areas on completion of Project activities.

Given the widespread and common nature of habitat in the region and absence of Threatened species or TECs in the proposed Purpose Permit Area, it is not considered to contain significant fauna habitat. Therefore, the proposed clearing is not likely to be at variance to Clearing Principle B.

4.3 CLEARING PRINCIPLE C – THREATENED AND PRIORITY FLORA

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

Site specific surveys have not identified any Threatened Species as being present within or adjacent to the Purpose Permit Area, however two Priority flora species were recorded, and are located outside of the Purpose Permit Area, approximately 250 m to the northwest (Figure 6).

4.3.1 Potential Impacts

No Threatened Flora as listed under the BC Act 2016 or Commonwealth EPBC Act were recorded within the survey area.

Given the absence of any threatened flora within the proposed Purpose Permit Area, the proposed clearing is not at variance with Principle C.

4.4 CLEARING PRINCIPLE D – THREATENED ECOLOGICAL COMMUNITIES

Principle (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 or PEC's were identified during the field survey conducted by Rapallo (2017). Database searches conducted by Rapallo (2017) identified one TEC and seven PECs within 50 km of the Purpose Permit Area, however none of the above communities overlap with the Purpose Permit Area and none are within close proximity (Rapallo 2017).

The TEC and six PECs are stygofauna communities or groundwater assemblages. The absence of calcretes or other geologies supportive of subterranean fauna in the Purpose Permit Area indicates that the likelihood of finding groundwater or stygofauna communities in the Purpose Permit Area is low, (Rapallo 2017). The absence of Banded Iron Formations in the Purpose Permit Area indicates that the likelihood of the Violet Range vegetation complex occurring in the project area is very low.

As the proposed clearing will have no impacts on TEC or PECs, it is not at variance with Clearing Principle D.

4.5 CLEARING PRINCIPLE E – REMNANT VEGETATION

Principle (e): Native vegetation should not be cleared if it is significant as remnant vegetation in an area that has been extensively cleared.

The pre-European vegetation types occurring in the project Purpose Permit Area are the Beard vegetation associations Wiluna 18, and Laverton 39 which will have at least 99.59 and 98.81 % remaining respectively within the Wiluna System of the Murchison IBRA Region (Table 3).

As large percentage of pre-European vegetation in the region and local area remains (>98%), clearing associated with the Project will not result in loss of a significant remnant of native vegetation. The proposed clearing will not be at variance with Clearing Principle E.

4.6 CLEARING PRINCIPLE F – WATERCOURSE OR WETLAND ENVIRONMENTS

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.

There are no wetlands of national importance (ANCA Wetlands) or conservation category wetlands within the project Purpose Permit Area. There are no significant surface water bodies in close proximity to the Purpose Permit Area with the closest being Lake Miranda approximately 30 km north.

Broadscale mapping shows one unnamed ephemeral, minor surface water drainage line within the Purpose Permit Area and Indicative Clearing Area (Figure 3) however based on the Rapallo (2017) site assessment, no drainage lines will be directly impacted by the proposed infrastructure or Indicative Clearing Area.

As the clearing will not impact wetlands, there are no GDEs and only minor drainage lines are present, the proposal will not be at variance with Clearing Principle F.

4.7 CLEARING PRINCIPLE G – LAND DEGRADATION

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

The condition of vegetation present in the Purpose Permit Area was assessed as Completely Degraded to Excellent using the scale developed by Keighery (1994). The Purpose Permit Area has been previously disturbed due to current and historical mining and exploration activities, as well as grazing activities. A maximum of 35 ha of clearing is required for this proposal.

4.7.1 Potential Impacts

Potential sources of land degradation from mining and construction activities include:

- Wind erosion during vegetation and topsoil stripping activities.
- Wind and water erosion of topsoil stockpiles and cleared areas.
- Wind and water erosion of rehabilitated surfaces, e.g. waste landforms.
- Water erosion due to changes in surface water flow.
- Soil compaction.

- Soil contamination i.e., Spills.
- Introduction and/or spread of weeds.

4.7.2 Management and Mitigation

The potential impacts of clearing and construction, such as land degradation from erosion and sedimentation, will be managed by standard avoidance and mitigation measures such as the installation of toe drains on the WRL and appropriate bunding around the pit, material stockpiles and access roads. In addition, impacts to drainage lines within proximity to the proposal will be minimised through incorporation of strategically placed flow control structures, channels and controlled discharge points aimed at minimising flood risk and to reduce erosion and sediment discharge to the receiving environment (AGMC 2020).

Due to the absence of water bodies within the Purpose Permit Area, land degradation from erosion and reshaping of the landscape from localised flooding would not be expected during typical weather conditions. Due to the low presence of weeds within the Purpose Permit Area, land degradation from weed infestation would not be expected.

In the context of intact vegetation on a regional scale and existing level of localised land degradation, the scale of disturbance from the proposed clearing is not anticipated to increase land degradation. As such, the project will not likely be at variance with Clearing Principle G.

4.8 CLEARING PRINCIPLE H - CONSERVATION ESTATE

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 Purpose Permit Area is not associated with any conservation lands and not located within DBCA within or Managed Lands. The closest Conservation Reserve is the Wanjarri Nature Reserve which is located approximately 57 km north of the Purpose Permit Area.

The project area does not contain any Environmentally Sensitive Area's (ESAs) listed under the *Environmental Protection Act 1986*. The nearest ESA is approximately 37 km to the west.

Due to the distance from the Wanjarri Nature Reserve, clearing of the site is not considered to be at variance with Clearing Principle H.

4.9 CLEARING PRINCIPLE I - SURFACE AND GROUNDWATER QUALITY

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.

The Purpose Permit Area is not located within a Public Drinking Water Source Area (DWER 2022). The Purpose Permit Area is located within the proclaimed Goldfields groundwater area under the *Rights in Water and Irrigation Act 1914*. Any groundwater extraction and/or taking or diversion of surface water for the purposes other than domestic and/or stock watering is subject to licence by the Department of Water and Environmental Regulation (DWER).

There are no permanent watercourses or wetlands located within the Purpose Permit Area. The closest significant water feature is Lake Miranda approximately 30 km north of the Purpose Permit Area.

Groundwater quality in the area is classified as saline with TDS concentrations ranging between 2000 and 2,700 mg/L (AECOM 2022). Ephemeral, minor surface water drainage lines in proximity to the proposal only flow following heavy rainfall and drain water from more elevated features southwest into larger drainage tributaries.

4.9.1 Potential Impacts

Surface water quality has the potential to be affected by increased sedimentation caused through clearing and soil disturbance and removal of vegetation that acts to bind soil, including riparian vegetation. This may result in a localised decrease in surface water quality. Surface water will be managed in accordance with AGO-ENV-PR001 – Ground and Surface Water Management Procedure. Hydrocarbon spills may occur from earth moving machinery used for land clearing activities. Uncontained spills may affect surface and/or groundwater quality. Hydrocarbons will be managed in accordance with AGO-ENV-PR009 – Hydrocarbon and Chemical Spill Management Procedure.

4.9.2 Management and Mitigation

Management measures to prevent contamination of surface and groundwater quality include:

- Hydrocarbons will be stored in bunded areas.
- Project design has considered locations of ephemeral drainages and minimised disturbance of these.
- Where necessary, surface water drainage infrastructure will be installed to divert surface water flows around cleared areas and back to downstream catchments.
- Spill kits will be maintained at the site to allow containment and treatment of spillages of hydrocarbons.
- Progressive rehabilitation of completed areas to minimise active areas exposed where possible.

Impacts to surface water and groundwater quality from the proposed clearing are not anticipated to be significant. Localised, short term impacts on surface water quality can be managed using standard erosion and sediment control mitigation measures. Overall, the proposed clearing is considered not to be at variance with Clearing Principle I.

4.10 CLEARING PRINCIPLE J – FLOODING POTENTIAL

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

The Purpose Permit Area is within a non-seasonal arid region that experiences a mean rainfall of 251.6 mm (BOM, 2022). Precipitation is predominantly associated with sporadic summer cyclonic rainfall and thunderstorms. No month in a given year can be considered reliably wet, and zero rainfall can be recorded in any month.

4.10.1 Potential Impacts

Removal of vegetation generally increases flooding whereby uptake, infiltration, moisture retention and physical barriers to reduce flow velocities provided by vegetation are also removed. The soils of the Purpose Permit Area include deep sands and loamy earths; hence it is likely that the surface water rapidly infiltrates the soil rather than form sheet flow (with the exception of large rainfall events, which are likely to result in some surface runoff).

4.10.2 Management and Mitigation

Management strategies to prevent flooding include:

- Project design has considered location of drainage lines and flood levels with the aim of minimising disturbance of these areas.
- Existing flow paths will be maintained where possible.

- Diversions will be installed where necessary to direct surface flow away from cleared areas.
- Diversion will be constructed such that surface water will flow into local drainage lines at rates similar to natural flows.

Overall, the proposed clearing will have no detectable increased impact on flooding potential for Project area or its immediate surrounds. Therefore, the proposed clearing will not be at variance with Clearing Principle J.

5. ROLES AND RESPONSIBILITIES

In addition to the management measures listed in Section 4 and referred to throughout this document, the following sections detail the roles and responsibilities that AGM have allocated to ensure appropriate environmental management is implemented throughout all phases on the project.

5.1 GENERAL MANAGER

- Ensure appropriate resources and systems are provided to implement the management and mitigation measures outlined in this document.
- Overall responsibility for ensuring that all supervisory, management employees and contractor personnel are aware of, and understand, their responsibilities under environmental approvals.
- Oversee the implementation of any corrective and remedial actions arising from audits and incident investigations.

5.2 LEAD: ENVIRONMENT AND COMMUNITY

- Ensure all land clearing for the proposal is conducted in compliance with approvals and other regulatory requirements.
- Ensure all employees and contractors on site are aware of and adhere to obligations regarding clearing requirements.
- Ensure adequate processes are maintained to communicate relevant information with internal stakeholders.
- Ensure that all the required information is provided in the NVCP application, and that data is accurate.
- Conduct visits and inspections to ensure all work complies with commitments and management measures outlined in this NVCP.
- Record and report environmental incidents to the Project Director and Regulator.
- Undertake incident cause analysis method investigations where required and manage the implementation of corrective and remedial actions arising from audits and incident investigations.
- Review and approve all internal surface disturbance permit applications.
- Maintain internal disturbance registers.
- Compile and collate vegetation clearing data for annual reporting in Annual Environmental Reports.

5.3 MINING MANAGEMENT

- Ensure management measures contained in this application and associated plans and procedures are implemented.
- Ensure that land clearing is undertaken only as authorised by the surface disturbance permits.
- Conduct site walkovers of areas with clearing machinery operators prior to clearing.
- Ensure that post-clearing surveys are conducted, and that data is provided to the Environmental Social Governance Manager.
- Report environmental incidents.

5.4 ALL EMPLOYEES AND CONTRACTORS

- Undergo site specific inductions.
- Prevent contamination of vegetation, topsoil and subsoil stockpiles.
- Adhere to all obligations in relation to vegetation clearing procedures.
- Report environmental incidents.
- Keep to existing tracks unless following advice from their Supervisor.
- Adhere to standard soil hygiene practices and spill response when operating machinery.
- Aid in implementing and maintaining environmental impact minimisation programs when requested by the Environmental Social Governance Manager.

6. REPORTING AND AUDITING

Disturbance as a result of the proposed vegetation clearing will be reported yearly under the AGM Annual Environmental Report (AER) and Mine Rehabilitation Fund (MRF) reporting.

Upon approval of this NVCP application and application of subsequent conditions, an annual compliance report will be submitted to DMIRS.

7. CONCLUSION

The vegetation and habitats present within the proposed Purpose Permit Area are well represented on a local and regional scale. It is considered unlikely that there will be any impact on the conservation status of relevant flora and fauna species or vegetation communities and there are likely to be only minor local impacts from loss and fragmentation of vegetation and fauna habitat.

In addition, AGM have stringent environmental management measures that will be applied at all stages of the proposal to avoid, prevent and reduce environmental impacts arising from vegetation clearing.

The proposed clearing will not impact significantly upon the ten clearing principles and a range of environmental management procedures are in place to ensure that clearing will be managed to minimise any potential adverse impacts. Rehabilitation will minimise exposed areas and the long-term loss of vegetation cover.

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APPENDICES

APPENDIX 1: FLORA AND FAUNA SURVEY (RAPALLO 2017)

Report No. J017883

Level 1 Flora and Fauna Survey of the Hidden Secret, Leviathan and Songvang Corridor Project Areas

Prepared for: Agnew Gold Mining Company

Date: 22 May 2017

Rapallo Environmental is a Western Australian consultancy with a strong reputation for technical excellence, client-focus and innovation. We build long-term alliances through outstanding delivery on a range of services to the resource sector, government and associated industries.



ENVIRONMENTAL

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CONSTRUCTION &
OPERATIONS
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MINING

RESOURCE
MANAGEMENT

Report No. J017883

Level 1 Flora and Fauna Survey of the Hidden Secret, Leviathan and Songvang Corridor Project Areas
Prepared for Agnew Gold Mining Company

17 November 2016

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Executive Summary

Rapallo Group Pty Ltd (Rapallo) was commissioned by Agnew Gold Mining Company (AGMC) to complete flora and fauna surveys in three project survey areas (PSAs) where future mining activities may occur. The PSAs are: Hidden Secret, Leviathan, and the Songvang Corridor. Each PSA intersects several mining leases.

Surveys included:

- Desktop review for flora and fauna;
- Level 1 reconnaissance flora and vegetation survey;
- Level 1 reconnaissance vertebrate fauna survey.

The purpose was to investigate and document the biological values of the PSAs, with the aim to minimise any potential impacts on the environment, and to collect data required for regulatory approvals documentation.

The surveys occurred from 24 to 29 September 2016.

Desktop Review – Flora

The flora desktop survey yielded a total of 74 taxa of conservation listed flora, and ten weeds, recorded from within 50 km surrounding the project area. The list of conservation significant taxa comprises four Threatened flora taxa, five Priority 1 taxa, 42 Priority 3 taxa, and six Priority 4 taxa. The greater majority of records were from the DPaW threatened and priority flora search, and these served to verify records from earlier fieldwork and desktop searches in the area.

The desktop review also revealed a number of priority flora that were flagged as conservation significant in previous survey reports, but which are currently no longer conservation listed. These taxa should be kept in mind when referencing these reports and removed from any current or future management plans.

The de-listed taxa are:

- *Acacia balsamea* (formerly Priority 3, now not listed)
- *Baeckea* sp. Melita Station (H. Pringle 2738) (formerly Priority 3, now not listed)
- *Calytrix erosipetala* (formerly Priority 3, now not listed)
- *Calytrix uncinata* (formerly Priority 3, now not listed)
- *Eucalyptus striaticalyx* (formerly Priority 1, now not listed)

In addition, several priority taxa that were flagged as Priority 1 in previous survey reports have currently been reassessed as a lower priority level. These include:

- *Baeckea* sp. Sandstone (C.A. Gardner s.n. 26 Oct. 1963) (Priority 3)
- *Calytrix verruculosa* (Priority 3)
- *Eremophila pungens* (Priority 4)
- *Grevillea inconspicua* (Priority 4)
- *Hemigenia exilis* (Priority 4)
- *Sauropus* sp. Woolgorong (M. Officer s.n. 10/8/94) (Priority 3)
- *Thryptomene* sp. Leinster (B.J. Lepschi & L.A. Craven 4362) (Priority 3)

Flora and Vegetation Survey Results

The Level 1 flora and vegetation survey of Hidden Secret, Leviathan and the Songvang Corridor PSAs identified 171 flora taxa, belonging to 40 families. For each individual PSA, these numbers are as follows. Hidden Secret: 67 taxa from 22 families, Leviathan: 100 taxa from 26 families, Songvang Corridor: 81 taxa from 24 families.

Conservation Significant Flora

Three taxa of conservation significant flora were recorded during the survey. These were:

- *Calotis* sp. Perrinvale Station (R.J. Cranfield 7096) – Priority 3
- *Thryptomene* sp. Leinster (B.J. Lepschi & L.A. Craven 4362) – Priority 3
- *Eremophila pungens* – Priority 4

Calotis sp. Perrinvale Station was only recorded in Leviathan. *Thryptomene* sp. Leinster and *Eremophila pungens* were recorded at Hidden Secret only.

Vegetation Communities

A total of 25 vegetation communities were recorded in Hidden Secret, 13 in Leviathan, and nine in the Songvang Corridor. Due to distance between the PSAs and differences in underlying geology, there was no overlap in vegetation communities between the PSAs.

Threatened and Priority Ecological Communities

The DPaW threatened and priority ecological communities database search identified one TEC and seven PECs within 50 km of the project area. None of these communities overlap with the PSAs.

The TEC and six PECs are stygofauna communities or groundwater assemblages. The absence of calcretes or other geologies supportive of subterranean fauna in the PSAs, as well as a review by Biota (2004) on likelihood of stygofauna occurrence in the Songvang prospect, indicates that the likelihood of finding groundwater or stygofauna communities in the PSAs is low.

The absence of Banded Iron Formations in the project area indicates that the likelihood of the Violet Range vegetation complex occurring in the project area is very low.

Desktop Review – Fauna

The fauna desktop review 29 species of protected fauna. These included eight species of Threatened fauna, one species of Other Specially Protected Fauna, thirteen species of Birds protected under an International Agreement, and seven Priority fauna species. The desktop review also yielded nine introduced (feral) fauna species.

The review found that of the 29 species of protected fauna, only three were assessed as having a high likelihood of occurring in the PSAs. These species were: Peregrine Falcon, Rainbow Bee-eater and Oriental Plover. None of these species would be restricted to the habitats of the PSA.

Fauna and Habitat Survey Results

The Level 1 fauna survey recorded 32 bird species, five reptile species, and thirteen mammal species from the three PSAs combined. No frogs were recorded. The greatest number of vertebrate fauna was recorded in Hidden Secret, with 34 species. This was partially due to the fact that acoustic bat surveys were only done in Hidden Secret, and five species of bat were recorded. Leviathan yielded 24 species, while only fifteen species were recorded in the Songvang Corridor.

The Level 1 fauna survey recorded sixteen different fauna habitats in Hidden Secret, seven fauna habitats in Leviathan, and five fauna habitats in the Songvang Corridor. All habitats were generally typical for the mulga shrubland/woodlands of the Murchison region. However, the breakaways area in Hidden Secret represents a relatively uncommon landform in the wider region.

Conservation Significant Fauna

None of the fauna species recorded in the PSAs are of conservation significance. However, the conservation listed Oriental Plover (*Charadrius veredus*) was recorded opportunistically outside the survey areas while the Rapallo team was travelling to site.

The following management recommendations are proposed in order to protect the biological values of the PSA during development of the project.

Recommendations

A general recommendation for all areas is to communicate to personnel about the potential for fauna on the roads, especially during dawn and dusk, and to adhere to appropriate driving speeds. This is especially relevant for the protected bird species Oriental Plover, which was recorded near the project area.

Hidden Secret

It is recommended that the breakaway plateau and slopes are avoided where possible. The breakaway area represents a relatively uncommon landform in the wider region, supporting fauna species not recorded elsewhere. The breakaway plateau also supports an extensive community of priority flora, i.e. *Eremophila pungens* (Priority 4) and *Thryptomene* sp. Leinster (Priority 3).

Ruby Dock (**Rumex vesicarius*) was recorded colonising the breakaway slopes proximal to the mining operations, occurring in many scattered spots. This weed species is wind dispersed and is likely to spread further quickly every year if not controlled. It is recommended that these areas are sprayed to reduce likelihood of spread.

Leviathan

Ruby Dock (**Rumex vesicarius*) was recorded all along the causeway at Leviathan. It is recommended that these areas are sprayed to reduce likelihood of spread. The causeway at Leviathan is interrupting water flow and causing water accumulation/starvation to the mulga communities. It is recommended that culverts are installed to restore flow.

Although not significant communities, the Mulga woodland habitat patches at Leviathan do provide refugia for fauna. The vegetation community *Acacia caesaneura* low forest patch should be avoided where possible so it can be retained as refugia.

Songvang Corridor

Seven weed species were recorded along the Songvang Corridor, with Ruby Dock (**Rumex vesicarius*) being the most common. It is recommended to manage Ruby Dock where practical.

1 Project Location and Scope

Agnew Gold Mining Company (AGMC) is a subsidiary of Gold Fields Australia Pty Ltd (Goldfields). AGMC operates the Agnew Gold Mine, located 23 kilometres south-west of Leinster, and 300 kilometres north of Kalgoorlie in Western Australia. AGMC is currently undertaking exploration activities with potential to develop into mining operations.

Rapallo Group Pty Ltd (Rapallo) was commissioned by AGMC to complete flora and fauna surveys in three project survey areas (PSAs) where future mining activities may occur. The PSAs are: Hidden Secret, Leviathan, and the Songvang Corridor. Each PSA intersects several mining leases. Details of the PSAs are shown in Table 1. The location and of the PSAs is shown in Figure 1.

Table 1 Details of the Project Survey Areas

Project Survey Area	Details of proposed development	Mining Leases	Area (ha)
Hidden Secret	Potential open pit mine expanding Glasgow Lass excavation and Dobra Serica (north of Glasgow Lass) in close proximity to breakaways.	M36/27, M36/32, M36/314	175
Leviathan	Potential open pit mine and associated infrastructure east of Fairyland Pit and Waste Rock Landform in close proximity to surface drainage zones.	M36/277, M36/622, M36/623	199
Songvang Corridor	Pipeline corridor adjacent to existing haul road disturbance (\pm 5.2 km length).	M36/55, M36/65, M36/284, M36/450	16

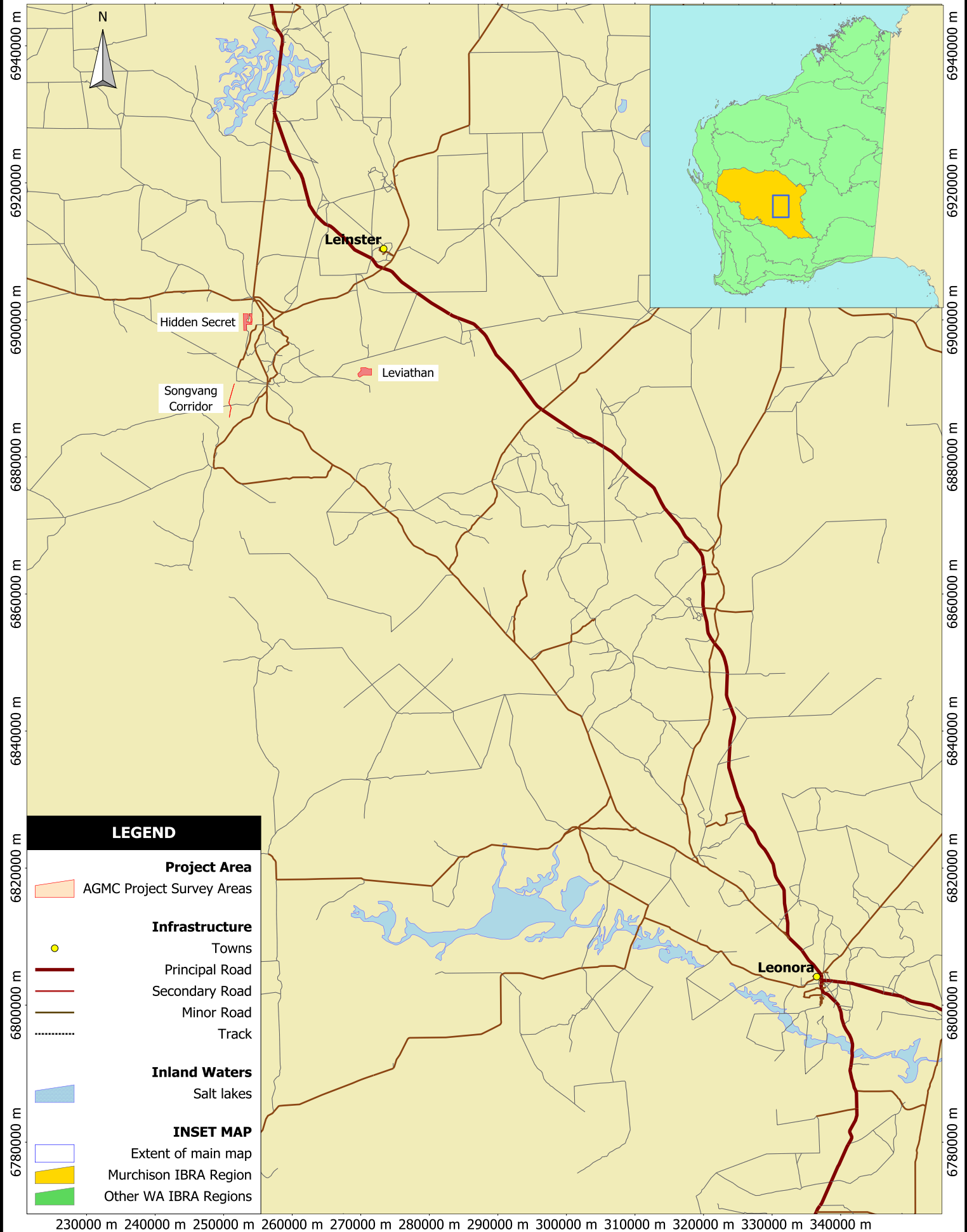
1.1 Scope

AGMC requested Rapallo to complete the following surveys within the PSAs, in accordance with the Environmental Protection Authority (EPA) Guidance Statements 51 and 56 (EPA 2004a; b):

- Desktop review for flora and fauna;
- Level 1 reconnaissance flora and vegetation survey;
- Level 1 reconnaissance vertebrate fauna survey.

The purpose of the surveys was to investigate and document the biological values of the PSAs, with the aim to minimise any potential impacts on the environment, and to collect data required for regulatory approvals documentation.

230000 m 240000 m 250000 m 260000 m 270000 m 280000 m 290000 m 300000 m 310000 m 320000 m 330000 m 340000 m



230000 m 240000 m 250000 m 260000 m 270000 m 280000 m 290000 m 300000 m 310000 m 320000 m 330000 m 340000 m



Agnew Gold Mining Company

Level 1 Flora and Fauna survey of the Hidden Secret, Leviathan and Songvang Corridor PSAs

Scale: 1 : 700,000
Datum: MGA94 (51)



Figure 1

Location of the Project Survey Areas

2 Regional Context

2.1 Climate and Weather

The nearest Bureau of Meteorology (BOM) weather station is at Leinster Aerodrome (station number 012314) located approximately 30 km north-east of the Agnew Gold Mine. Mean monthly temperatures and rainfall recorded at the Leinster Aerodrome from 1994 to 2016 are shown in Figure 2.

The project area experiences hot summers and cool winters. The hottest month is January with a highest mean monthly temperature of 37.2 °C. July is the coolest month with lowest mean monthly temperature of 6.1 °C in July. Temperature can fluctuate greatly between years, with temperatures as high as 47.8 °C recorded in January 2013, and as low as -1.6 °C recorded in July 1999 (BOM 2016a).

The average annual rainfall recorded at the Leinster Aerodrome is 259.1 mm, with most rainfall occurring in the summer months (BOM 2016a). Rainfall is related both to dissipating tropical cyclones tracking southeast and to locally generated thunderstorms. Cyclonic activity is greatest between December and April, reflecting the tropical wet season in the north of the state (BOM 2016b). Rainfall amounts fluctuate greatly between years. In some years monthly rainfall in December, January, February and March was in excess of 100 ml, while in other years zero rainfall was recorded for the same months.

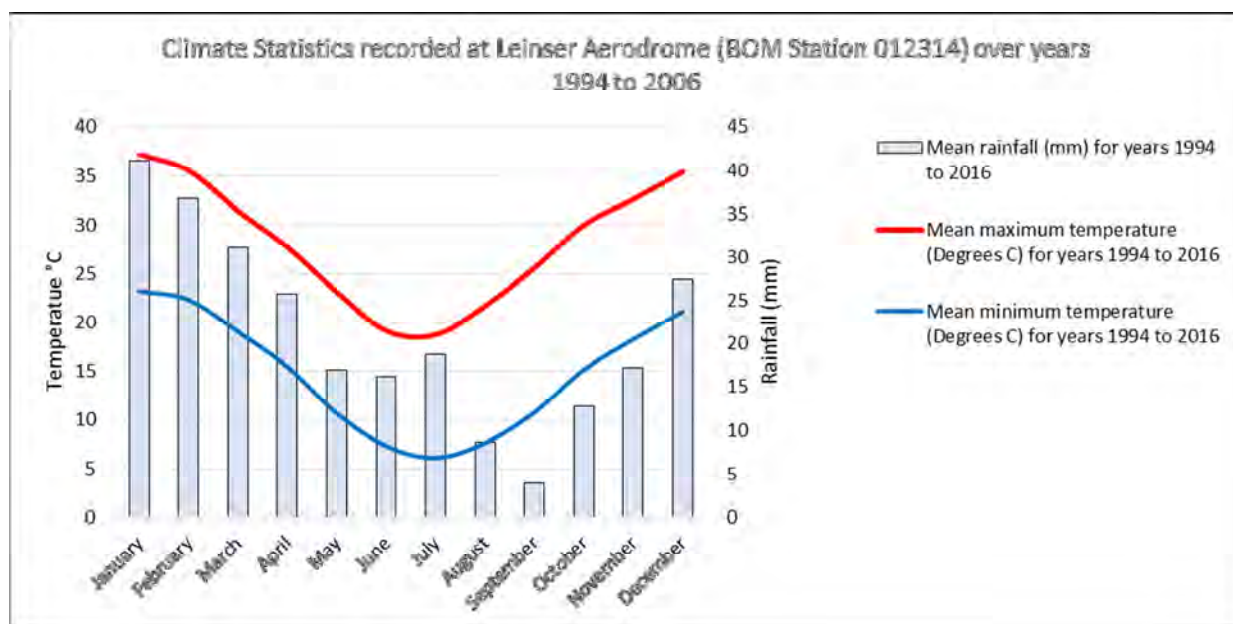


Figure 2 Mean monthly rainfall and temperatures at Leinster Aero weather station (012314)

During the field survey completed by Rapallo, from 24 to 29 September 2016, daytime temperatures were mild, with maxima ranging from 18.5 to 27.4 °C, and nights were cold, with minima ranging from 4.7 to 9.4 °C. No rainfall was recorded during the survey (Table 2).

In the months preceding the survey period, above average rainfall was recorded in June (28.0 mm) and July (29.6), although very little rain fell in August and September. The high rainfall in June and July is likely to have generated very suitable conditions for flowering and fruiting of plant species during the Rapallo survey in September.

Table 2 Daily temperature and rainfall during the survey (Leinster Aero weather station)

Survey date	Maximum Daily Temperature	Minimum Daily Temperature	Rainfall
24 September 2016	22.2 °C	7.3 °C	0 mm
25 September 2016	23.2 °C	9.4 °C	0 mm
26 September 2016	23.1 °C	9.2 °C	0 mm
27 September 2016	27.4 °C	8.7 °C	0 mm
28 September 2016	18.5 °C	8.1 °C	0 mm
29 September 2016	21.8 °C	4.7 °C	0 mm

2.2 Biogeography

2.2.1 IBRA Bioregions

The bioregions of Australia are described in the Interim Biogeographic Regionalisation for Australia (IBRA) (Thackway & Cresswell 1995). Bioregions are large, geographically distinct areas of land with common characteristics such as geology, landform patterns, climate, ecological features and plant and animal communities. The latest version, IBRA7, classifies Australia's landscapes into 89 large geographically distinct bioregions and 419 subregions (Department of the Environment and Energy 2016a).

The project area is situated in the East Murchison (MUR1) subregion (Cowan 2001) of the Murchison IBRA Region. The East Murchison subregion encompasses the northern parts of the 'Southern Cross' and 'Eastern Goldfields' Terrains of the Yilgarn Craton. It is characterised by its internal drainage. The major landforms of the East Murchison subregion include:

- Extensive areas of elevated red desert sandplains with minimal dune development.
- Salt lake systems associated with an occluded palaeodrainage system.
- Broad plains of red-brown soils.
- Breakaway complexes.

2.2.2 Land Systems

The mapping of soils, landscapes and vegetation in the Rangelands of Western Australia has been ongoing since the 1950s. Land systems are defined as “an area or group of areas throughout which there is a recurring pattern of topography, soils and vegetation”. Over the years, different parts of the Rangelands have been surveyed by various organisations, often in isolation from each other and using different methods and concepts. Some do not refer to land systems, but instead use the concept of ‘rangeland types’ or ‘broad pasture types’ instead (Tille 2006).

Over the past decades, the availability of digital mapping and database systems has led to gradual integration of the various maps and concepts into soil-landscape regions, provinces and zones. In this process, the original rangeland land system maps were used to identify broad patterns, which were further defined using (amongst others) the ASRIS Atlas of Australian Soils (CSIRO 2015), Beard’s botanical districts of Western Australia (1990), and the related IBRA Regions (Thackway & Cresswell 1995).

The project area lies within the Salinaland Plains Zone (zone 279) of the Murchison soil-landscape province (this province overlaps in part with the Murchison IBRA Region). The Salinaland Plains zone covers a very broad area of 132,450 km²) and is described as: Sandplains (with hardpan wash plains

and some mesas, stony plains and salt lakes) on granitic rocks (and some greenstone) of the Yilgarn Craton. Red sandy earths, Red deep sands, Red shallow loams and Red loamy earths with some Red-brown hardpan shallow loams, Salt lake soils and Red shallow sandy duplexes. Mulga shrublands with spinifex grasslands (and some halophytic shrublands and eucalypt woodlands). Located in the northern Goldfields from Lakes Barlee and Ballard to Wiluna and Laverton (Tille 2006).

At a finer scale, integrated digital maps were created of the rangelands land systems. The resulting shape file map of the rangelands land systems (Department of Agriculture 2007) was used to query the land systems of the project area. Each PSA straddles at least three different land systems (Table 3).

Table 3 Land Systems of the Project Survey Areas

Land System	Land Type	Description	Extent in PSA (ha)	Extent in WA (ha)
Land Systems of the Hidden Secret PSA				
Nubev Land System	Stony plains with acacia shrublands and halophytic shrublands	Gently undulating stony plains, minor limonitic low rises and drainage floors supporting mulga and halophytic shrublands.	38.8	153,799
Sherwood Land System	Mesas, breakaways and stony plains with acacia or eucalypt woodlands and halophytic shrublands	Breakaways, kaolinised footslopes and extensive gently sloping plains on granite supporting mulga shrublands and minor halophytic shrublands.	114.4	1,587,328
Wyarri Land System	Hills and ranges with acacia shrublands	Granite domes, hills and tor fields with gritty-surfaced fringing plains supporting mulga and granite wattle shrublands.	22.7	88,823
Land Systems of the Leviathan PSA				
Jundee Land System	Wash plains on hardpan with mulga shrublands	Hardpan plains with ironstone gravel mantles and occasional sandy banks supporting mulga shrublands.	118.7	661,594
Tiger Land System	Wash plains and sandy banks on hardpan, with mulga shrublands and wanderrrie grasses or spinifex	Gravelly hardpan plains and sandy banks with mulga shrublands and wanderrrie grasses.	65.6	110,786
Violet Land System	Stony plains with acacia shrublands and halophytic shrublands	Gently undulating gravelly plains on greenstone, laterite and hardpan, with low stony rises and minor saline plains; supporting groved mulga and bowgada shrublands and patchy halophytic shrublands.	5.7	583,687
Land Systems of the Songvang Corridor PSA				
Leonora Land System	Low hills with eucalypt or acacia woodlands with halophytic undershrubs	Low greenstone hills and stony plains supporting mixed stony chenopod shrublands.	11.5	126,856
Monk Land System	Wash plains and sandy banks on hardpan, with mulga shrublands and	Hardpan plains with occasional sandy banks supporting mulga tall shrublands and wanderrrie grasses.	4.7	998,652

	wanderrie grasses or spinifex			
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2.2.3 Soils

A digital map of the ASRIS Atlas of Australian Soils (CSIRO 2015) was queried in relation to the PSAs. Hidden Secret and the southern half of the Songvang Corridor fall within soil map unit Fa7; the southern part of the Songvang Corridor falls within map unit My50, while Leviathan fall within map unit BE6. These soil map units are described below:

- Fa7 Greenstone hills and low ranges with some slate and basalt: dominant soils are shallow stony earthy loams (Um5.51) on the steep slopes, while (Um5.3) and (Uc5.21) overlying red-brown hardpan occur on the stony pediments.
- My50 Broad plains with a scatter of surface gravels: chief soils are shallow neutral red earths (Gn2.12) and shallow earthy loams (Um5.3), in intimate micro-association. They are underlain by a red-brown hardpan at depths of 6-30 in.
- BE6 Extensive flat and gently sloping plains that sometimes have a surface cover of gravels and on which red-brown hardpan frequently outcrops: chief soils are shallow earthy loams (Um5.3) with associated (Gn) soils of units My50 and Mz23. As mapped, there are inclusions of units Oc47 and BB9.

2.2.4 Geology

The project area is situated upon the Yilgarn Craton. The surface geology underlying the project area is of Archaean origin. Hidden Secret is situated upon sedimentary rocks, while Leviathan and the Songvang Corridor are situated upon igneous mafic volcanic rocks (Geoscience Australia 2010).

The bedrock geology underlying Hidden Secret is of Neoproterozoic origin, while the bedrock under Leviathan and the Songvang Corridor is of Mesoproterozoic origin. Hidden Secret is situated upon the Jones Creek Conglomerate Formation, comprising metamorphosed conglomerate and sandstone sedimentary siliciclastic rocks. The northern half of the Songvang Corridor is situated upon Kalgoorlie Terrane greenstones comprising metamorphosed igneous volcanic ultramafic rock. The southern half of the Songvang Corridor is situated in part upon Kalgoorlie Terrane greenstones comprising fine to very fine grained mafic rock with minor ultramafic rock; and in part upon Yilgarn Craton Granites. The majority of Leviathan is underlain by Kalgoorlie Terrane greenstones comprising felsic volcanic and volcanoclastic rocks; with small sections underlain Kalgoorlie Terrane greenstones of ultramafic rock (DMP 2014).

2.3 Regional Vegetation

The project area is situated on the boundary of the Wiluna and Laverton phytographic Subregions of the Austin Botanical District in the Eremaean Botanical Province as mapped and described by Beard (1990).

The Eremaean Province has a desert climate without an assured growing season. In the North there is a summer rainfall maximum with dry spinifex grassland of *Triodia* and *Plectrarchne*, though deserts with intermittent rainfall, to low *Acacia-Eucalyptus* woodlands receiving evenly distributed rains in the south-west (WA Herbarium 2016).

The boundaries of the Austin Botanical District are broadly compatible with the boundaries of the Murchison IBRA Region. Vegetation of the Murchison IBRA Region is described as: Mulga low woodlands, often rich in ephemerals, on outcrop and fine-textured Quaternary alluvial and eluvial

surfaces mantling granitic and greenstone strata of the northern part of the Yilgarn Craton. Surfaces associated with the occluded drainage occur throughout with hummock grasslands on Quaternary sandplains, saltbush with shrublands on calcareous soils and Halosarcia low shrublands on alkaline alluvia. Areas of red sandplains with mallee-mulga parkland over hummock grasslands occur in the east (WA Herbarium 2016).

Within the Austin Botanical District, Leviathan and the Songvang corridor are located in the Laverton Subregion, but less than 10 km from the boundary with the Wiluna subregion. Hidden Secret straddles the boundary of the Laverton and Wiluna Subregions.

3 Methods

3.1 Scientific License

Collection of flora specimens was conducted under Licence SL011572 for “Scientific or Other Prescribed Purposes” issued by the Western Australian Department of Parks and Wildlife (DPaW), under the provisions of the Western Australian *Wildlife Conservation Act 1950*. As part of the license requirements, a copy of this report will be forwarded to the DPaW. Fauna surveying was conducted under the Western Australian *Wildlife Conservation Act 1950* Regulation 17 (01-000045-1).

3.2 Personnel

Table 4 outlines the personnel that were involved in the field survey and the preparation of this report.

Table 4 Personnel involved in this project

Name	Position	Field Survey	Taxonomic ID	Reporting	Review
Kate George	Principal Environmental Scientist	•		•	•
Conrad Slee	Senior Botanist	•	•	•	•
Marieke Weerheim	Environmental Scientist			•	

3.3 Desktop Review

A desktop review of regional flora, fauna, and ecological communities was completed. The following sources of information were included in the desktop review:

- Department of Parks and Wildlife (DPaW) databases for Threatened Flora, Threatened Fauna, and Threatened and Priority Ecological Communities (TEC-PEC);
- DPaW (2016) NatureMap online database;
- Birdlife Australia’s (2016) Birddata online database;
- Department of the Environment and Energy (2016a) Protected Matters Search Tool;
- Western Australian Herbarium (2016) FloraBase website.
- Reports of previous environmental surveys completed on behalf of AGMC, including:
 - ENV Australia (2008) Agnew Fauna Survey;
 - Jim’s Seeds Weeds and Trees (2004) Flora Survey of the Lawlers Gold Mine Leases
 - Jim’s Seeds Weeds and Trees (2006) Review of Flora and Fauna for Gold Fields Australia Agnew Gold Mine.
 - Minesite Rehabilitation Services (2003) Appraisal for the Flora and Fauna at the Proposed Songvang Open Cut Mine;
 - Onshore Environmental Consultants (2008a) Flora and Vegetation Survey Crusader, 450 South, Zone 2, and New Woman Prospects.
 - Onshore Environmental Consultants (2008b) Flora and Vegetation Survey Emu - Vivien Pipeline, Vivien, Vivien Gem, Turret North and Cinderella Prospects.
 - Woodman Environmental Consulting (2006) Vivien Project Flora and Vegetation Assessment.

- Biota Environmental Sciences (2004) Assessment of Stygofaunal Occurrence at the Songvang Prospect, near Leinster.

The above databases and reports were reviewed in order to place the natural values of the project area in a regional context, and to identify threatened and priority flora, fauna, and ecological communities with the potential to occur in the project area. Results of the desktop review are discussed in section 4.1.

3.4 Level 1 Flora and Vegetation Survey

A Level 1 flora and vegetation survey was completed by one Rapallo botanist over a period of six days: 24 to 29 September 2016. The survey methods and assessment level were in accordance with Environmental Protection Authority (EPA) *Guidance Statement No. 51: Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* (EPA 2004a)

The three PSAs Hidden Secret, Leviathan and the Songvang Corridor were accessed by four wheel drive vehicle using existing tracks and surveyed on foot. The survey activities included the assessment of relevé sites, opportunistic collection of flora species and mapping of vegetation boundaries.

3.4.1 Relevé Sites

Nineteen relevé sites were selected for flora and vegetation assessment, within representative areas of vegetation community types identified in the field (Braun-Blanquet 1932). Of these sites, six were located in Hidden Secret, six in Leviathan, and seven in the Songvang Corridor. Central points of the relevé sites are mapped in Figure 3, Figure 4, and Figure 5, and coordinates listed in Appendix 2.

During the course of the survey the client revised the extent of the Leviathan PSA. As a result of this, relevé site LEV 06 now sits outside the new PSA boundaries. For the benefit of biological information, flora data for LEV 06 and vegetation maps within the old PSA boundaries has been included in this report.

The use of unbounded relevé sites provides a quick and efficient method to assess species composition and vegetation structure of the native vegetation. The selection of each relevé site was based on aiming to sample different vegetation community types within the three PSAs. Vegetation communities were initially determined visually in the field based on species composition, vegetation structure, landform and soils.

The relevé sites were complimented with the assessment and mapping of vegetation in the field, with reference to existing relevé sites and collected flora specimens. Many additional point locations within the three PSAs were described during the vegetation mapping phase. Each vegetation type was assigned a name for mapping purposes.

Relevé sites consisted of unbounded assessment plots that generally were less than 50m by 50m in area, centred on a GPS marked location. The following information was recorded within each relevé site:

- Site location (GPS coordinates) and photos.
- Geology, landform, and soil.
- Growth form, height, and density of all dominant flora taxa.
- Vegetation description according to National Vegetation Information System (NVIS) Level IV (Australian Government, Department of the Environment 2016b)
- Vegetation condition, according to Keighery (1994).

- Existing disturbances.

Flora specimens were collected of the dominant species in the relevé. Flowering and fruiting specimens were collected where possible to aid taxonomic identification.

Each specimen was assigned a unique field name and field number, and were marked with a plant tag containing specimen and location information. All specimens were pressed and dried on the day of collection, and transported to Perth for taxonomic identification. Fragile material such as flowers, seed capsules, or very small specimens were sealed in paper bags which were marked as per the plant tags.

3.4.2 Opportunistic Flora Collections

While traversing the survey area and during vegetation mapping, flora specimens were opportunistically collected of taxa not represented in the relevés, of potential conservation significant species, weeds and those required (such as eucalypts) to accurately describe the vegetation.

The coordinates of opportunistic collections were recorded with a GPS. All opportunistic specimens were assigned a unique field name and number, and were tagged and pressed as described for the relevé specimens. Notes were taken on the vegetation type (i.e. field name) and relevant topography, geology and soil information.

3.4.3 Vegetation Mapping

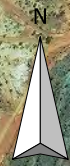
The extent of the broad vegetation types in the project area (as identified for the relevé surveys) was established by systematically traversing the survey area on foot. The boundaries of vegetation community types were recorded in the field on aerial imagery maps while surveying and ground-truthing. These vegetation boundaries were then digitised into polygons in a Geographic Information System (GIS) attributes layer in the office using Manifold software program. Vegetation maps are presented in this report, and the polygon shapefiles will be provided separately to AGGM. A broad vegetation description was recorded for each polygon in the field, which was linked to existing relevé sites and collected flora specimens. Where appropriate, other flora species within the vegetation were also recorded.

3.4.4 Specimen Identification

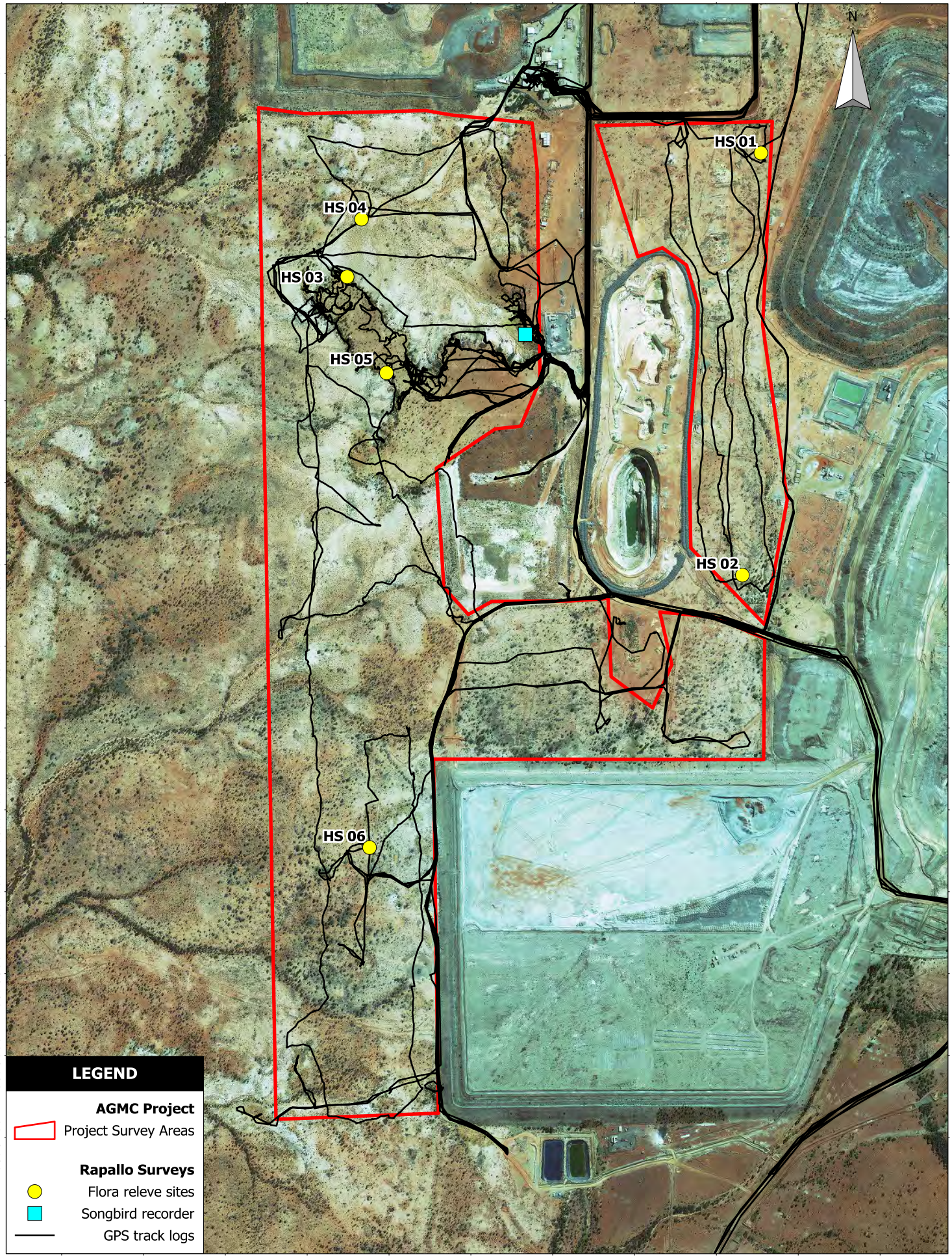
All flora specimens collected in the field were identified by Rapallo's botanical taxonomist (Conrad Slee) who was also the senior botanist who conducted the survey. The taxonomic identification of flora specimens was conducted with the use of the Reference Collection, latest flora identification keys and equipment available at the Western Australian Herbarium located in Kensington. Flora specimens were considered to be very good for identification purposes, with approximately 85% of the specimen taxa with some fruits or flowering parts. This enabled all specimens to be identified to species level (or beyond to subspecies or variety level). As part of the licence conditions, suitable voucher specimens will be lodged with the Western Australian Herbarium; these include specimens of:

- Conservation significant species.
- Species found outside their normal range (range extensions).
- Species which may represent a yet undescribed variety, species, or subspecies.
- Other species of significance, as defined by the EPA.

252400 m 252600 m 252800 m 253000 m 253200 m 253400 m 253600 m 253800 m 254000 m 254200 m 254400 m



6898400 m 6898600 m 6898800 m 6899000 m 6899200 m 6899400 m 6899600 m 6899800 m 6900000 m 6900200 m 6900400 m 6900600 m 6900800 m 6901000 m



6898400 m 6898600 m 6898800 m 6899000 m 6899200 m 6899400 m 6899600 m 6899800 m 6900000 m 6900200 m 6900400 m 6900600 m 6900800 m 6901000 m


252400 m 252600 m 252800 m 253000 m 253200 m 253400 m 253600 m 253800 m 254000 m 254200 m 254400 m

LEGEND

AGMC Project

 Project Survey Areas

Rapallo Surveys

 Flora releve sites

 Songbird recorder

 GPS track logs



Agnew Gold Mining Company

Level 1 Flora and Fauna survey of the Hidden Secret, Leviathan and Songvang Corridor PSAs

Scale: 1 : 12,000
Datum: MGA94 (51)

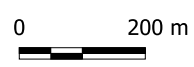
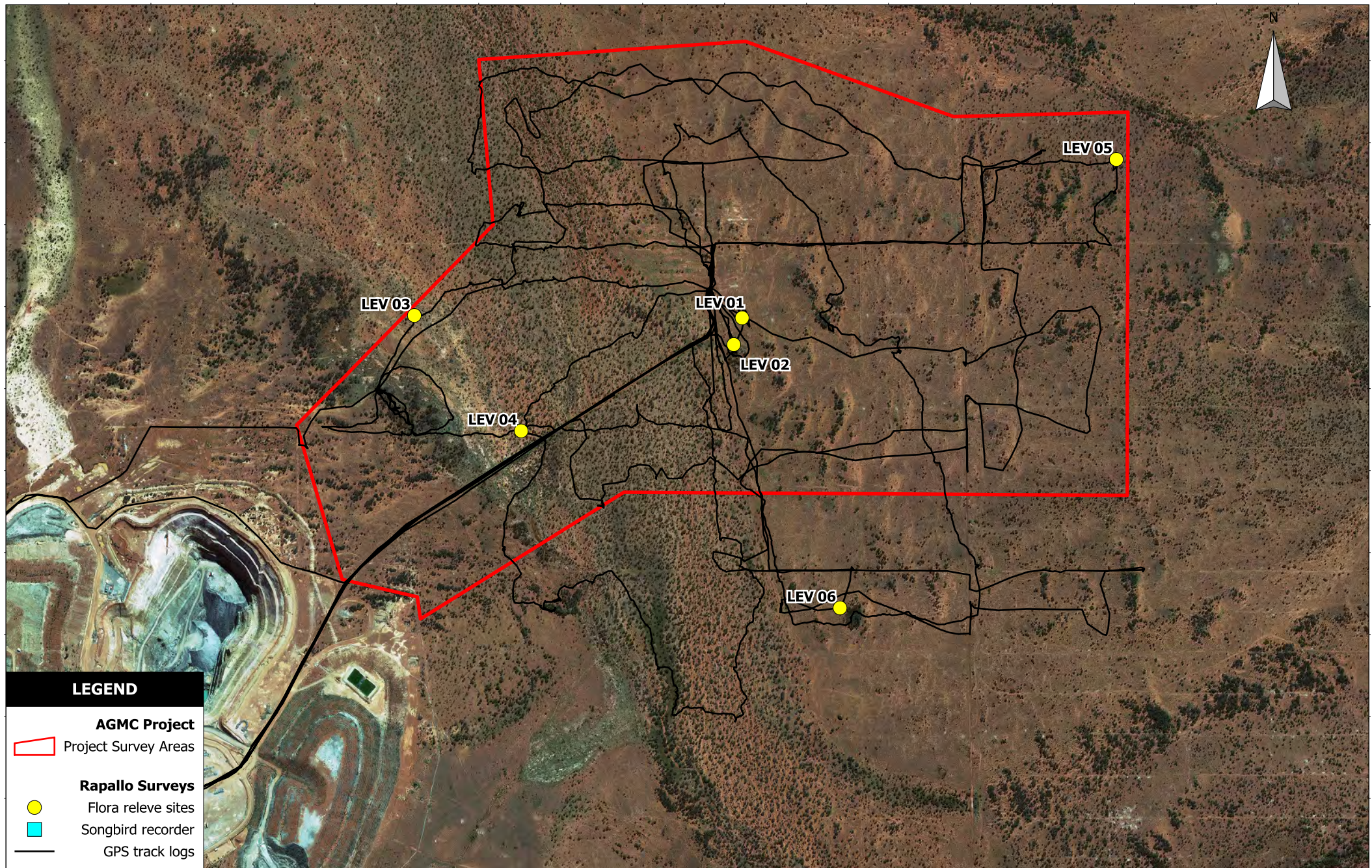


Figure 3

Hidden Secret:
Flora releve sites, songbird recorder, and flora and fauna survey tracks.

269000 m 269200 m 269400 m 269600 m 269800 m 270000 m 270200 m 270400 m 270600 m 270800 m 271000 m 271200 m 271400 m 271600 m 271800 m 272000 m

6891200 m 6891400 m 6891600 m 6891800 m 6892000 m 6892200 m 6892400 m 6892600 m 6892800 m 6893000 m



LEGEND

- ▭ **AGMC Project**
Project Survey Areas
- **Rapallo Surveys**
Flora releve sites
- Songbird recorder
- GPS track logs

269000 m 269200 m 269400 m 269600 m 269800 m 270000 m 270200 m 270400 m 270600 m 270800 m 271000 m 271200 m 271400 m 271600 m 271800 m 272000 m



Agnew Gold Mining Company

Level 1 Flora and Fauna survey of the Hidden Secret, Leviathan and Songvang Corridor PSAs

Scale: 1 : 12,000

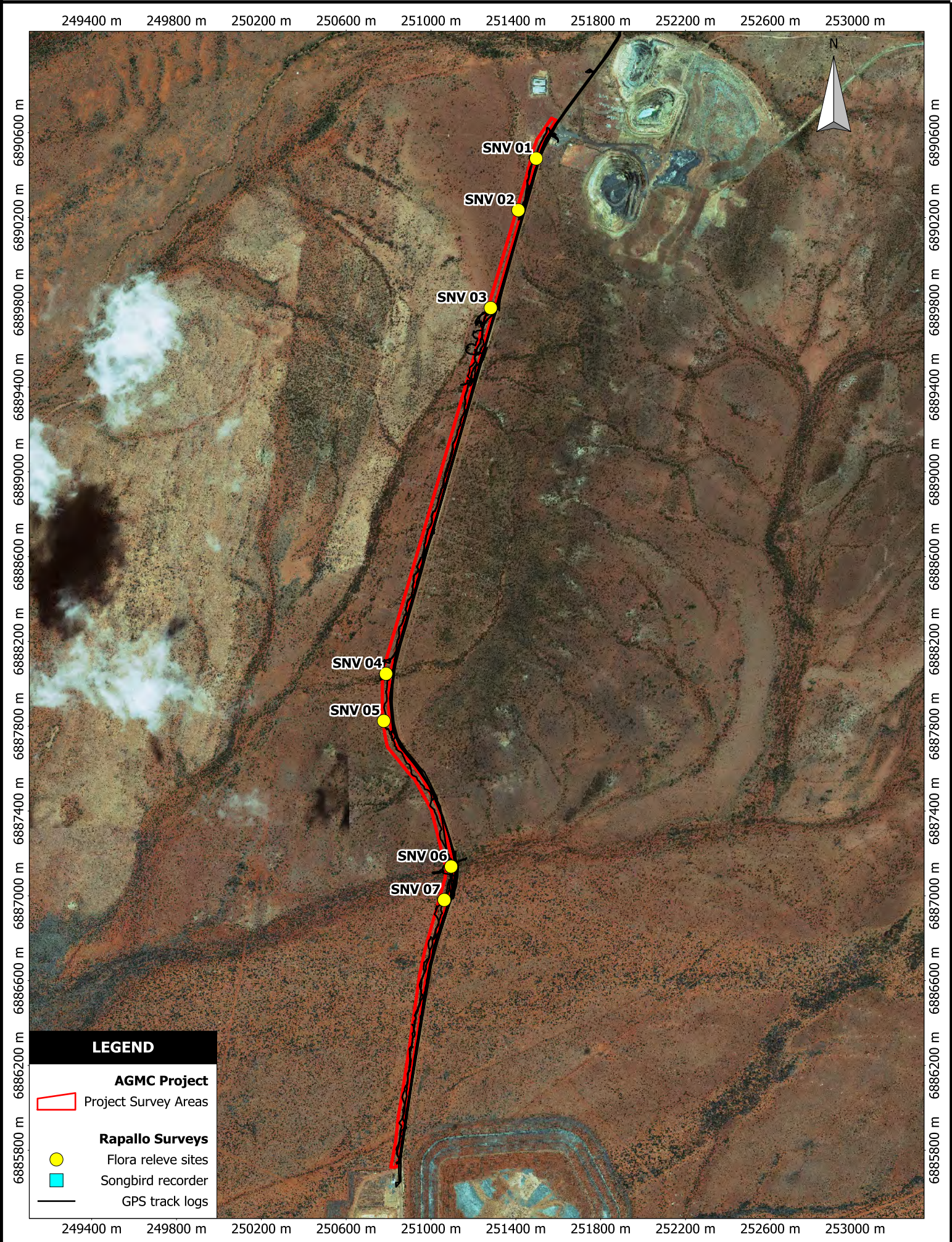
Datum: MGA94 (51)

0 200 m



Figure 4

Leviathan:
Flora releve sites, and flora and fauna survey tracks.



Agnew Gold Mining Company
 Level 1 Flora and Fauna survey of the Hidden Secret, Leviathan and Songvang Corridor PSAs

Scale: 1 : 22,000
 Datum: MGA94 (51)

0 >200 m

Figure 5
 Songvang Corridor:
 Flora releve sites, and
 flora and fauna survey tracks.

3.5 Level 1 Fauna Survey

A Level 1 (reconnaissance) vertebrate fauna survey was completed by one Rapallo ecologist over a period of six days: from 24 to 29 September 2016. The survey was conducted in accordance with the following EPA guidance documents:

- EPA Guidance Statement No. 56: *Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia* (EPA 2004b),
- EPA and DEC (2010) *Technical Guide - Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment*.

The target species groups were all terrestrial vertebrate fauna: mammals, reptiles, birds, and frogs. The project area was accessed by 4WD vehicle and surveyed on foot. Survey activities included foraging and opportunistic records, fauna habitat assessments, spotlighting, and acoustic bat surveys.

3.5.1 Fauna Habitat Assessments

The project area was traversed on foot with a focus on identifying the main fauna habitat types present in the three PSAs. Central coordinates were taken of fauna habitats and areas deemed of particular interest for conservation significant fauna.

Fauna habitat descriptions focussed on broad habitat types as relevant from a terrestrial vertebrate fauna perspective. The flora and vegetation mapping (section 3.4.3) was used as a guide to mark fauna habitat boundaries. For each fauna habitat identified, the following data was recorded.

- Broad vegetation description (in line with the flora survey)
- Topography, geology, and soil.
- Leaf litter depth and coverage.
- Suitability for species of conservation significance
- GPS coordinates of habitat boundaries, with notes on extent surrounding the waypoint.

3.5.2 Foraging and Opportunistic Fauna Records

During the systematic traverses of the project area, all opportunistic sightings of vertebrate fauna were recorded. Opportunistic records included direct fauna sightings and calls, and indirect evidence such as tracks, scats, burrows, and feeding signs. Photographs and GPS coordinates were taken of all indirect evidence, and notes were taken of abundance and locality where appropriate.

Hand foraging included turning rocks, logs, and old sheet metal, peeling bark, raking leaf litter and searching under vegetation. Hand foraging was conducted in all fauna habitat types, focusing on prospective areas for cryptic species.

3.5.3 Acoustic Bat Surveys

Bat species present in the project area were assessed through acoustic recordings of their calls using a Songbird SM2 device (SM2). The SM2 was set up overnight on the nights of 25, 26, 27, and 28 September 2016 at the base of a rocky outcrop in the Hidden Secret project area, at coordinates 51J 253533 mE 6900362 mS (see Figure 3). This locality was deemed most likely to support bats.

3.5.4 Fauna Specimen Identification

All vertebrate fauna species were identified in the field from sight, calls, or secondary evidence (tracks, scats, burrows, diggings, etc.). No fauna was captured. Photographs taken of fauna species or secondary evidence were compared against field guides and existing photographs to further verify identification.

3.6 Survey Limitations and Constraints

In accordance with EPA Guidance Statements No. 51 and 56 (EPA 2004a; b), an assessment of the limitations of the survey is presented in Table 5.

Table 5 Discussion of potential limitations and constraints experienced during the survey

Aspect	Constraint	Discussion
Experience of Consultants	No	The Senior Botanist on the project has extensive experience with over 15 years conducting flora surveys throughout Western Australia. He has worked in most bioregions of Western Australia including the Murchison. He is an experienced plant taxonomist and completed the specimen identifications for the project. The zoological assessment was completed by Rapallo's Principal Ecologist, who has nearly two decade of experience completing fauna surveys throughout Western Australia.
Scope	No	Scope and intensity of survey were suitable to achieve the survey aims of a Level 1 flora and fauna assessment.
Proportion of flora and fauna recorded, identified and/or collected.	No	The survey comprised a combined Level 1 flora and fauna survey. The Level 1 flora survey recorded dominant species in each structural layer within the relevé sites. The species list from the survey provides a good reflection of the overall flora occurring within the project survey areas at Level 1. All flora specimens were identified to species level. All fauna species observed in the field were identified.
Information sources e.g. previously available information (whether historic or recent) vs. new data.	No	Sufficient regional flora and fauna information was available to place the survey area in a regional context. However, there appeared to be a paucity of DPaW Threatened and Priority Fauna records within the direct vicinity of the project area, as evidenced by the DPaW Species and Communities personnel suggesting a 150 km radius search area.
Proportion of task achieved and further work may be required	No	The vegetation communities and fauna habitats of the project survey areas were adequately assessed at the intensity appropriate for the purpose of Level 1 flora and fauna assessments. The vegetation assessment and mapping presented in this report are based on a light field assessment at Level 1. As such, it should be noted that the vegetation mapping represents a broad overview only, and not the outcome of an extensive Level 2 flora and vegetation assessment.
Timing, weather, seasons. Cycle	No	The survey timing (September 2016) occurred within period recommended by the EPA for completing flora and fauna assessments within the region. Temperatures during the survey were mild, and daytime reptiles were active. In regards to the flora assessment, the project area experienced sufficient rainfall in the months preceding the survey, and 85% of flora taxa recorded in the survey carried reproductive material (flowers, fruits, seeds).
Disturbances that affected the survey	No	There were no disturbances that adversely affected the survey.

Aspect	Constraint	Discussion
Survey Intensity	No	Survey intensity was appropriate for the purpose of a Level 1 flora and fauna survey. The relevé survey method provides for basic vegetation mapping of the area.
Completeness of Survey	No	All the major vegetation communities and fauna habitats of the project area were surveyed.
Resources	No	The survey was adequately resourced.
Access Problems and Remoteness	No	The entire project area was readily accessible due to a network of unsealed roads, tracks and old exploration line.
Availability of contextual information within the region	No	Sufficient information is available to discuss the flora and fauna of the project area in a regional context.

4 Results

4.1 Desktop Results

4.1.1 Flora Desktop Results

The flora desktop survey yielded a total of 74 taxa of conservation listed flora, and ten weeds, recorded from within 50 km surrounding the project area. These are listed in Appendix 3. The list of conservation significant taxa comprises four Threatened flora taxa, five Priority 1 taxa, 42 Priority 3 taxa, and six Priority 4 taxa. The greater majority of records were from the DPaW threatened and priority flora search, and these served to verify records from earlier fieldwork and desktop searches in the area.

The DPaW search results comprised two types of data:

- Confirmed records of individuals or populations, with locality information included; and
- List of all conservation significant taxa that could possibly occur in the desktop search area based on distribution maps (FloraBase).

If only the confirmed records are taken into account, the desktop results only count sixteen conservation significant flora: three Priority 1 taxa, and ten Priority 3 taxa. To highlight the different levels of certainty regarding the occurrence of taxa near the project area, all entries based on actual survey records are marked with 'X' in Appendix 3, while all entries based on distribution maps only are marked 'L'.

The Rapallo Level 1 flora and vegetation survey (see section 4.2) recorded four Priority taxa and six weeds, which are highlighted in Appendix 3. These ten taxa include four taxa that were not picked up in the desktop search. These additional taxa have been included in the Appendix:

- *Calotis* sp. Perrinvale Station (R.J. Cranfield 7096) (Priority 3 flora) of the family Asteraceae
- **Centaurea melitensis* (weed)
- **Cuscuta epithimum* (weed)
- **Sonchus oleraceus* (weed)

Note 1

The desktop review also revealed a number of priority flora that were flagged as conservation significant in previous survey reports, but which are currently no longer conservation listed. These taxa should be kept in mind when referencing these reports and removed from any current or future management plans. The de-listed taxa are:

- | | |
|---|---------------------------------------|
| • <i>Acacia balsamea</i> | (formerly Priority 3, now not listed) |
| • <i>Baeckea</i> sp. Melita Station (H. Pringle 2738) | (formerly Priority 3, now not listed) |
| • <i>Calytrix erosipetala</i> | (formerly Priority 3, now not listed) |
| • <i>Calytrix uncinata</i> | (formerly Priority 3, now not listed) |
| • <i>Eucalyptus striatocalyx</i> | (formerly Priority 1, now not listed) |

In addition, several priority taxa that were flagged as Priority 1 in previous survey reports have currently been reassessed as a lower priority level. These include:

- *Baeckea* sp. Sandstone (C.A. Gardner s.n. 26 Oct. 1963) (Priority 3)

- *Calytrix verruculosa* (P3) (Priority 3)
- *Eremophila pungens* (P4) (Priority 4)
- *Grevillea inconspicua* (P4) (Priority 4)
- *Hemigenia exilis* (P4) (Priority 4)
- *Sauropus* sp. Woolgorong (M. Officer s.n. 10/8/94) (Priority 3)
- *Thryptomene* sp. Leinster (B.J. Lepschi & L.A. Craven 4362) (Priority 3)

The above changes in conservation status (including de-listing) affect all reports reviewed for the desktop (see list section 3.3), except Onshore (2008a).

Note 2

The common weed Double Gee (previously **Emex australis*) has undergone a review and name change. Its current name is **Rumex hypogaeus*.

4.1.2 Fauna Desktop Results

The fauna desktop review 29 species of protected fauna. These included eight species of Threatened fauna, one species of Other Specially Protected Fauna, thirteen species of Birds protected under an International Agreement, and seven Priority fauna species. The desktop review also yielded nine introduced (feral) fauna species.

The likelihood of these species occurring in the PSAs and the potential for them to be affected by project activities was reviewed, based the following sources of information:

- Johnstone and Storr (1998, 2004) Handbook of Western Australian Birds, Volumes I and II.
- Wilson and Swan (2013) Complete Guide to Reptiles of Australia
- Van Dyck and Strahan (2008) The Mammals of Australia
- Australian Government Department of the Environment and Energy (2016b) Species Profiles and Threats Database.
- Birdlife Australia (Birdlife Australia 2016) Birddata Database.
- National Recovery Plan for Malleefowl (Benshemesh 2007)
- Night Parrot Conservation Advice (Threatened Species Scientific Committee 2016)

The review found that of the 29 species of protected fauna, only three were assessed as having a high likelihood of occurring in the survey areas, and eight were assessed as possible to occur. The remaining species were assessed as having a low likelihood to occur in the survey areas. Of the nine species of introduced fauna, four were assessed as highly likely, four were assessed as possible, and one was assessed as unlikely to occur in the survey areas.

Fauna species considered highly likely or possible to occur in the PSAs are listed in Table 6. Please refer to Appendix 4 for the full list of fauna species identified in the desktop, and arguments for their assessment of likelihood.

Table 6 Fauna Desktop: Species considered highly likely or possible to occur in the project area

Scientific Name	Common Name	Status* ¹ WC Act	Status* ¹ EPBC Act	Likelihood of occurrence* ²
Threatened Fauna				
<i>Calyptrorhynchus latirostris</i>	Carnaby's cockatoo	EN	EN	Possible
<i>Leipoa ocellata</i>	Malleefowl	VU	VU	Possible
Birds Protected under and International Agreement				
<i>Tringa nebularia</i>	Common Greenshank	IA	M, IA	Possible
<i>Ardea modesta</i>	Eastern Great Egret	IA	M	Possible
<i>Apus pacificus</i>	Fork-tailed Swift	IA	M, IA	Possible
<i>Charadrius veredus</i>	Oriental Plover	IA	M, IA	High
<i>Merops ornatus</i>	Rainbow Bee-eater	IA	M	High
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	IA	IA, M	Possible
<i>Tringa glareola</i>	Wood Sandpiper	IA	M, IA	Possible
Other Specially Protected Fauna				
<i>Falco peregrinus</i>	Peregrine Falcon	OS	-	High
Introduced (Feral) Fauna				
<i>Bos Taurus</i>	Cattle	Feral	Feral	High
<i>Camelus dromedaries</i>	Dromedary Camel	Feral	Feral	Possible
<i>Canis lupus dingo</i>	Dog / Dingo	Feral	Feral	High
<i>Capra hircus</i>	Goat	Feral	Feral	High
<i>Felis catus</i>	Domestic Cat	Feral	Feral	High
<i>Mus musculus</i>	House Mouse	Feral	Feral	Possible
<i>Oryctolagus cuniculus</i>	European Rabbit	Feral	Feral	High
<i>Vulpes vulpes</i>	Red Fox	Feral	Feral	Possible

Footnotes

*1 Refer to Appendix 1 for conservation codes and their definitions.

*2 See Appendix 4 for a detailed review of likelihood assessment.

4.1.3 Ecological Communities Desktop Results

The DPaW threatened and priority ecological communities database search identified one TEC and seven PECs within 50 km of the project area. These are listed in Table 7. None of these communities overlap with the PSAs and the likelihood of future biological surveys identifying these communities within the PSAs are low, based on the assessment below.

The TEC and six PECs are stygofauna communities or groundwater assemblages. The absence of calcretes or other geologies supportive of subterranean fauna in the PSAs, as well as a review by Biota (2004) on likelihood of stygofauna occurrence in the Songvang prospect, indicates that the likelihood of finding groundwater or stygofauna communities in the PSAs is low.

The absence of Banded Iron Formations in the project area indicates that the likelihood of the Violet Range vegetation complex occurring in the project area is low.

Table 7 Threatened and Priority Ecological Communities recorded within 50 km of the project area

Community Name	Status	Distance to project*
Lake Miranda east calcrete groundwater assemblage types on Carey palaeodrainage on Yakabindie Station	Priority 1	32 km north of Hidden Secret
Lake Miranda west calcrete groundwater assemblage types on Carey palaeodrainage on Yakabindie Station	Priority 1	22 km north of Hidden Secret
Pinnacles calcrete groundwater assemblage type on Raeside palaeodrainage on Pinnacles Station	Priority 1	19 km south-west of Songvang Corridor
Yakabindie calcrete groundwater assemblage type on Carey palaeodrainage on Yakabindie Station	Priority 1	36 km north of Hidden Secret
Yandal calcrete groundwater assemblage type on Carey palaeodrainage on Yandal Station	Priority 1	41 km north-east of Leviathan
Depot Springs stygofauna community	Vulnerable	37 km west of Hidden Secret
Violet Range (Perseverance Greenstone Belt) vegetation complexes (banded ironstone formation)	Priority 1	40 km north of Hidden Secret

*Footnote: Distance measured from edge of TEC-PEC buffer zone to nearest Project Survey Area boundary.

4.2 Flora and Vegetation Survey Results

The Level 1 flora and vegetation survey of Hidden Secret, Leviathan and the Songvang Corridor PSAs identified 171 flora taxa, belonging to 40 families. For each individual PSA, these numbers are as follows. Hidden Secret: 67 taxa from 22 families, Leviathan: 100 taxa from 26 families, Songvang Corridor: 81 taxa from 24 families. The complete list of taxa and families is presented in Appendix 5.

The quality of material available in the field was good, with 85% of taxa recorded (67% of specimens collected) carrying either flowers, fruits, or seeds. Reproductive parts of the plant are important for species identification, and consequentially all specimens were able to be identified to species level, and many (37 taxa) to the level of subspecies, variety, or form.

The families Fabaceae (Acacias and Sennas) and Chenopodiaceae (saltbushes and Maireanas) were the most species-rich, with respectively 27 taxa and 25 taxa recorded in the survey areas. Also species-rich were the families of Asteraceae (Daisies) and Scrophulariaceae (Eremophilas) with respectively 18 and 16 taxa recorded.

4.2.1 Conservation Significant Flora

Three taxa of conservation significant flora were recorded during the survey. These were:

- *Calotis* sp. Perrinvale Station (R.J. Cranfield 7096) – Priority 3
- *Thryptomene* sp. Leinster (B.J. Lepschi & L.A. Craven 4362) – Priority 3
- *Eremophila pungens* – Priority 4

Thryptomene sp. Leinster and *Eremophila pungens* were only recorded in Hidden Secret (Figure 6), and *Calotis* sp. Perrinvale Station was only recorded in Leviathan (Figure 7). The coordinates of conservation significant flora are listed in Appendix 6. Please note that these only represents opportunistic records made within the limitations of a Level 1 flora survey. It is highly likely that more a detailed Targeted survey would uncover additional localities for these, and potentially other, conservation significant taxa.

***Calotis* sp. Perrinvale Station (R.J. Cranfield 7096) – Priority 3**

Calotis sp. Perrinvale Station (Plate 1, Plate 2) is a small herb in the Asteraceae family. It has yellow flowers. It only occurs in the Murchison and Yalgoo IBRA Regions (WA Herbarium 2016). This taxon was recorded in Leviathan at site LEV 06 which is a small mulga patch on a loamy clay plain (Appendix 7). After a revision to the PSA boundaries, LEV 06 is now located ~270 m south of the Leviathan PSA.

***Thryptomene* sp. Leinster (B.J. Lepschi & L.A. Craven 4362) – Priority 3**

Thryptomene sp. Leinster (Plate 3, Plate 4) is a medium to tall shrub (0.5 - 2.5 m high) in the Myrtaceae family. The taxon only occurs in the Eastern Murchison subregion of the Murchison IBRA Region (WA Herbarium 2016). It was recorded in at 130 localities in Hidden Secret, on a rocky mesa in the north-western part of the PSA. Here it occurs in the same vegetation community as *Eremophila pungens*. The top of the mesa was degraded due to heavy grazing by cattle, but the slopes were in good condition. Relevé site HS 05 was positioned on this mesa (see Appendix 7 for a site description).

***Eremophila pungens* – Priority 4**

Eremophila pungens (Plate 5, Plate 6) is a small shrub (0.5 - 1.5 m high) in the Scrophulariaceae family. It has purple-violet flowers, with the main flowering period in June to August. It grows on plains, ridges and breakaways. The taxon occurs in the Gascoyne, Great Victoria Desert, and Murchison IBRA Regions (WA Herbarium 2016). *Eremophila pungens* was recorded at 167 localities in Hidden Secret, on a rocky mesa in the north-western part of the PSA. Here it occurs in the same vegetation community as *Thryptomene* sp. Leinster, which is represented by relevé site HS 05 (see Appendix 7 for a site description).



Plate 1 *Calotis* sp. Perrinvale
Station: whole plant



Plate 2 *Calotis* sp. Perrinvale
Station: close-up of old flower /
developing spikey burr fruits



Plate 3 *Thryptomene* sp.
Leinster (R.J. Cranfield 7096): shrub



Plate 4 *Thryptomene* sp.
Leinster (R.J. Cranfield 7096): close-up of branchlets.



Plate 5 *Eremophila pungens*:
flower



Plate 6 *Eremophila pungens*:
developing hairy fruit

4.2.2 Introduced Flora (Weeds)

Eight taxa of introduced flora (weeds) were recorded during the survey. These are presented in Table 8 below and mapped in Figure 6, Figure 7 and Figure 8. Seven of these weeds were recorded in in the Songvang Corridor, with five weeds recorded at relevé site SNV 06 alone (see Figure 8). Two weeds were recorded in Hidden Secret, and three weeds were recorded in Leviathan.

Table 8 Weeds recorded in the PSAs

Family	Species	Common Name	Hidden Secret	Leviathan	Songvang Corridor
Asteraceae	* <i>Centaurea melitensis</i>	Maltese Cockspur	x		
	* <i>Sonchus oleraceus</i>	Common Sowthistle		x	x
Convolvulaceae	* <i>Cuscuta epithimum</i>	Lesser Dodder		x	x
Cucurbitaceae	* <i>Citrullus lanatus</i>	Afghan Melon			x
Lamiaceae	* <i>Salvia verbenaca</i>	Wild Sage			x
Polygonaceae	* <i>Rumex hypogaeus</i>	Double Gee			x
	* <i>Rumex vesicarius</i>	Ruby Dock	x	x	x
Primulaceae	* <i>Lysimachia arvensis</i>	Pimpernel			x

The coordinates of weed localities are listed in Appendix 6. It must be noted that the coordinates for Ruby Dock (**Rumex vesicarius*) along the rocky causeway in Leviathan represent a few indicative localities, with the full extent of this weed stretching the entire length of the vegetated areas along the causeway both north and south sides.

4.2.3 Vegetation Community Mapping

A total of 25 broad vegetation communities were identified in Hidden Secret, 13 in Leviathan, and nine in the Songvang Corridor. Due to distance between the PSAs and differences in underlying geology, there was no overlap in vegetation communities between the PSAs.

It is important to note that the vegetation community descriptions and maps presented below are indicative only. The vegetation communities presented in this report are based on a broad Level 1 assessment, involving a limited number of foot transects within a limited time frame, and using only a small number of relevé sites. The normal procedure applied for detailed vegetation mapping is a Level 2 assessment, involving a large number of replicated survey quadrats within which all flora taxa are collected, creation of a site by species matrix, followed by statistical analysis conducted to confirm groupings and communities.

Hidden Secret Vegetation Communities

The majority of vegetation communities in Hidden Secret were mixed Acacia woodlands or shrublands, many of which dominated by species of Mulga (*Acacia aneura*, *A. aptaneura*, *A. caesaneura*, *A. fuscaneura*, *A. incurvaneura*, *A. mulganeura* and *A. craspedocarpa*). These mixed *Acacia* and Mulga communities were differentiated by relative dominance of the different Mulga species, openness of vegetation, substrate, and understorey composition. Other communities in Hidden Secret included mixed shrublands dominated by species of saltbush, and one *Melaleuca* shrubland. Hidden Secret also included areas without vegetation, comprising cleared and/or degraded areas, and a naturally bare quartz plain. The Hidden Secret area supported a greater variation in vegetation due to a greater variation in ground geological conditions, including mesa crests, breakaways and plains.

The vegetation communities recorded in Hidden Secret are mapped in Figure 9. Full community descriptions (based on Level 1 assessment) are provided in Appendix 8.

Leviathan Vegetation Communities

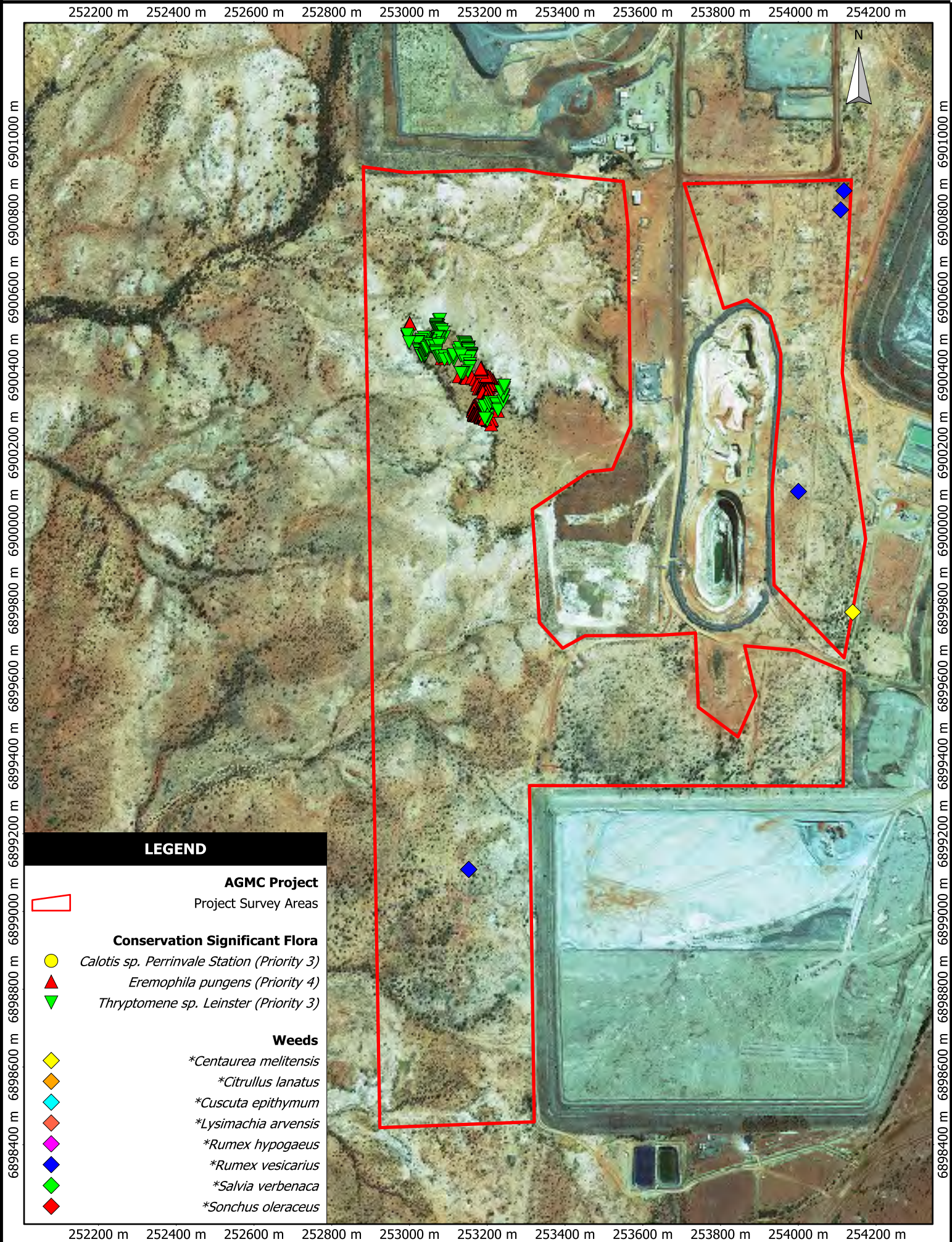
The western half of Leviathan comprises various types of mixed Mulga and *Acacia* woodlands and shrublands. These Mulga / *Acacia* communities were differentiated by relative dominance of the various Mulga / *Acacia* species, openness of the vegetation and variation in understorey composition. Other vegetation communities in the western half of Leviathan were mixed shrublands dominated by saltbushes, and *Acacia* sparse shrublands. The eastern half of Leviathan is dominated by an extensive area of mixed tussock grasslands with low shrubs, within which patches of Mulga woodlands and Mulga shrublands are embedded, as well as one small patch of *Acacia* low forest. Leviathan also included areas without vegetation, such as a causeway and road, degraded previously cleared areas, and an area which appeared to be degraded due to mine discharge.

The vegetation communities recorded in Leviathan are mapped in Figure 10. Full community descriptions (based on Level 1 assessment) are provided in Appendix 8.

Songvang Corridor Vegetation Communities

The vegetation communities in the Songvang Corridor comprised mixed Mulga woodlands and mixed Mulga shrublands. These were differentiated by relative dominance of the various Mulga species, openness of the vegetation, and differences in understorey composition. The Songvang Corridor also included areas without vegetation, comprising cleared and degraded land (especially at the start and end of the corridor) and frequent stony soil stockpiles.

The vegetation communities recorded in the Songvang Corridor are mapped in Figure 11 and Figure 12. Full community descriptions (based on Level 1 assessment) are provided in Appendix 8.



LEGEND

AGMC Project

Project Survey Areas

Conservation Significant Flora

- *Calotis sp. Perrinvale Station (Priority 3)*
- ▲ *Eremophila pungens (Priority 4)*
- ▼ *Thryptomene sp. Leinster (Priority 3)*

Weeds

- ◆ **Centaurea melitensis*
- ◆ **Citrullus lanatus*
- ◆ **Cuscuta epithymum*
- ◆ **Lysimachia arvensis*
- ◆ **Rumex hypogaeus*
- ◆ **Rumex vesicarius*
- ◆ **Salvia verbenaca*
- ◆ **Sonchus oleraceus*



Agnew Gold Mining Company

Level 1 Flora and Fauna survey of the Hidden Secret, Leviathan and Songvang Corridor PSAs

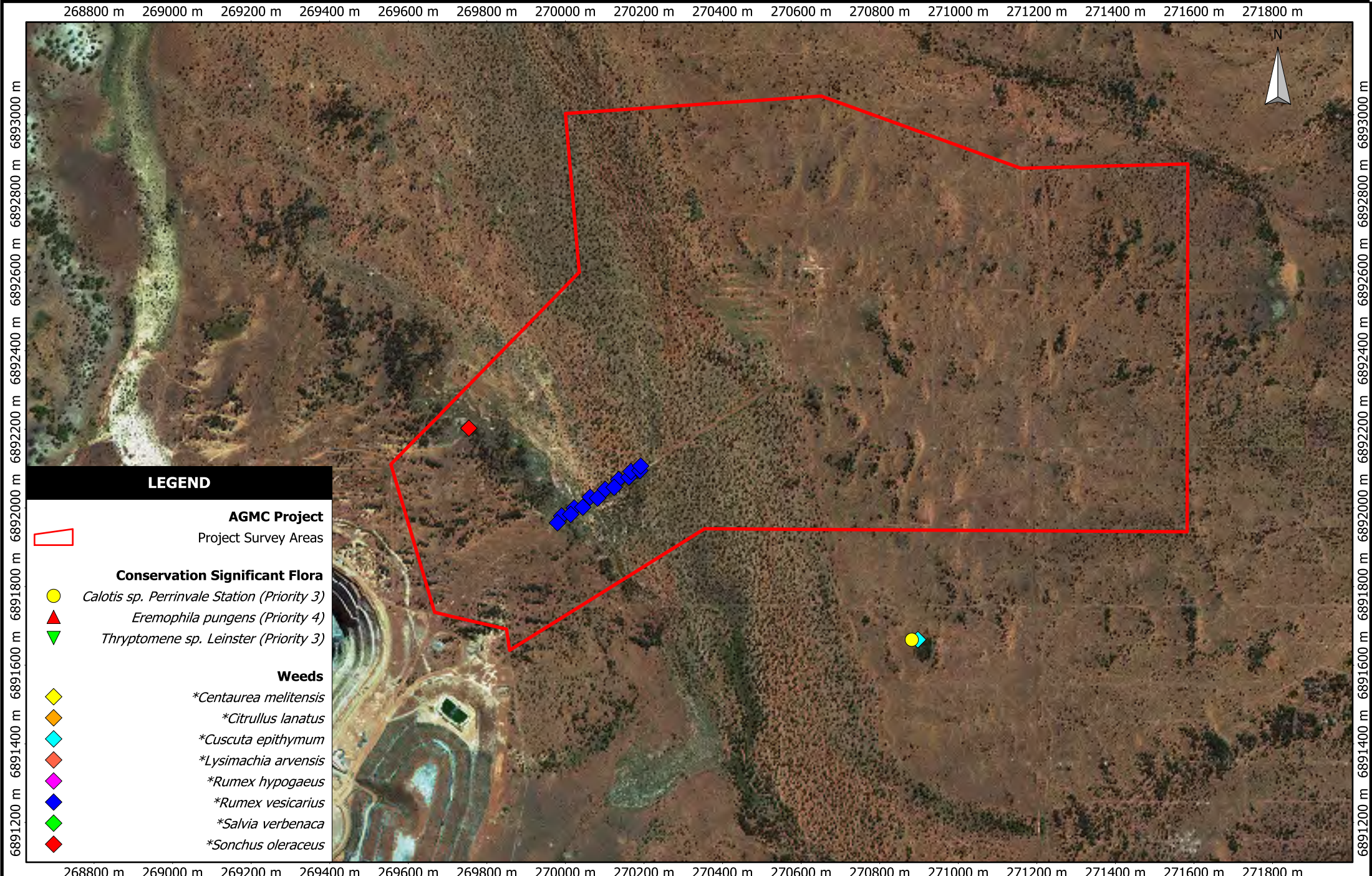
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Datum: MGA94 (51)

0 200 m



Figure 6

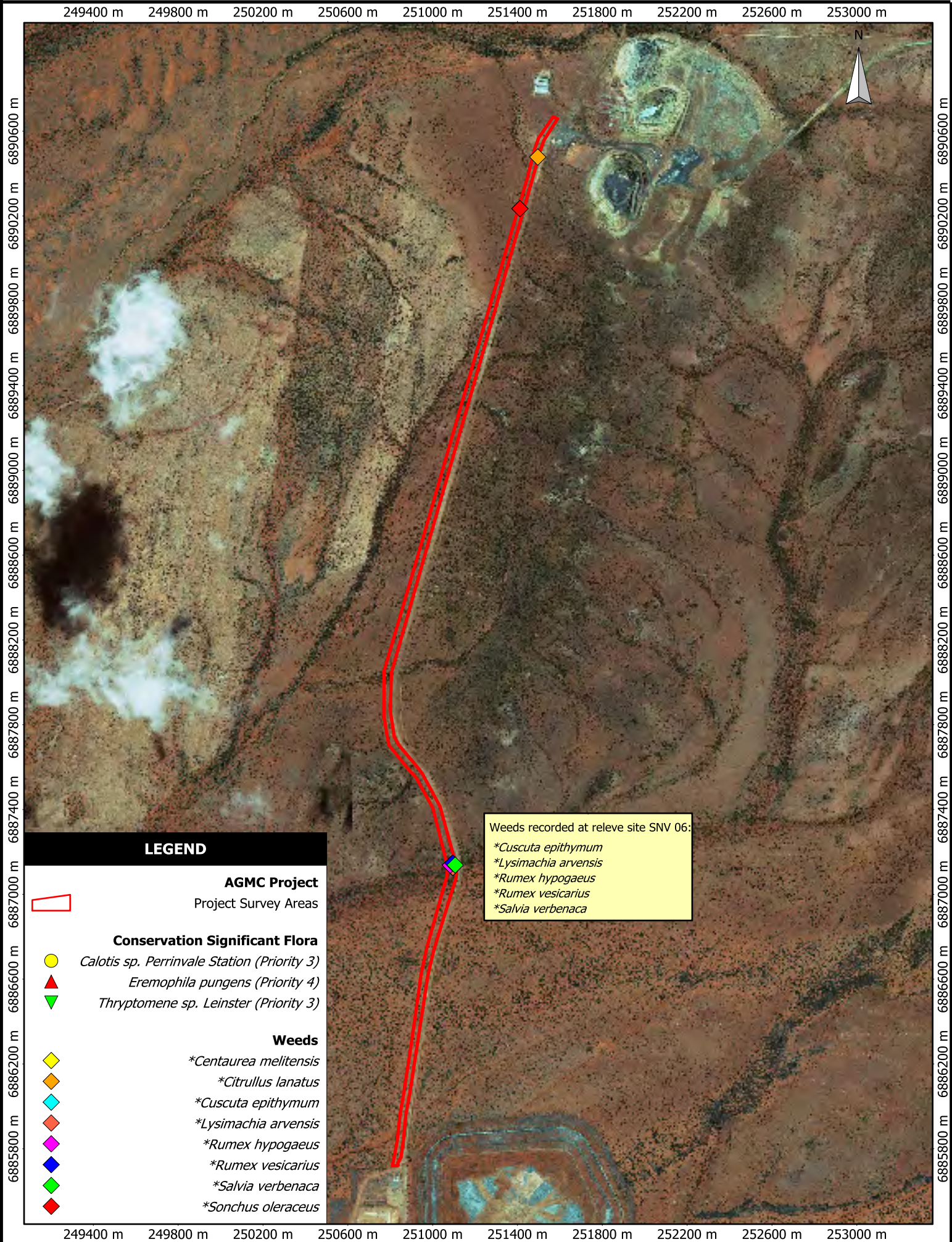
Hidden Secret:
Conservation significant flora and weeds recorded in L1 flora survey



Agnew Gold Mining Company
Level 1 Flora and Fauna survey of the Hidden Secret,
Leviathan and Songvang Corridor PSAs

Scale: 1 : 12,000
Datum: MGA94 (51)
0 200 m

Figure 7
Leviathan: Conservation significant flora
and weeds recorded in L1 flora survey

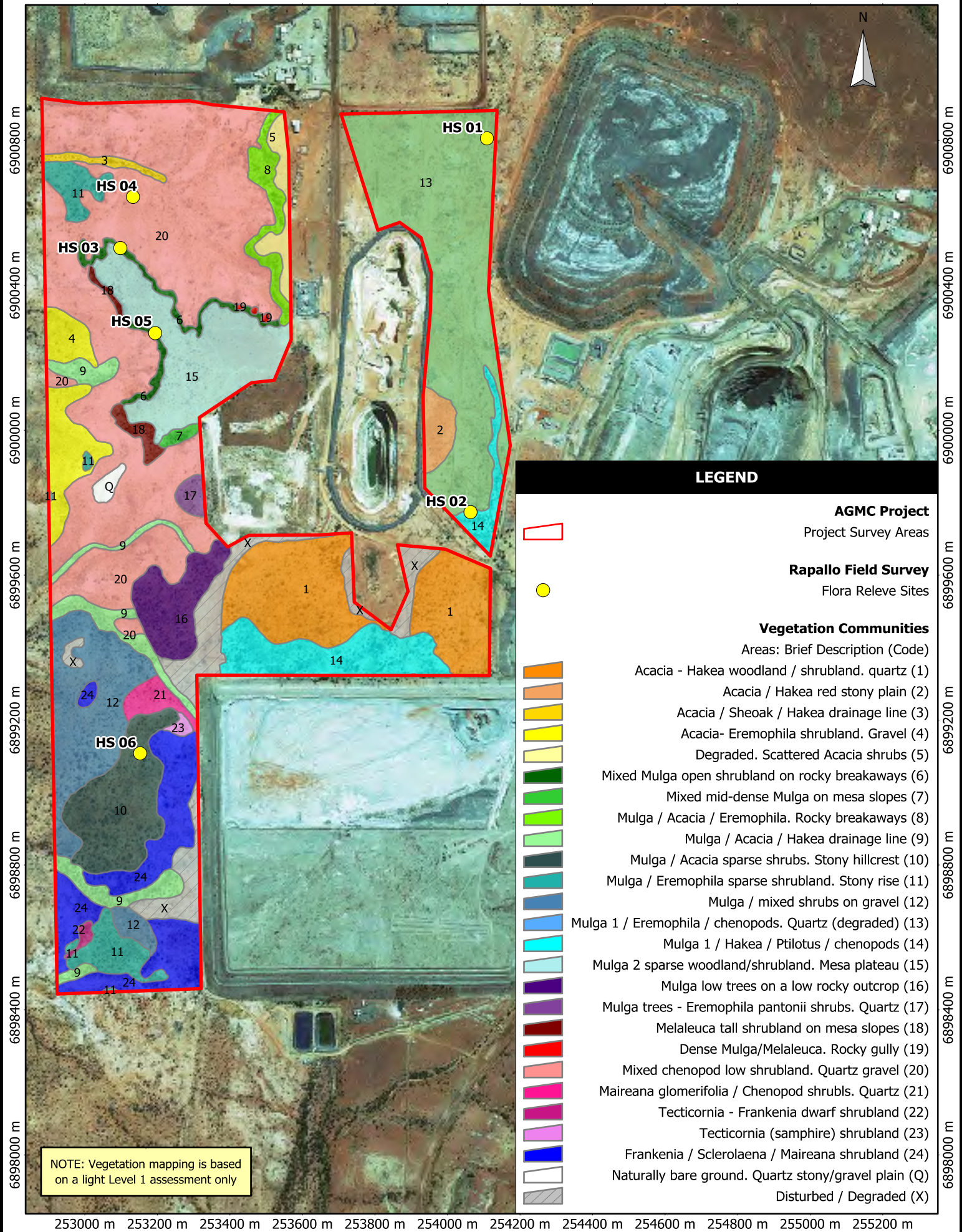


Agnew Gold Mining Company
Level 1 Flora and Fauna survey of the Hidden Secret, Leviathan and Songvang Corridor PSAs





























Scale: 1 : 22,000
Datum: MGA94 (51)
0 400 m

Figure 8
Songvang Corridor:
Conservation significant flora and weeds recorded in L1 flora survey

253000 m 253200 m 253400 m 253600 m 253800 m 254000 m 254200 m 254400 m 254600 m 254800 m 255000 m 255200 m



LEGEND

-  **AGMC Project**
Project Survey Areas
-  **Rapallo Field Survey**
Flora Releve Sites
- Vegetation Communities**
Areas: Brief Description (Code)
-  Acacia - Hakea woodland / shrubland. quartz (1)
-  Acacia / Hakea red stony plain (2)
-  Acacia / Sheoak / Hakea drainage line (3)
-  Acacia- Eremophila shrubland. Gravel (4)
-  Degraded. Scattered Acacia shrubs (5)
-  Mixed Mulga open shrubland on rocky breakaways (6)
-  Mixed mid-dense Mulga on mesa slopes (7)
-  Mulga / Acacia / Eremophila. Rocky breakaways (8)
-  Mulga / Acacia / Hakea drainage line (9)
-  Mulga / Acacia sparse shrubs. Stony hillcrest (10)
-  Mulga / Eremophila sparse shrubland. Stony rise (11)
-  Mulga / mixed shrubs on gravel (12)
-  Mulga 1 / Eremophila / chenopods. Quartz (degraded) (13)
-  Mulga 1 / Hakea / Ptilotus / chenopods (14)
-  Mulga 2 sparse woodland/shrubland. Mesa plateau (15)
-  Mulga low trees on a low rocky outcrop (16)
-  Mulga trees - Eremophila pantonii shrubs. Quartz (17)
-  Melaleuca tall shrubland on mesa slopes (18)
-  Dense Mulga/Melaleuca. Rocky gully (19)
-  Mixed chenopod low shrubland. Quartz gravel (20)
-  Maireana glomerifolia / Chenopod shrubs. Quartz (21)
-  Tecticornia - Frankenia dwarf shrubland (22)
-  Tecticornia (samphire) shrubland (23)
-  Frankenia / Sclerolaena / Maireana shrubland (24)
-  Naturally bare ground. Quartz stony/gravel plain (Q)
-  Disturbed / Degraded (X)

NOTE: Vegetation mapping is based on a light Level 1 assessment only

253000 m 253200 m 253400 m 253600 m 253800 m 254000 m 254200 m 254400 m 254600 m 254800 m 255000 m 255200 m

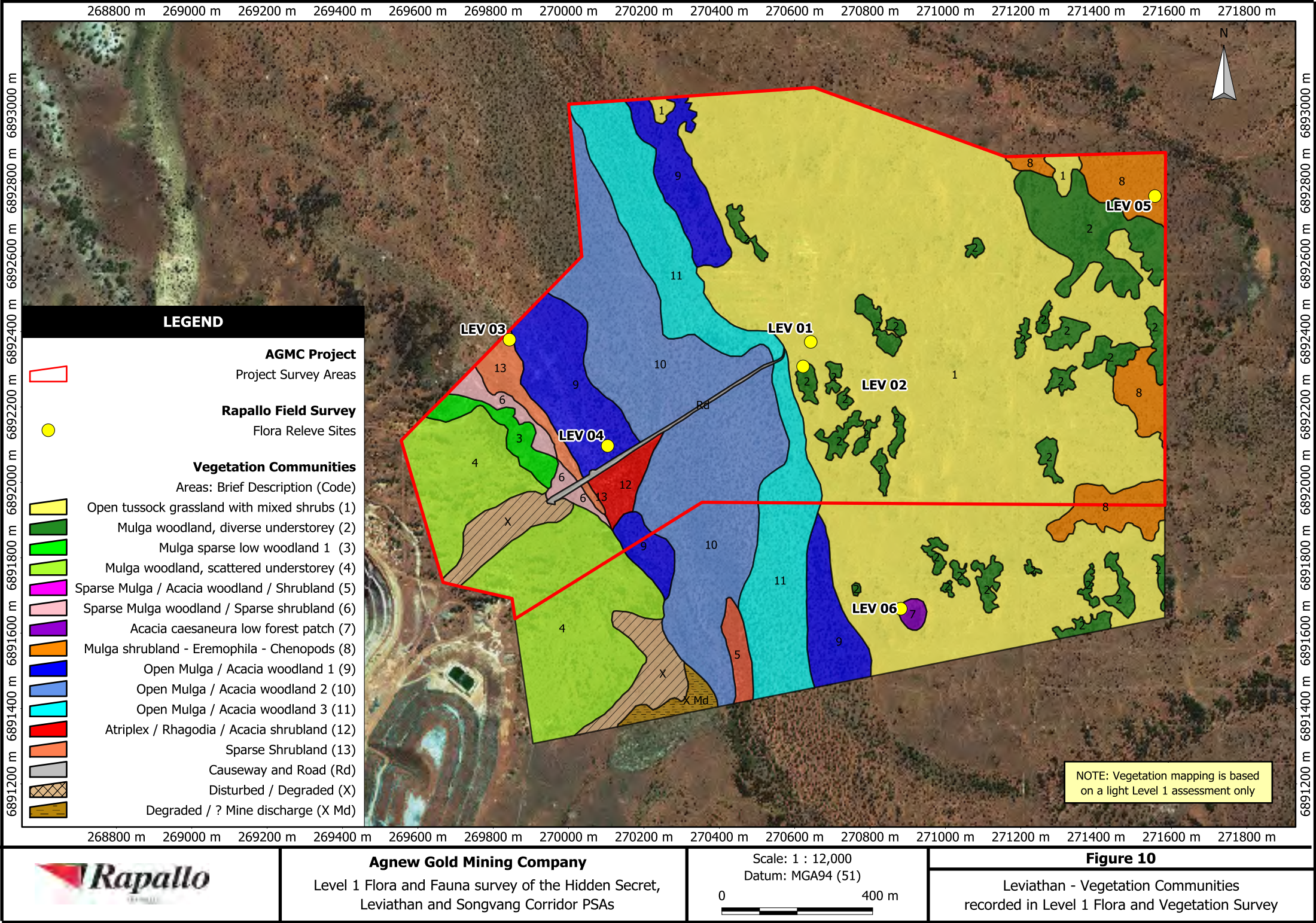


Agnew Gold Mining Company
Level 1 Flora and Fauna survey of the Hidden Secret, Leviathan and Songvang Corridor PSAs

Scale: 1 : 13,000
Datum: MGA94 (51)



Figure 9
Hidden Secret
Vegetation Communities recorded in Level 1 Flora and Vegetation Survey



LEGEND

AGMC Project
Project Survey Areas

Rapallo Field Survey
Flora Releve Sites

Vegetation Communities
Areas: Brief Description (Code)

- Open tussock grassland with mixed shrubs (1)
- Mulga woodland, diverse understorey (2)
- Mulga sparse low woodland 1 (3)
- Mulga woodland, scattered understorey (4)
- Sparse Mulga / Acacia woodland / Shrubland (5)
- Sparse Mulga woodland / Sparse shrubland (6)
- Acacia caesaneura low forest patch (7)
- Mulga shrubland - Eremophila - Chenopods (8)
- Open Mulga / Acacia woodland 1 (9)
- Open Mulga / Acacia woodland 2 (10)
- Open Mulga / Acacia woodland 3 (11)
- Atriplex / Rhagodia / Acacia shrubland (12)
- Sparse Shrubland (13)
- Causeway and Road (Rd)
- Disturbed / Degraded (X)
- Degraded / ? Mine discharge (X Md)

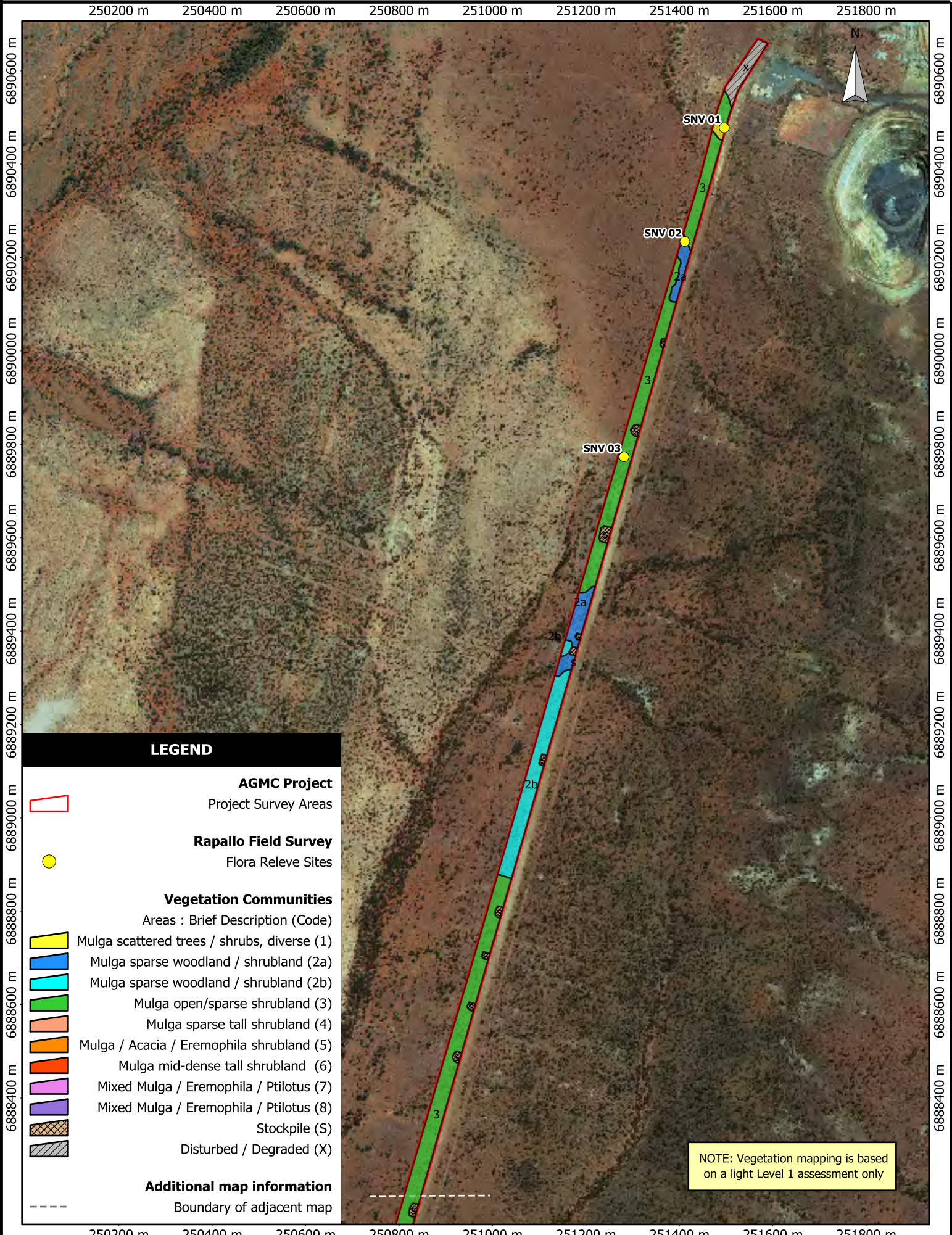
NOTE: Vegetation mapping is based on a light Level 1 assessment only
















Agnew Gold Mining Company
Level 1 Flora and Fauna survey of the Hidden Secret,
Leviathan and Songvang Corridor PSAs

Scale: 1 : 12,000
Datum: MGA94 (51)
0 400 m

Figure 10
Leviathan - Vegetation Communities
recorded in Level 1 Flora and Vegetation Survey



LEGEND

-  **AGMC Project**
Project Survey Areas
-  **Rapallo Field Survey**
Flora Releve Sites
- Vegetation Communities**
Areas : Brief Description (Code)
-  Mulga scattered trees / shrubs, diverse (1)
-  Mulga sparse woodland / shrubland (2a)
-  Mulga sparse woodland / shrubland (2b)
-  Mulga open/sparse shrubland (3)
-  Mulga sparse tall shrubland (4)
-  Mulga / Acacia / Eremophila shrubland (5)
-  Mulga mid-dense tall shrubland (6)
-  Mixed Mulga / Eremophila / Ptilotus (7)
-  Mixed Mulga / Eremophila / Ptilotus (8)
-  Stockpile (S)
-  Disturbed / Degraded (X)
- Additional map information**
--- Boundary of adjacent map

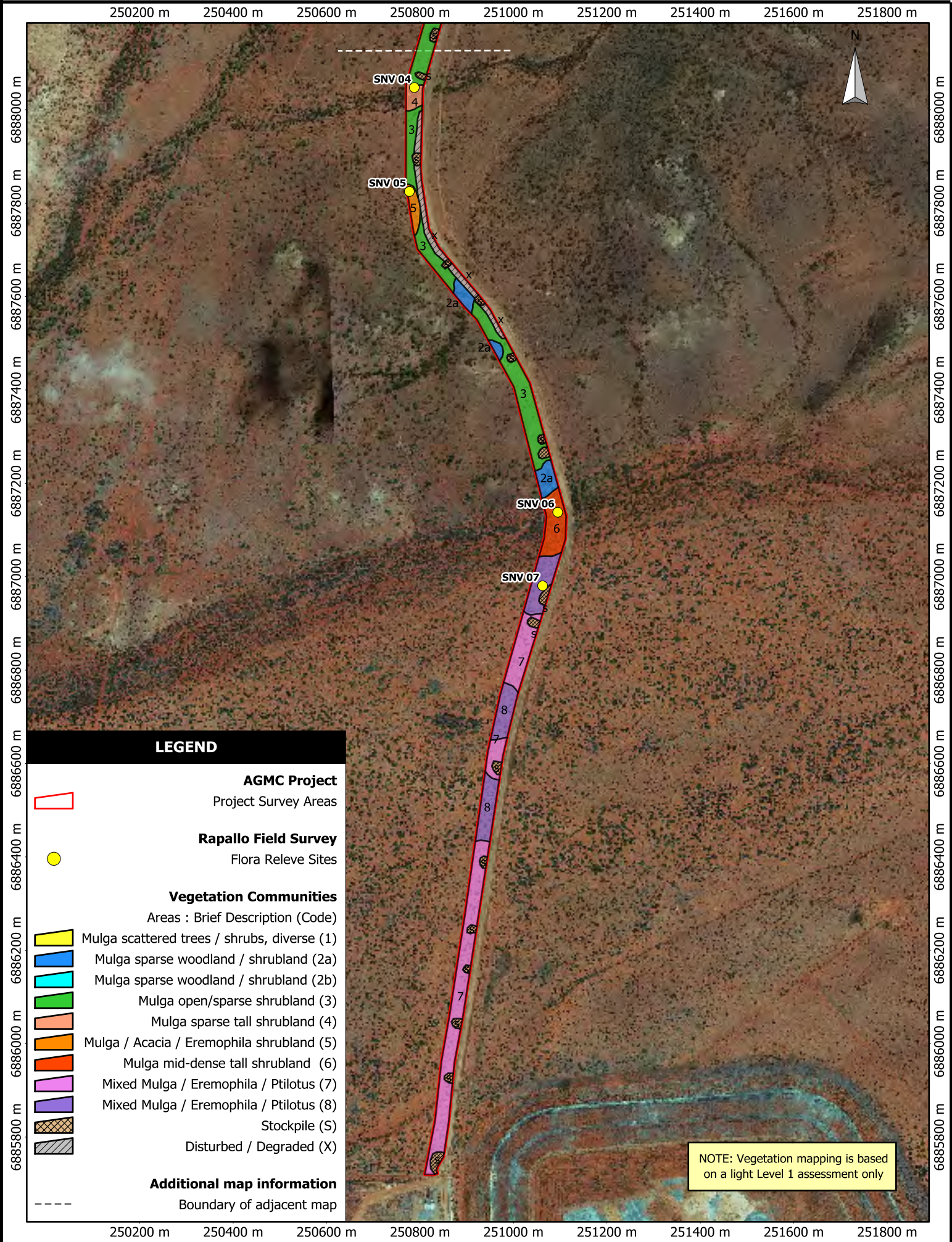
NOTE: Vegetation mapping is based on a light Level 1 assessment only



Agnew Gold Mining Company
Level 1 Flora and Fauna survey of the Hidden Secret, Leviathan and Songvang Corridor PSAs

Scale: 1 : 10,000
Datum: MGA94 (51)
0 200 m

Figure 11
Songvang Corridor (northern half) Vegetation Communities recorded in Level 1 Flora and Vegetation Survey



Agnew Gold Mining Company
Level 1 Flora and Fauna survey of the Hidden Secret, Leviathan and Songvang Corridor PSAs

Scale: 1 : 10,000
Datum: MGA94 (51)
0 200 m

Figure 12
Songvang Corridor (southern half) Vegetation Communities recorded in Level 1 Flora and Vegetation Survey

4.3 Fauna Survey Results

The Level 1 Fauna survey recorded 32 bird species, five reptile species, six native mammal species and five introduced mammal species from the three PSAs combined. No frogs were recorded.

The greatest number of vertebrate fauna was recorded in Hidden Secret, with 34 species. This was partially due to the fact that acoustic bat surveys were only done in Hidden Secret, and five species of bat were recorded (see Appendix 10). Leviathan yielded 24 species, while only fifteen species were recorded in the Songvang Corridor. The list of fauna recorded in the survey is presented in Appendix 9.

None of the fauna species recorded in the PSAs is of conservation significance. However, the conservation listed Oriental Plover (*Charadrius veredus*) was recorded opportunistically outside the survey areas while the Rapallo team was travelling to site. See section 4.3.2 below for details.

4.3.1 Regional Comparison of Fauna Assemblages Recorded

A review of the NatureMap search tool (DPaW 2016), which uses a wide range of databases from previous surveys, indicated 68 species of bird, five native mammals, 30 reptiles, and five frogs that could occur in or near the project areas.

Given NatureMap combines results from many surveys over a wide range of landforms and fauna habitats, the bird list for the Rapallo Level 1 survey was very good. The frogs on the NatureMap list are all burrowing frogs, which only become active after significant rainfall events. Hence, a Level 1 survey is unlikely to record them. Similarly, most reptiles and native mammals have their highest activity levels at night, dusk, and dawn. Therefore, diurnal reconnaissance 'snapshot' surveys do not generally record many species in these groups. In order to effectively and comprehensively sample the frog, reptile, and small mammals assemblages of the project areas, Level 2 fauna surveys involving pitfall traps would be required.

Interestingly, the Rapallo survey recorded two additional species Ring-tailed Dragon and Little Woodswallow that were not listed in the NatureMap report. Both Ring-tailed Dragons and Little Woodswallows are associated with rocky outcrops, breakaways, and other landforms of strong relief, indicating that the breakaway area in Hidden Secret represent a relatively uncommon landform in the wider region. The breakaways were also considered the only area in the PSAs highly likely to support bats, and indeed five species of bat were recorded.

4.3.2 Conservation Significant Fauna

Oriental Plover (*Charadrius veredus*) – Listed IA and M

The Oriental Plover is protected under both the Western Australian *Wildlife Conservation Act 1950* and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) as a Migratory bird listed under an international agreement. Under the EPBC Act the species is also listed as Marine (see Appendix 1 for conservation codes).

The Oriental Plover is a non-breeding visitor to Australia, where the species occurs in both coastal and inland areas. The entire global population of Oriental Plovers is considered to occur in Australia during the non-breeding season. They arrive in north-western Australia in early to mid-September, with numbers increasing during October and sometimes in November. Birds then gradually move back to their breeding grounds between February and April (Department of the Environment and Energy 2016b).

On 27 September 2016 four Oriental Plovers were recorded sitting on the Agnew-Sandstone Road, 19 km north-east of Hidden Secret and 14 km North of Leviathan, at coordinate 51J, 271849 mE, 6906574 mS. Because of sightings in close proximity, the Oriental Plover is considered highly likely to occur in the PSAs (see section 4.1.2 and Appendix 4). Project developments are unlikely to significantly affect this species' habitat, which is extensive both inside and outside the Agnew Gold project area. However, vehicle strike poses a potential risk to individual birds as they appear to like sitting on roads. The risk of vehicle strike can be reduced by observing speed limits and educating personnel.

4.3.3 Introduced (Feral) Fauna

Four species of introduced fauna were recorded during the survey, all of which via scats or other signs. These were the cow or cattle (*Bos Taurus*), dog or dingo (*Canis lupus dingo*), goat (*Capra hircus*), domestic cat (*Felis catus*) and the European rabbit (*Oryctolagus cuniculus*). The majority of scats and signs were recorded in Hidden Secret, but it is highly likely that these same species also occur in the other PSAs.

4.3.4 Fauna Habitat Mapping

The Level 1 fauna survey recorded sixteen different fauna habitats in Hidden Secret, seven fauna habitats in Leviathan, and five fauna habitats in the Songvang Corridor. These are outlined in text below, and mapped in Figure 13, Figure 14, Figure 15, and Figure 16. Further details of the fauna habitats recorded during the survey are provided in Appendix 11.

Hidden Secret

The habitats of the Hidden Secret PSA (Figure 13) are dominated by a sandstone breakaway surrounded by stony plains and rises. Minor runoff drainage comes of the breakaway area and stony rises and flows predominantly southwest into larger drainage tributaries. Vegetation associations are varied, however the majority are typical mulga woodland or shrubland habitats with some saltbush shrublands. Small gullies and shallow caves occur within the breakaway slopes. Much of the breakaway slopes are south-westerly facing, however the height of the breakaway did not allow for cool shaded habitats and the areas investigated did not present deep accumulations of litter and cool soil that could indicate the potential of short range endemic terrestrial invertebrates such as trapdoor spiders or scorpions.

Fauna habitats in Hidden Secret are typical for the East Murchison IBRA subregion. Hidden Secret occurs within the Nubev, Sherwood, and Wyarri Land Systems (section 2.2.2). The breakaway area in Hidden Secret represent a relatively uncommon landform in the wider region, supporting fauna species not recorded (or considered likely to be recorded) in Leviathan and Hidden Secret, or reported in the DPaW NatureMap database.

Leviathan

The habitats of the Leviathan PSA (Figure 14) are dominated by plains of hard orange soil bisected by a narrow drainage tract flowing northwest. Vegetation associations are all typical mulga shrubland habitats. The open tussock grassland plain dominating the eastern portion of the project area is peppered with patches of open tall acacia shrubland over mixed eremophila. These patches can be areas of water deposition promoting a thicker understory and deeper soils than the surrounding hard plains. There is possibility that Malleefowl could utilise these mulga patches especially the ones with the thicker understory such as the vegetation community *Acacia caesaneura* low forest patch. No signs of Malleefowl were noted during the survey. A causeway blocks the drainage tract and is causing water accumulation on the south eastern side of the causeway and water starvation on the north western side.

Fauna habitats in Leviathan are typical for the East Murchison IBRA subregion. Leviathan occurs within the Tiger (1106 km²), Jundee (2656km²) and Violet (1611 km²) Land Systems (section 2.2.2).

Songvang Corridor

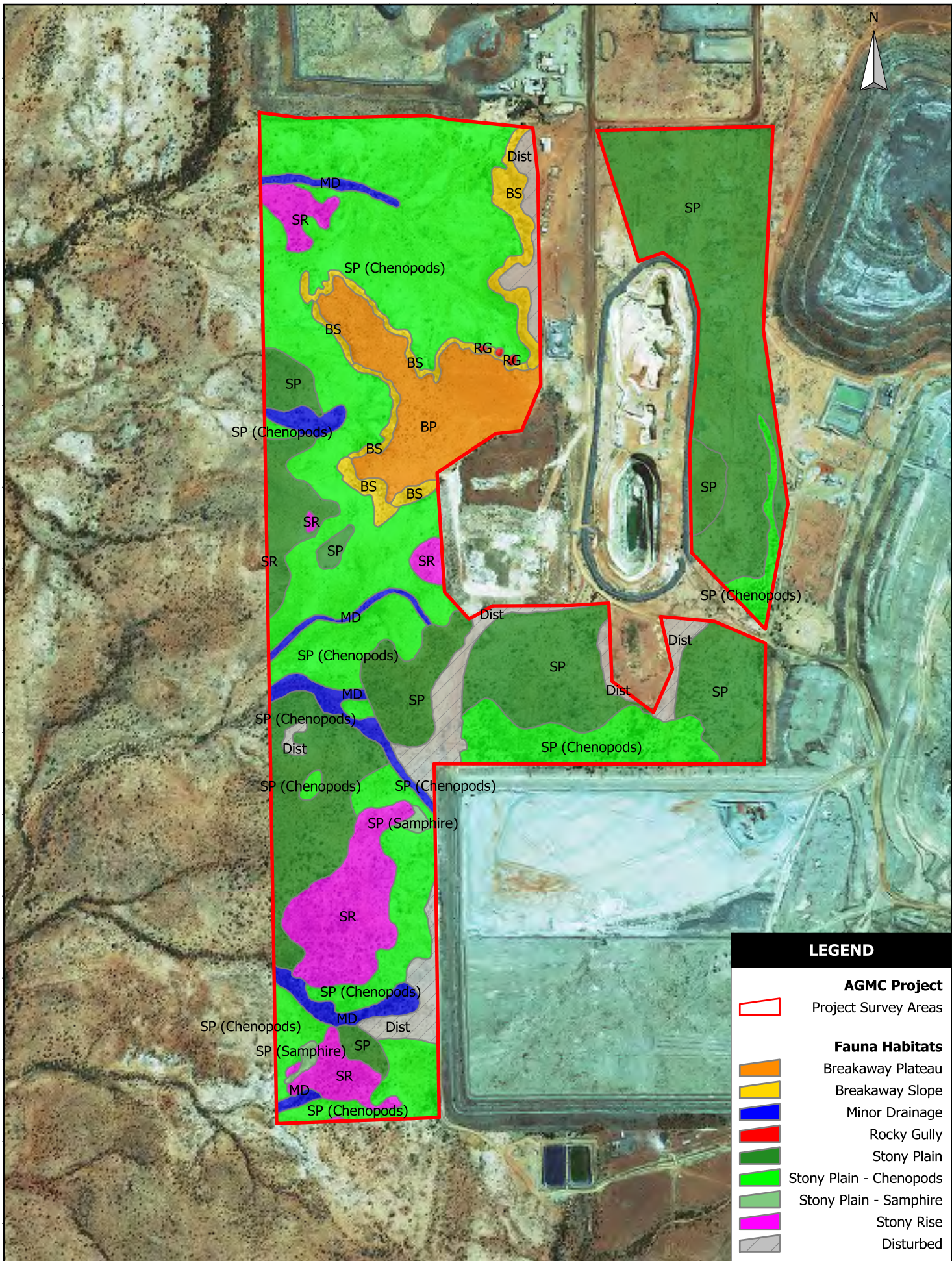
The habitats of the Songvang Corridor PSA (Figure 15, Figure 16) are dominated by stony undulating plains and sandy clay undulating plains bisected by minor drainage flowing to the southwest to broader drainage tracts. Vegetation associations are all typical mulga shrubland habitats.

Fauna habitats in the Songvang Corridor are typical for the East Murchison IBRA subregion - Songvang occurs within the Leonora (1074km²), Monk (8162m²) Land Systems (section 2.2.2).











252400 m 252600 m 252800 m 253000 m 253200 m 253400 m 253600 m 253800 m 254000 m 254200 m 254400 m



6898200 m 6898400 m 6898600 m 6898800 m 6899000 m 6899200 m 6899400 m 6899600 m 6899800 m 6900000 m 6900200 m 6900400 m 6900600 m 6900800 m 6901000 m



LEGEND

-  **AGMC Project**
Project Survey Areas
-  **Fauna Habitats**
Breakaway Plateau
-  Breakaway Slope
-  Minor Drainage
-  Rocky Gully
-  Stony Plain
-  Stony Plain - Chenopods
-  Stony Plain - Samphire
-  Stony Rise
-  Disturbed

252400 m 252600 m 252800 m 253000 m 253200 m 253400 m 253600 m 253800 m 254000 m 254200 m 254400 m



Agnew Gold Mining Company
Level 1 Flora and Fauna survey of the Hidden Secret, Leviathan and Songvang Corridor PSAs


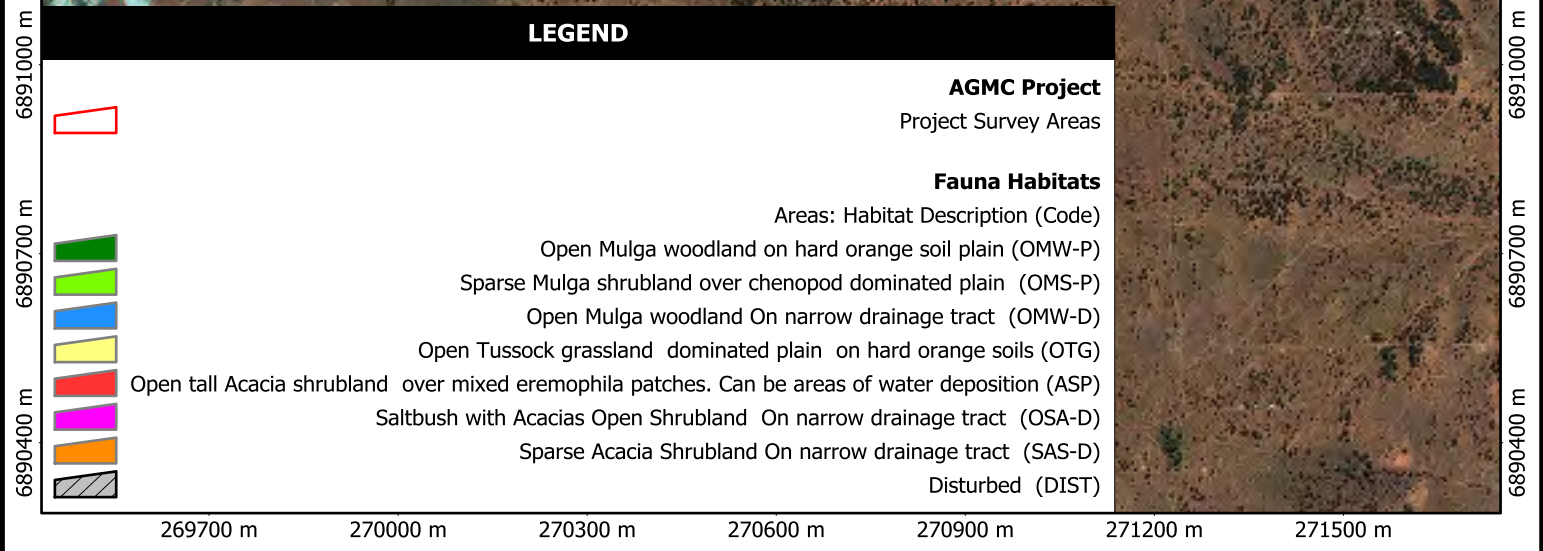
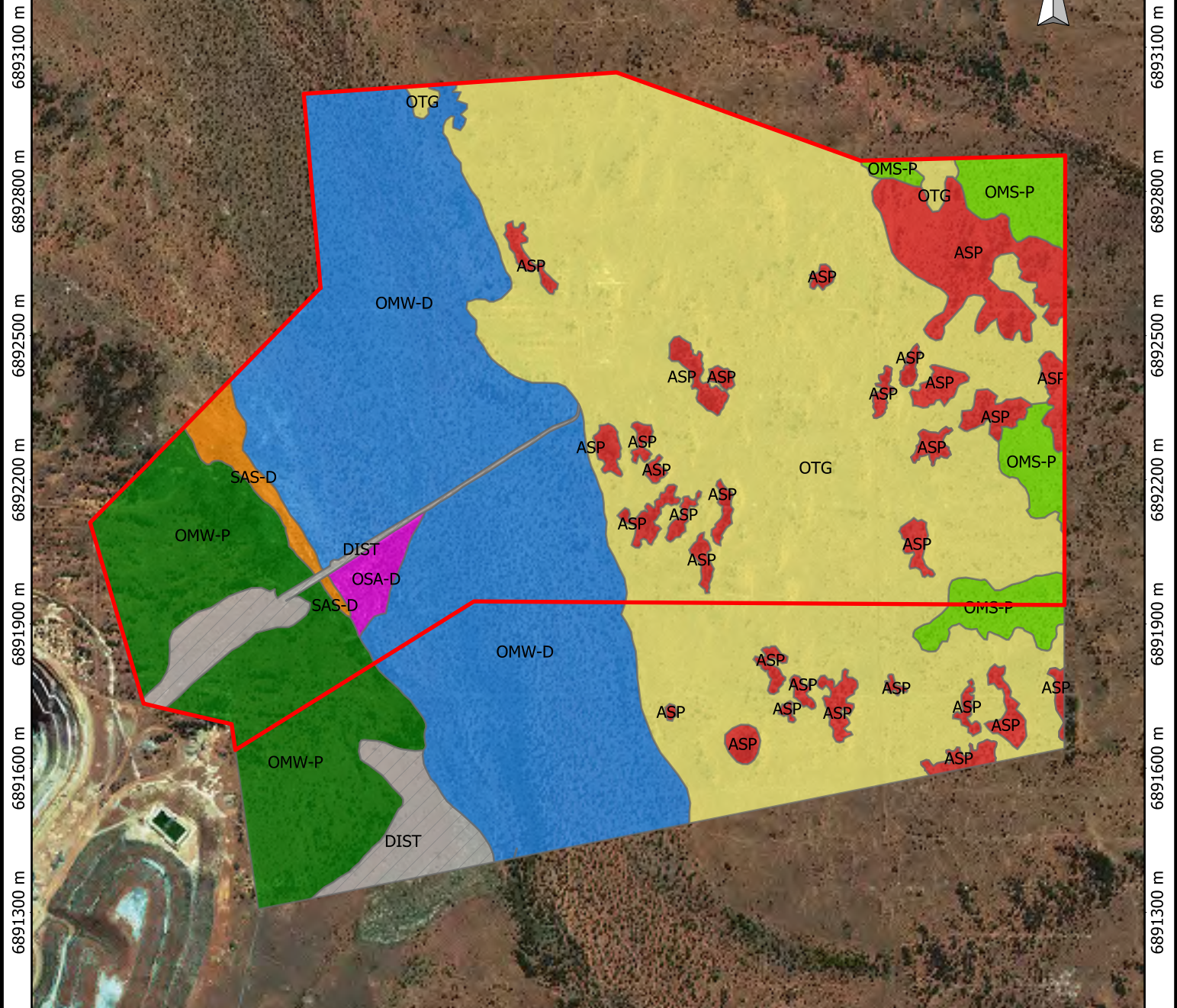
Scale: 1 : 12,000
Datum: MGA94 (51)
0 200 m


Figure 13
Hidden Secret
Fauna Habitats recorded in
Level 1 Fauna Survey

269700 m 270000 m 270300 m 270600 m 270900 m 271200 m 271500 m



269700 m 270000 m 270300 m 270600 m 270900 m 271200 m 271500 m



Agnew Gold Mining Company
Level 1 Flora and Fauna survey of the Hidden Secret, Leviathan and Songvang Corridor PSAs


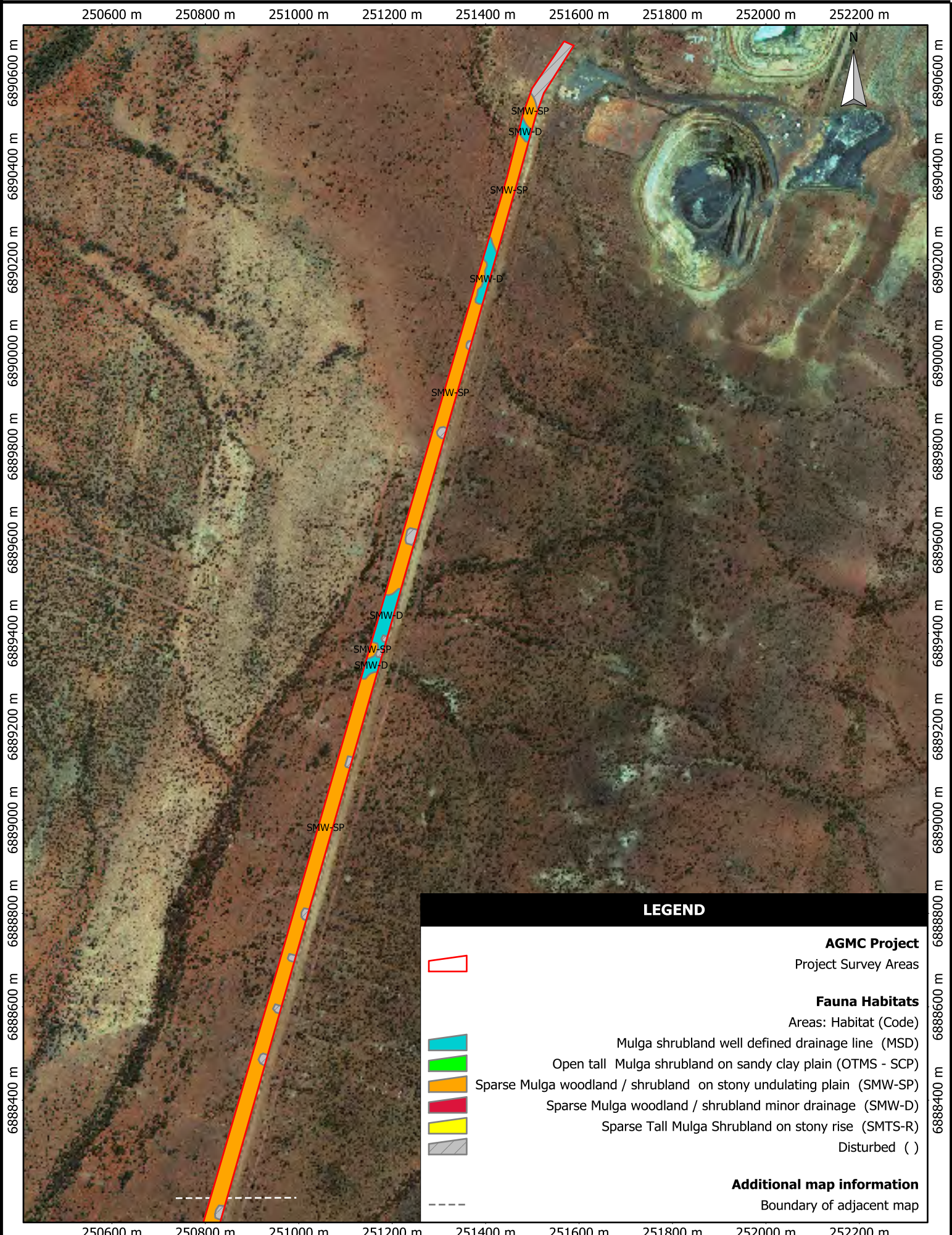







Scale: 1 : 12,000
Datum: MGA94 (51)
0 200 m


Figure 14
Leviathan
Fauna Habitats recorded in the Level 1 Fauna Survey



LEGEND

      	<p>AGMC Project Project Survey Areas</p> <p>Fauna Habitats Areas: Habitat (Code)</p> <p>Mulga shrubland well defined drainage line (MSD)</p> <p>Open tall Mulga shrubland on sandy clay plain (OTMS - SCP)</p> <p>Sparse Mulga woodland / shrubland on stony undulating plain (SMW-SP)</p> <p>Sparse Mulga woodland / shrubland minor drainage (SMW-D)</p> <p>Sparse Tall Mulga Shrubland on stony rise (SMTS-R)</p> <p>Disturbed ()</p> <p>Additional map information Boundary of adjacent map</p>
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Agnew Gold Mining Company
Level 1 Flora and Fauna survey of the Hidden Secret, Leviathan and Songvang Corridor PSAs

Scale: 1 : 10,000
Datum: MGA94 (51)


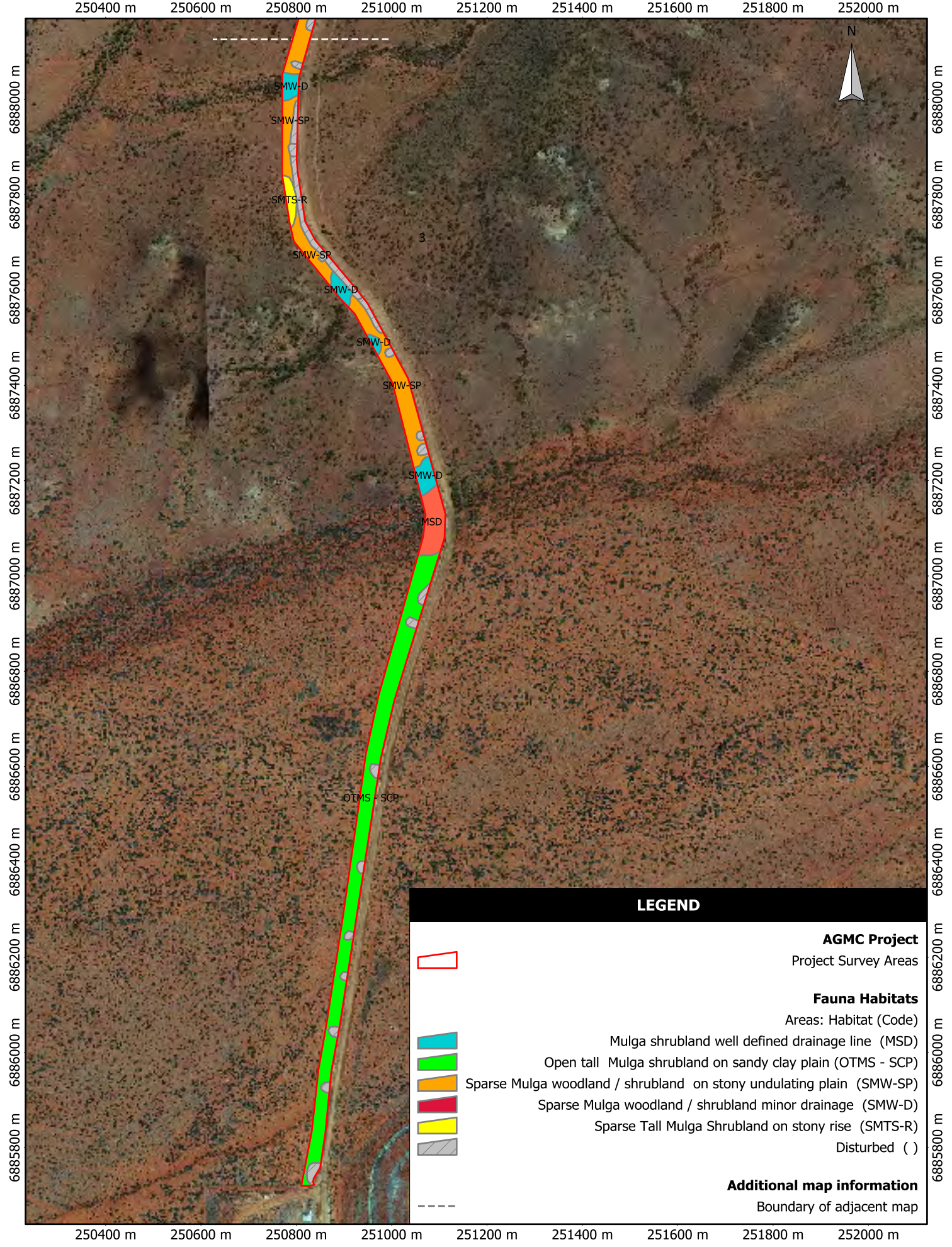










Figure 15
Songvang Corridor (northern half)
Fauna Habitats recorded in the
Level 1 Fauna Survey



LEGEND

       	<p>AGMC Project Project Survey Areas</p> <p>Fauna Habitats Areas: Habitat (Code)</p> <p>Mulga shrubland well defined drainage line (MSD)</p> <p>Open tall Mulga shrubland on sandy clay plain (OTMS - SCP)</p> <p>Sparse Mulga woodland / shrubland on stony undulating plain (SMW-SP)</p> <p>Sparse Mulga woodland / shrubland minor drainage (SMW-D)</p> <p>Sparse Tall Mulga Shrubland on stony rise (SMTS-R)</p> <p>Disturbed ()</p> <p>Additional map information Boundary of adjacent map</p>
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Agnew Gold Mining Company
 Level 1 Flora and Fauna survey of the Hidden Secret, Leviathan and Songvang Corridor PSAs

Scale: 1 : 10,000
 Datum: MGA94 (51)

0 200 m




Figure 16
 Songvang Corridor (southern half)
 Fauna Habitats recorded in the
 Level 1 Fauna Survey

5 Recommendations

The following management recommendations are proposed in order to protect the biological values of the PSA during development of the project.

A general recommendation for all areas is to communicate to personnel about the potential for fauna on the roads, especially during dawn and dusk, and to adhere to appropriate driving speeds. This is especially relevant for the protected bird species Oriental Plover, which was recorded near the project area.

Hidden Secret

It is recommended that the breakaway plateau and slopes are avoided where possible. The breakaway area represents a relatively uncommon landform in the wider region, supporting fauna species not recorded elsewhere. The breakaway plateau also supports an extensive community of priority flora, i.e. *Eremophila pungens* (Priority 4) and *Thryptomene* sp. Leinster (Priority 3).

Ruby Dock (**Rumex vesicarius*) was recorded colonising the breakaway slopes proximal to the mining operations, occurring in many scattered spots (mapped as one central point in Figure 6). This weed species is wind dispersed and is likely to spread further quickly every year if not controlled. It is recommended that these areas are sprayed to reduce likelihood of spread.

Leviathan

Ruby Dock (**Rumex vesicarius*) was recorded all along the causeway at Leviathan (Figure 7). It is recommended that these areas are sprayed to reduce likelihood of spread. The causeway at Leviathan is interrupting water flow and causing water accumulation/starvation to the mulga communities. It is recommended that culverts are installed to restore flow.

Although not significant communities, the Mulga woodland habitat patches at Leviathan do provide refugia for fauna. The vegetation community *Acacia caesaneura* low forest patch should be avoided where possible so it can be retained as refugia.

Songvang Corridor

Seven weed species were recorded along the Songvang Corridor, with Ruby Dock (**Rumex vesicarius*) being the most common. It is recommended to manage Ruby Dock where practical.

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7 Appendices

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Appendix 1 Conservation Codes

Specially protected fauna or flora are species which have been adequately searched for and are deemed to be, in the wild, either rare, at risk of extinction, or otherwise in need of special protection, and have been gazetted as such.

Categories of specially protected fauna and flora are:

T	Threatened Species
CR	Critically endangered species
EN	Endangered species
VU	Vulnerable species
EX	Presumed extinct
IA	Migratory birds protected under an international agreement
CD	Conservation dependent fauna
OS	Other specially protected fauna

Priority species are possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened flora or fauna.

Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

In this report, priority species are given the codes P1, P2, P3 and P4.

See next page: DPaW (2015) Conservation Codes for Western Australian Flora and Fauna for details.

Appendix 2 Coordinates of flora Relevé sites

Area	Relevé site number	Zone	Easting	Northing
Hidden Secret	HS 01	51J	254108.7	6900805
Hidden Secret	HS 02	51J	254063.5	6899774
Hidden Secret	HS 03	51J	253097.8	6900503
Hidden Secret	HS 04	51J	253132.8	6900644
Hidden Secret	HS 05	51J	253193.9	6900268
Hidden Secret	HS 06	51J	253152.4	6899108
Leviathan	LEV 01	51J	270642.7	6892373
Leviathan	LEV 02	51J	270622.3	6892307
Leviathan	LEV 03	51J	269843	6892379
Leviathan	LEV 04	51J	270103.6	6892097
Leviathan	LEV 05	51J	271556	6892759
Leviathan	LEV 06	51J	270881.6	6891665
Songvang Corridor	SNV 01	51J	251495.8	6890478
Songvang Corridor	SNV 02	51J	251411.4	6890235
Songvang Corridor	SNV 03	51J	251281.3	6889773
Songvang Corridor	SNV 04	51J	250787.7	6888047
Songvang Corridor	SNV 05	51J	250777.1	6887825
Songvang Corridor	SNV 06	51J	251094.8	6887138
Songvang Corridor	SNV 07	51J	251062.4	6886981

Appendix 3 Flora Desktop Results

Status	Scientific Name	Databases* ¹			Survey / Desktop Reports* ²						R* ³
		DPaW	NM	PM	JM4	JM6	MRS	O8a	O8b	W6	
T	<i>Acacia forrestiana</i>	L									
T	<i>Acacia splendens</i>	L									
T	<i>Eucalyptus dolorosa</i>	L									
T	<i>Grevillea calliantha</i>	L									
P1	<i>Baeckea</i> sp. Dandaragan (G. Paczkowska s.n. PERTH 08245606)	L									
P1	<i>Dampiera plumosa</i>	L									
P1	<i>Eremophila arachnoides</i> subsp. <i>tenera</i>	L									
P1	<i>Eremophila arguta</i>	L									
P1	<i>Eremophila congesta</i>	L									
P1	<i>Hypocalymma linifolium</i>	L									
P1	<i>Hypocalymma</i> sp. Dandaragan (C.A. Gardner 9014)	L									
P1	<i>Lechenaultia aphylla</i>	L									
P1	<i>Micromyrtus chrysodema</i>	X	X					X			
P1	<i>Neurachne lanigera</i>	L									
P1	<i>Persoonia leucopogon</i>	L									
P1	<i>Philothea tubiflora</i>	L									
P1	<i>Pityrodia canaliculata</i>	L									
P1	<i>Rhagodia</i> sp. Yeelirrie Station (K.A. Shepherd et al. KS 1396)	X	X								
P1	<i>Stenanthemum patens</i>	L						X			
P1	<i>Tecticornia</i> sp. Lake Way (P. Armstrong 05/961)	L									
P1	<i>Vittadinia cervicalis</i> var. <i>oldfieldii</i>	L									
P2	<i>Cristonia biloba</i> subsp. <i>pubescens</i>	L									
P2	<i>Dampiera tephrea</i>	L									
P2	<i>Eremophila mirabilis</i>	L									
P2	<i>Hemigenia curvifolia</i>	L									
P2	<i>Thryptomene eremaea</i>	L									
P3	<i>Acacia cummingiana</i>	L									
P3	<i>Acacia epacantha</i>	L									
P3	<i>Allocasuarina ramosissima</i>	L									
P3	<i>Austroparmelina macrospora</i>	L									
P3	<i>Baeckea</i> sp. London Bridge (M.E. Trudgen 5393)	L									
P3	<i>Baeckea</i> sp. Sandstone (C.A. Gardner s.n. 26 Oct. 1963)	X	X		X		X	X			

Status	Scientific Name	Databases* ¹			Survey / Desktop Reports* ²						R* ³
		DPaW	NM	PM	JM4	JM6	MRS	O8a	O8b	W6	
P3	<i>Banksia pteridifolia</i> subsp. <i>vernalis</i>	L									
P3	<i>Bossiaea eremaea</i>	L									
P3	<i>Calotis</i> sp. Perrinvale Station (R.J. Cranfield 7096)										X
P3	<i>Calytrix praecipua</i>	L									
P3	<i>Calytrix verruculosa</i>	L				X		X			
P3	<i>Cratystylis centralis</i>	L									
P3	<i>Cryptandra</i> sp. Cowcowing (Wittwer W 1210)	L									
P3	<i>Eremophila annosocaulis</i>	L									
P3	<i>Eremophila arachnoides</i> subsp. <i>arachnoides</i>	X	X								
P3	<i>Eremophila flaccida</i> subsp. <i>attenuata</i>	L									
P3	<i>Eremophila shonae</i> subsp. <i>diffusa</i>	L									
P3	<i>Eremophila simulans</i> subsp. <i>megacalyx</i>	L									
P3	<i>Euryomyrtus inflata</i>	L									
P3	<i>Goodenia lyrata</i>	L									
P3	<i>Grevillea obliquistigma</i> subsp. <i>cullenii</i>	L									
P3	<i>Grevillea tenuiloba</i>	L									
P3	<i>Grevillea thyrsoides</i> subsp. <i>thyrsoides</i>	L									
P3	<i>Gunniopsis propinqua</i>	X									
P3	<i>Homalocalyx echinulatus</i>	L									
P3	<i>Hybanthus floribundus</i> subsp. <i>chloroxanthus</i>	L						X	X		
P3	<i>Hypocalymma tetrapterum</i>	L									
P3	<i>Labichea eremaea</i>	L									
P3	<i>Lechenaultia galactites</i>	L									
P3	<i>Mirbelia stipitata</i>	L									
P3	<i>Olearia mucronata</i>	L									
P3	<i>Philothea coateana</i>	L									
P3	<i>Phyllanthus baeckeoides</i>	X	X								
P3	<i>Prostanthera ferricola</i>	L									
P3	<i>Sauropus</i> sp. Woolgorong (M. Officer s.n. 10/8/94)	L				X		X			
P3	<i>Sida picklesiana</i>	L									
P3	<i>Stackhousia clementii</i>	L									
P3	<i>Thryptomene nealensis</i>	X	X					X			

Status	Scientific Name	Databases* ¹			Survey / Desktop Reports* ²						R* ³
		DPaW	NM	PM	JM4	JM6	MRS	O8a	O8b	W6	
P3	<i>Thryptomene</i> sp. Leinster (B.J. Lepschi & L.A. Craven 4362)	X	X			X		X			
P3	<i>Tribulus adelacanthus</i>	L									
P3	<i>Triglochin protuberans</i>	L									
P3	<i>Verticordia jamiesonii</i>	X	X								
P3	<i>Xanthoparmelia nashii</i>	L									
P4	<i>Asterolasia drummondii</i>	L									
P4	<i>Eremophila pungens</i>	X	X		X	X	X	X	X		
P4	<i>Eucalyptus jutsonii</i> subsp. <i>jutsonii</i>	L									
P4	<i>Grevillea inconspicua</i>	X	X		X	X	X	X			
P4	<i>Hemigenia exilis</i>	X	X		X	X	X	X			
P4	<i>Stylidium aeonioides</i>	L									
Weed	* <i>Carrichtera annua</i>			X		X					
Weed	* <i>Cenchrus ciliaris</i>			X				X	X		
Weed	* <i>Centaurea melitensis</i>										X
Weed	* <i>Citrullus lanatus</i>				X	X		X	X		X
Weed	* <i>Cucumis myriocarpus</i>				X					X	
Weed	* <i>Cuscuta epithymum</i>										X
Weed	* <i>Hypochaeris glabra</i>								X		
Weed	* <i>Lysimachia arvensis</i>				X					X	X
Weed	* <i>Rumex hypogaeus</i>				X					X	X
Weed	* <i>Rumex vesicarius</i>				X					X	X
Weed	* <i>Salvia verbenaca</i>									X	
Weed	* <i>Solanum nigrum</i>				X						
Weed	* <i>Sonchus oleraceus</i>										X

Footnotes

*1 Databases:

DPaW Database Search DPaW Threatened Species and Communities Branch:

X = Represents actual specimens or survey coordinates of known populations / individuals

L = List of all conservation significant flora whose distribution maps fall within 50 km of search locality.

NM NatureMap online database search tool

PM EPBC Protected Matters search tool

*2 Reports Reviewed:

JM4 Jim's Seeds Weeds and Trees (2004) Flora Survey of the Lawlers Gold Mine Leases

JM6 Jim's Seeds Weeds and Trees (2006) Review of Flora and Fauna for Gold Fields Australia Agnew Gold Mine.

MRS3 Minesite Rehabilitation Services (2003) Appraisal for the Flora and Fauna at the Proposed Songvang Open Cut Mine;

O8a Onshore Environmental Consultants (2008a) Flora and Vegetation Survey Crusader, 450 South, Zone 2, and New Woman Prospects.

O8b Onshore Environmental Consultants (2008b) Flora and Vegetation Survey Emu - Vivien Pipeline, Vivien, Vivien Gem, Turret North and Cinderella Prospects.

W6 Woodman Environmental Consulting (2006) Vivien Project Flora and Vegetation Assessment.

*3 Rapallo

R *Rapallo (2016) L1 Flora and Fauna Survey of Hidden Secret, Leviathan and Songvang Corridor (THIS REPORT)*

Appendix 4 Fauna Desktop Results and Review

Scientific Name	Common Name	Status* ¹ WC Act	Status* ¹ EPBC Act	Likelihood of occurrence	Reasons for assessment
Threatened Fauna					
<i>Pezoporus occidentalis</i>	Night Parrot	CR	EN	Low	Very rare and highly elusive bird. Only confirmed locations are in the Pilbara and in Queensland, hundreds of km away from the survey areas. However, yet undiscovered populations may occur elsewhere as it is very difficult to detect. The Agnew Gold project area does not support the species' preferred habitat: especially old and large spinifex clumps or other dense low vegetation needed for breeding and daytime roost are absent. The Night Parrot is considered unlikely to occur in the survey areas, and unlikely to be impacted by project developments.
<i>Calyptorhynchus latirostris</i>	Carnaby's cockatoo	EN	EN	Possible	No suitable feeding or breeding habitat present in survey areas. Nearest records are to the east, so birds could potentially traverse the Agnew Gold project area during migration. However, all records are more than 10 years old and species is declining. The Carnaby's Cockatoo may occasionally visit the survey areas, but is unlikely to be impacted by project developments.
<i>Petrogale lateralis lateralis</i>	Black-flanked Rock-wallaby	EN	VU	Low	The Black-footed Rock Wallaby is only know from a few mainland locations in WA, the nearest of which is the Calvert Ranges, Little Sandy Desert, more than 300 km north of the Agnew Gold project. DPaW database shows two populations recorded 80 km north of the project area: Yeelirrie (2015) and East Murchison (2009) so it is possible that more yet unknown populations will be discovered in the future. The breakaways and stony rises in the Hidden Secret survey area may offer marginal habitat. However, no evidence of rocks wallabies (especially scats) was found. The caves were full of Euro (<i>Macropus robustus</i>) scats, and the tops of the breakaways grazed out by cattle and rabbits. Hence, even if the habitat was suitable, competition for food and shelter would likely prevent for rock wallabies to occur in Hidden Secret. No suitable habitat was found in Leviathan and Songvang. Hence, the Black-footed Rock Wallaby is unlikely to occur in the survey areas, or be affected by project developments.
<i>Falco hypoleucos</i>	Grey Falcon	VU	-	Low	Rare and cryptic bird, is uncommon within its range and can easily be overlooked during surveys. Agnew Gold project is south of its normal range, with the nearest Birdata record just south of Meekatharra, 250 km north-

Scientific Name	Common Name	Status* ¹ WC Act	Status* ¹ EPBC Act	Likelihood of occurrence	Reasons for assessment
					west of the project. Desktop review of other areas surveyed within the Agnew Gold project suggest that suitable breeding habitat may occur in tall <i>Eucalyptus camaldulensis</i> along rivers. However, this habitat is absent from the survey areas covered in this report. The Grey Falcon is therefore unlikely to occur in the survey areas, and very unlikely to be impacted by project developments.
<i>Leipoa ocellata</i>	Malleefowl	VU	VU	Possible	The Agnew Gold project is situated within the species' range and contains potentially suitable habitat of scrubland and woodland dominated by mallee and <i>Acacia</i> species. Numerous DPaW records exist both to the north and south. The nearest records are from Yeelirrie (2000), 50 km north of the project area, and from Mount Forest 75 km south-west (2012). The Rapallo survey did not record any evidence of Malleefowl mounds. However, the project survey areas were extensive (nearly 400 ha) and a survey at Level 1 does not allow for detailed coverage of all potential habitat areas. Hence, it is not possible to exclude the occurrence of the Malleefowl in the project area, and if present it may be impacted by the project to some extent.
<i>Macrotis lagotis</i>	Greater Bilby	VU	VU	Low	The Agnew Gold project lies south of the species' known distribution, and does not contain its preferred habitat of desert sandplains and dunes with spinifex, or massive red earths with <i>Acacia</i> shrubland. The DPaW database search only yielded one record from 1981, located 37 km south-east of Leviathan. The Bilby is unlikely to occur in the project survey areas, or be impacted by project developments.
<i>Liopholis kintorei</i>	Great Desert Skink	VU	VU	Low	The survey areas, or the greater Agnew Gold project area, do not contain the species' preferred habitat of red sandplains and sand ridges. The nearest DPaW record is very old (1964) and located 65 km north of Hidden Secret. Since the species appears to be declining throughout its range with many previously known sites no longer supporting populations, it is possible that this population no longer exists. The three currently known remaining populations in WA are more than 600 km away. The Great Desert Skink is unlikely to occur in the survey areas, or be impacted by project developments.
<i>Calidris ferruginea</i>	Curlew sandpiper	VU, IA	CR	Low	The Curlew Sandpiper is predominantly coastal, with very few inland records. The nearest DPaW record is 100 km of the project area, dated

Scientific Name	Common Name	Status* ¹ WC Act	Status* ¹ EPBC Act	Likelihood of occurrence	Reasons for assessment
					1980. No suitable foraging habitat occurs in the survey areas. The Curlew Sandpiper is unlikely to occur in the survey areas, or be impacted by project developments.
Birds Protected under an International Agreement					
<i>Tringa nebularia</i>	Common Greenshank	IA	M, IA	Possible	The Common Greenshank is a versatile and adaptive bird, which may occur anywhere deep inland where there is some ephemeral or permanent water. Nearest record 38 km east of Leviathan (1978), with more recent records from Malcom Dam Nature Reserve near Leonora, 120 km south-east (2011). The Common Greenshank may visit the survey areas to forage along the larger creek lines when they hold water, as well as other locations where water can accumulate during the wetter months of the year. However, because large areas of permanent wetlands or suitable breeding habitat are absent, the project is unlikely to impact on the species.
<i>Ardea modesta</i>	Eastern Great Egret	IA	M	Possible	Non-breeding birds may forage along the larger creek lines when they hold water, as well as other locations where water can accumulate during the wetter months of the year. However, because the survey areas do not contain large areas of permanent wetlands or suitable breeding habitat, the project is unlikely to impact on the Eastern Great Egret.
<i>Apus pacificus</i>	Fork-tailed Swift	IA	M, IA	Possible	This highly aerial species tends to only land in its breeding locations, which are outside of Australia. The species may be recorded flying above the project area when they visit Australia between August and April. Nearest Murchison records between 80 (2015 Yeelirrie) and 100 km away (2008). Because the Fork-tailed Swift would only utilise the air space above the survey areas and never land, it is highly unlikely to be affected by ground-based project activities.
<i>Motacilla cinerea</i>	Grey Wagtail	IA	M, IA	Low	Rare visitor to Australia with very few confirmed records. The Grey Wagtail is highly unlikely to ever visit the Agnew Gold project. If it does, the fact that it is a vagrant species means that the project is unlikely to have an impact on the species as a whole.
<i>Gelochelidon nilotica</i>	Gull-billed tern	IA	IA	Low	This robust tern is only rarely found over the ocean. Instead it frequents lagoons, bays, estuaries and a wide variety of inland freshwater bodies. The Agnew Gold project lies outside of this species' regular range. The nearest

Scientific Name	Common Name	Status* ¹ WC Act	Status* ¹ EPBC Act	Likelihood of occurrence	Reasons for assessment
					DPaW record is 90 km north-west at Yeelirrie (2015). Because survey areas do not support large permanent water bodies or wetlands, the Gull-billed Tern is unlikely to visit the survey areas or be affected by project activities.
<i>Charadrius veredus</i>	Oriental Plover	IA	M, IA	High	The Rapallo survey team recorded four Oriental Plovers sitting on the road between Leinster and the survey areas on 27 September 2016. The sighting was on the Agnew-Sandstone Road, 19 KN north-east of Hidden Secret and 14 km North of Leviathan. Because of this sighting, the Oriental Plover is considered likely to occur in the survey areas, but only for short periods of the year and not during the breeding season. Project developments are unlikely to significantly affect this species' foraging habitat, which is extensive both inside and outside the Agnew Gold project area. However, vehicle strike poses a potential risk to individual birds as they appear to like sitting on roads. The risk of vehicle strike can be reduced by observing speed limits and educating personnel.
<i>Pluvialis fulva</i>	Pacific golden plover	IA	M, IA	Low	This species does not usually occur far inland and the survey areas do not support suitable habitat. The nearest DPaW database record is from Malcolm Dam Nature Reserve near Leonora in 1979, 120 km south-east of the project area. The Pacific Golden Plover is unlikely to visit the survey areas, or be impacted by project developments.
<i>Merops ornatus</i>	Rainbow Bee-eater	IA	M	High	The Rainbow Bee-eater is a common bird which may temporarily visit the Agnew Gold project during migration. However, the project is situated in parts of its Australian range where it is less common. The survey areas contains suitable habitat. The DPaW database holds numerous records both north, south-east and south-west of the project area. Project developments may impact some of the species' feeding habitat, but are unlikely to affect many individuals and there is plenty of suitable habitat available in surrounding areas. Rainbow bee-eaters appear not very sensitive to disturbance outside their breeding areas, and local birds are likely to adapt to human activities associated with the project.
<i>Calidris canutus</i>	Red Knot	IA	EN, M, IA	Low	The Agnew Gold project lies outside of this species' normal range, and the survey areas lack suitable habitat. The nearest DPaW database record is from Malcolm Dam Nature Reserve near Leonora in 1978. The Red Knot is highly unlikely to visit the survey areas, or be impacted by the project.

Scientific Name	Common Name	Status* ¹ WC Act	Status* ¹ EPBC Act	Likelihood of occurrence	Reasons for assessment
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	IA	IA, M	Possible	The Sharp-tailed Sandpiper prefers coastal areas, but is there are also numerous and widespread inland records of the species. The nearest Birdata record is from Malcolm Dam Nature Reserve just east of Leonora. The survey areas contain potentially suitable habitat during the wetter months of the year, and the Sharp-tailed Sandpiper may forage along the larger creek lines when they hold water, as well as other locations where water can accumulate. In these months, individuals may be disturbed by project activities nearby. It is recommended that project activities avoid larger creek lines or low lying areas where possible. However, the survey areas only contain marginal feeding habitat, so impacts on the species as a whole would be low.
<i>Calonectris leucomelas</i>	Streaked shearwater	IA	IA, M	Low	The Streaked Shearwater is a highly marine species, which does not usually venture inland. DPaW has three records of vagrant birds recorded at camp Lake Ida Minesite near Menzies (2012). However these have not been adopted by Birdlife Australia (Birdata) so may be spurious. If sightings were correct then it is highly unlikely to happen again. The project is highly unlikely to impact on the Streaked Shearwater.
<i>Tringa glareola</i>	wood sandpiper	IA	M, IA	Possible	The Wood Sandpiper uses inland freshwater wetlands, and the Agnew Gold project lies within its range. This species may temporarily visit the project area for feeding during the wetter months of the year when larger creeks and low lying areas are inundated. The nearest DPaW database record is old (1978) and 90 km south-west of Songvang. The Wood Sandpiper may be affected to a minor extent by project activities that remove or disturb the wetter parts of the survey areas. However, the survey areas only contain marginal feeding habitat, so overall impacts on the species as a whole would be low.
<i>Motacilla flava</i>	Yellow Wagtail	IA	M, IA	Low	The Yellow Wagtail is a vagrant visitor to the northern parts of WA. The DPaW database has no records within 150 km of the project area. The Yellow Wagtail is highly unlikely to visit the project area.
Other Specially Protected Fauna					

Scientific Name	Common Name	Status* ¹ WC Act	Status* ¹ EPBC Act	Likelihood of occurrence	Reasons for assessment
<i>Falco peregrinus</i>	Peregrine Falcon	OS	-	High	The Peregrine Falcon is widespread throughout Australia. It preferred habitat is cliffs and wooded areas near coasts, watercourses and lakes. The survey areas do not contain suitable habitat, but the Eucalyptus camaldulensis woodlands along rivers recorded elsewhere in the Agnew Gold project may support this species. The DPaW database holds numerous records to the north, south, east and west of the project area, including one record 18 km south of Leviathan. The Peregrine Falcon is considered likely to occur over the survey areas while hunting. However, the absence of nesting habitat means it is unlikely to be affected by project activities.
Priority Fauna					
<i>Charadrius rubricollis</i>	Hooded Plover	P4	-	Low	The Hooded Plover is a small beach nesting bird. The nearest DPaW database record is from Lake Barlee (1998) 120 km south-west of the Songvang Corridor. Birdata shows another record from Malcolm Dam Nature Reserve near Leonora. The species is unlikely to occur in the project area because there is not suitable habitat. It may visit as a vagrant during the wetter months of the year when larger creek lines and low lying areas hold water, but this is unlikely. Developments associated with the proposed project are therefore considered unlikely to impact the Hooded Plover.
<i>Polytelis alexandrae</i>	Princess Parrot	P4	VU	Low	The Agnew Gold project lies outside of the Princess Parrot's normal range. The survey areas do not contain suitable habitat of lightly wooded country with tree hollows for nesting. The nearest DPaW database records are 65 km to the north (1964), and 115 km to the west (1915), but these records are very old. These records are very old. The nearest Birdata record is from Neale Junction Nature Reserve, more than 400 km east of the project area. Hence, the Princess Parrot is unlikely to occur in the survey areas, or be impacted by project developments.

Scientific Name	Common Name	Status* ¹ WC Act	Status* ¹ EPBC Act	Likelihood of occurrence	Reasons for assessment
<i>Amytornis striatus striatus</i>	Striated grasswren	P4	-	Low	The Agnew Gold project lies outside of this species' normal range, and lacks suitable habitat: Spinifex (<i>Triodia</i> spp.) is absent from both the survey areas covered for this report, and in other areas surveys previously surveyed for the Agnew Gold project. The nearest DPaW and Birddata records are from the Wanjarri Nature Reserve, 65 km north-east of the project area but this reserve has spinifex which the project area lacks. The Striated Grasswren is therefore unlikely to occur in the survey areas, or be affected by project developments.
<i>Dasyercus blythi</i>	Brush-tailed Mulgara	P4	-	Low	The Agnew Gold project area is located within the species' range, but the survey areas do not contain suitable habitat in the form of spinifex (<i>Triodia</i> spp.) grassland on deep sandy soils. Reports of other surveys within the Agnew Gold project area also fail to report any spinifex grasslands. The DPaW database shows numerous records to the north of the project area, the nearest 47 km away (2004) from Sir Samuel. Also two recent records (2012) 100 km south of project area. Despite nearby records, the absence of habitat indicates a low likelihood of the Brush-tailed Mulgara occurring in the project area. The species is therefore unlikely to be affected by project developments.
<i>Dasyercus cristicauda</i>	Crest-tailed Mulgara	P4	VU	Low	The Crest-tailed Mulgara does not occur in Western Australia. Until recently, the Crest-tailed and Brush-tailed Mulgara were treated as one species, and old records did not distinguish between the two. The DPaW database records of this species are probably spurious and likely represent sightings of the Brush-tailed Mulgara instead.
<i>Nyctophilus major tor</i>	Central Long-eared Bat	P4	-	Low	The Agnew Gold project is situated on the southern fringe of the species' distribution, but the survey areas do not contain its preferred habitat of mixed eucalypt woodlands. Reports of biological surveys in other parts of the Agnew Gold project also fail to report mixed eucalypt woodlands. Absence of suitable habitat means that it is unlikely that the Central Long-eared Bat occurs within, or in close proximity of the survey areas, and the project is unlikely to impact the species.

Scientific Name	Common Name	Status* ¹ WC Act	Status* ¹ EPBC Act	Likelihood of occurrence	Reasons for assessment
<i>Sminthopsis longicaudata</i>	Long-tailed Dunnart	P4	-	Low	The Long-tailed Dunnart is distributed in widely scattered localities in areas with rugged, rocky terrain. The Agnew Gold project is situated within the species' range, but the survey areas do not contain suitable habitat. Reports of biological surveys from other parts of the Agnew Gold project also did not record suitable habitat. The DPaW database has 46 records from the west, south-west, and south of the project area, the majority of which from the past five years. Nearest recent records from Mt Richardson, 75 km south-west. Absence of suitable habitat means that the species is unlikely to occur in the survey areas, or be impacted by project developments.
Introduced (Feral) Fauna					
<i>Bos Taurus</i>	Cattle	Feral	Feral	High	Scats and grazing recorded in Hidden Secret, Leviathan, and Songvang Corridor.
<i>Camelus dromedaries</i>	Dromedary Camel	Feral	Feral	Possible	Project area within its known range, and contains suitable habitat.
<i>Canis lupus dingo</i>	Dog / Dingo	Feral	Feral	High	Scats recorded in Hidden Secret survey area. Species recorded previously from other areas within the Agnew Gold project (ENV 2008).
<i>Capra hircus</i>	Goat	Feral	Feral	High	Project area within its current range. Species recorded from other areas in the Agnew Gold project. A single goat horn recorded in Hidden Secret.
<i>Felis catus</i>	Domestic Cat	Feral	Feral	High	Scats recorded in Hidden Secret survey area.
<i>Equus asinus</i>	Donkey	Feral	Feral	Low	Project area outside its currently known range.
<i>Mus musculus</i>	House Mouse	Feral	Feral	Possible	Project area within its known range, and contains suitable habitat.
<i>Oryctolagus cuniculus</i>	European Rabbit	Feral	Feral	High	Scats recorded in Hidden Secret survey area.
<i>Vulpes vulpes</i>	Red Fox	Feral	Feral	Possible	Project area within its known range, and contains suitable habitat.

Footnotes:

*1 = See Appendix 1 for explanation of conservation codes.

Appendix 5 Flora Survey Results

Family Name	Taxon Name	Hidden Secret	Leviathan	Songvang Corridor
Acanthaceae	<i>Harnieria kempeana</i> subsp. <i>muelleri</i>			X
Amaranthaceae	<i>Ptilotus aervoides</i>		X	X
	<i>Ptilotus gaudichaudii</i>		X	
	<i>Ptilotus gaudichaudii</i> subsp. <i>gaudichaudii</i>			X
	<i>Ptilotus helipteroides</i>			X
	<i>Ptilotus nobilis</i>	X		
	<i>Ptilotus obovatus</i>	X	X	
	<i>Ptilotus obovatus</i> var. <i>obovatus</i>	X	X	X
	<i>Ptilotus polystachyus</i>			X
	<i>Ptilotus roei</i>		X	X
	<i>Ptilotus schwartzii</i> var. <i>schwartzii</i>		X	
Apocynaceae	<i>Marsdenia australis</i>		X	
Asphodelaceae	<i>Bulbine semibarbata</i>			X
Asteraceae	* <i>Centaurea melitensis</i>	X		
	* <i>Sonchus oleraceus</i>		X	X
	<i>Brachyscome ciliaris</i>			X
	<i>Calocephalus knappii</i>			X
	<i>Calocephalus multiflorus</i>		X	
	<i>Calotis</i> sp. Perrinvale Station (R.J. Cranfield 7096)		X	
	<i>Gnephosis arachnoidea</i>		X	X
	<i>Gnephosis tenuissima</i>		X	
	<i>Hyalosperma glutinosum</i> subsp. <i>glutinosum</i>		X	
	<i>Podolepis kendallii</i>		X	
	<i>Pterocaulon sphacelatum</i>			X
	<i>Rhodanthe charsleyae</i>		X	X
	<i>Rhodanthe chlorocephala</i> subsp. <i>splendida</i>		X	
	<i>Rhodanthe propinqua</i>		X	
	<i>Senecio magnificus</i>	X		
	<i>Vittadinia humerata</i>	X		
	<i>Waitzia acuminata</i> var. <i>acuminata</i>		X	
<i>Cephalopterum drummondii</i>		X		
Brassicaceae	<i>Lepidium platypetalum</i>	X		X
Campanulaceae	<i>Isotoma petraea</i>	X		
	<i>Wahlenbergia tumidifructa</i>		X	
Casuarinaceae	<i>Casuarina pauper</i>	X		
Chenopodiaceae	<i>Atriplex cinerea</i>		X	

Family Name	Taxon Name	Hidden Secret	Leviathan	Songvang Corridor
Chenopodiaceae (continued)	<i>Atriplex codonocarpa</i>		x	x
	<i>Atriplex semilunaris</i>		x	
	<i>Dissocarpus paradoxus</i>		x	
	<i>Dysphania kalpari</i>		x	
	<i>Dysphania melanocarpa</i> forma <i>melanocarpa</i>			x
	<i>Dysphania rhadinostachya</i>			x
	<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	x	x	x
	<i>Maireana</i> aff. <i>tomentosa</i>	x		x
	<i>Maireana breviflora</i>	x		
	<i>Maireana carnosa</i>		x	
	<i>Maireana convexa</i>		x	
	<i>Maireana georgei</i>	x	x	x
	<i>Maireana glomerifolia</i>	x		
	<i>Maireana platycarpa</i>			x
	<i>Maireana tomentosa</i> subsp. <i>tomentosa</i>	x	x	
	<i>Maireana trichoptera</i>	x		
	<i>Maireana triptera</i>	x	x	x
	<i>Rhagodia eremaea</i>		x	x
	<i>Salsola australis</i>			x
	<i>Sclerolaena cuneata</i>	x	x	
	<i>Sclerolaena densiflora</i>	x	x	x
<i>Sclerolaena diacantha</i>		x		
<i>Sclerolaena eriacantha</i>	x	x	x	
<i>Tecticornia doliiformis</i>	x			
Convolvulaceae	* <i>Cuscuta epithymum</i>		x	x
	<i>Duperreya commixta</i>		x	x
Cucurbitaceae	* <i>Citrullus lanatus</i>			x
Cyperaceae	<i>Fimbristylis dichotoma</i>		x	
Euphorbiaceae	<i>Euphorbia australis</i> var. <i>subtomentosa</i>			x
	<i>Euphorbia drummondii</i>		x	
Fabaceae	<i>Acacia aneura</i>	x	x	x
	<i>Acacia aptaneura</i>	x	x	x
	<i>Acacia ayersiana</i> (short phyllode variant)		x	
	<i>Acacia caesaneura</i>	x	x	x
	<i>Acacia caesaneura</i> x <i>craspedocarpa</i>	x		
	<i>Acacia craspedocarpa</i>	x	x	x
	<i>Acacia erinacea</i>	x		
	<i>Acacia fuscaeneura</i>			x
<i>Acacia incurvaneura</i>	x	x	x	

Family Name	Taxon Name	Hidden Secret	Leviathan	Songvang Corridor
Fabaceae (continued)	<i>Acacia incurvaneura</i> (sub-terete / flattened form)	x		
	<i>Acacia incurvaneura</i> (terete form)	x		
	<i>Acacia latrobei</i> subsp. <i>latrobei</i>	x		
	<i>Acacia macraneura</i>			x
	<i>Acacia mulganeura</i>		x	
	<i>Acacia oswaldii</i>	x		
	<i>Acacia quadrimarginea</i>	x	x	x
	<i>Acacia ramulosa</i> var. <i>linophylla</i>		x	x
	<i>Acacia tetragonophylla</i>	x	x	
	<i>Acacia victoriae</i>		x	
	<i>Acacia xanthocarpa</i>			x
	<i>Indigofera georgei</i>		x	
	<i>Senna artemisioides</i> subsp. <i>helmsii</i>			x
	<i>Senna artemisioides</i> subsp. <i>X artemisioides</i>			x
	<i>Senna charlesiana</i>	x	x	
	<i>Senna glaucifolia</i>			x
	<i>Senna manicula</i>			x
<i>Senna</i> sp. Meekatharra (E. Bailey 1-26)	x	x	x	
Frankeniaceae	<i>Frankenia laxiflora</i>	x		
Geraniaceae	<i>Erodium cygnorum</i>	x		
Goodeniaceae	<i>Goodenia mimuloides</i>	x		x
	<i>Goodenia occidentalis</i>		x	
	<i>Scaevola spinescens</i>	x	x	x
Haloragaceae	<i>Haloragis odontocarpa</i> forma <i>rugosa</i>		x	
Hemerocallidaceae	<i>Dianella revoluta</i> var. <i>divaricata</i>		x	
Lamiaceae	* <i>Salvia verbenaca</i>			x
	<i>Spartothamnella teucriflora</i>		x	
Loranthaceae	<i>Lysiana casuarinae</i>		x	
Malvaceae	<i>Abutilon cryptopetalum</i>		x	x
	<i>Brachychiton gregorii</i>			x
	<i>Hibiscus burtonii</i>		x	
	<i>Sida calyxhymenia</i>	x		x
	<i>Sida ectogama</i>		x	x
	<i>Sida fibulifera</i>	x		x
	<i>Sida</i> sp. dark green fruits (S. van Leeuwen 2260)		x	x
Myrtaceae	<i>Baeckea</i> sp. Melita Station (H. Pringle 2738)	x		
	<i>Calytrix erosipetala</i>	x		

Family Name	Taxon Name	Hidden Secret	Leviathan	Songvang Corridor
Myrtaceae (continued)	<i>Eucalyptus camaldulensis</i>		x	
	<i>Melaleuca interioris</i>	x		
	<i>Thryptomene</i> sp. Leinster (B.J. Lepschi & L.A. Craven 4362)	x		
Pittosporaceae	<i>Pittosporum angustifolium</i>	x		
Plantaginaceae	<i>Plantago cunninghamii</i>		x	
Poaceae	<i>Aristida contorta</i>	x	x	
	<i>Austrostipa elegantissima</i>		x	
	<i>Cymbopogon ambiguus</i>			x
	<i>Enneapogon caerulescens</i>		x	x
	<i>Eragrostis desertorum</i>		x	
	<i>Eragrostis dielsii</i>	x	x	
	<i>Eragrostis eriopoda</i>			x
	<i>Eragrostis setifolia</i>		x	x
	<i>Eriachne flaccida</i>		x	
	<i>Eriachne mucronata</i> (dwarf form)	x	x	
	<i>Eriachne pulchella</i> subsp. <i>pulchella</i>		x	
	<i>Monachather paradoxus</i>		x	
	<i>Sporobolus caroli</i>			x
Polygalaceae	<i>Polygala glaucifolia</i>			x
Polygonaceae	* <i>Rumex hypogaeus</i>			x
	* <i>Rumex vesicarius</i>	x		x
Portulacaceae	<i>Calandrinia creethae</i>		x	
	<i>Calandrinia eremaea</i>	x	x	
Primulaceae	* <i>Lysimachia arvensis</i>			x
Proteaceae	<i>Grevillea berryana</i>		x	x
	<i>Grevillea inconspicua</i>	x		
	<i>Hakea leucoptera</i> subsp. <i>sericipes</i>			x
	<i>Hakea lorea</i> subsp. <i>lorea</i>		x	x
	<i>Hakea preissii</i>	x		
Pteridaceae	<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>		x	
Rubiaceae	<i>Psydrax latifolia</i>	x	x	
	<i>Psydrax rigidula</i>		x	x
	<i>Psydrax suaveolens</i>		x	
Rutaceae	<i>Philotheca brucei</i> subsp. <i>brucei</i>	x		
Santalaceae	<i>Santalum lanceolatum</i>		x	
	<i>Santalum spicatum</i>		x	x
Sapindaceae	<i>Dodonaea microzyga</i> var. <i>acrolobata</i>	x		
	<i>Dodonaea viscosa</i> subsp. <i>mucronata</i>	x		x

Family Name	Taxon Name	Hidden Secret	Leviathan	Songvang Corridor
Scrophulariaceae	<i>Eremophila forrestii</i> subsp. <i>forrestii</i>		x	
	<i>Eremophila galeata</i>	x	x	x
	<i>Eremophila homoplastica</i>		x	
	<i>Eremophila hygrophana</i>		x	
	<i>Eremophila latrobei</i> subsp. <i>filiformis</i>			x
	<i>Eremophila latrobei</i> subsp. <i>latrobei</i>	x	x	
	<i>Eremophila margarethae</i>		x	x
	<i>Eremophila metallicorum</i>	x	x	x
	<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>			x
	<i>Eremophila oppositifolia</i> subsp. <i>angustifolia</i>	x		
	<i>Eremophila pantonii</i>	x		
	<i>Eremophila platycalyx</i> subsp. <i>platycalyx</i>	x	x	x
	<i>Eremophila pungens</i>	x		
	<i>Eremophila serrulata</i>		x	
	<i>Eremophila spectabilis</i> subsp. <i>brevis</i>	x	x	x
<i>Eremophila youngii</i> subsp. <i>youngii</i>			x	
Solanaceae	<i>Nicotiana rosulata</i> subsp. <i>rosulata</i>		x	
	<i>Solanum lasiophyllum</i>		x	x
Thymelaeaceae	<i>Pimelea trichostachya</i>			x
	<i>Pimelea microcephala</i> subsp. <i>microcephala</i>			x
Zygophyllaceae	<i>Zygophyllum eremaeum</i>	x		

Footnotes:

* An asterisk preceding a taxon name indicates that the taxon is considered to be alien to Western Australia (i.e. weed) (WA Herbarium 2016).

Summary Statistics

	Total for all PSAs combined	Hidden Secret	Leviathan	Songvang Corridor
Families	40	22	26	24
Taxa	171	67	100	81
Conservation Significant Flora	3	2	1	0
Weeds	8	2	3	7

Appendix 6 Coordinates of conservation significant flora and weeds

Coordinates of Conservation Significant Flora recorded in Level 1 Flora and Vegetation Survey					
Area	Taxon	Status	Zone	Easting	Northing
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	254140	6899770
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	254109	6900805
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	254117	6900854
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	253152	6899108
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	254000	6900081
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	253152	6899108
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270897	6891665
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	269990	6891980
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270023	6892000
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270063	6892027
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270101	6892047
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270135	6892072
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	269980	6891962
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270013	6891983
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270044	6892002
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270082	6892025
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270124	6892052
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270161	6892078
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270167	6892093
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270190	6892095
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270192	6892107
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	269754	6892203
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	251496	6890478
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	251095	6887138
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	251095	6887127
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	251083	6887138
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	251095	6887148
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	251411	6890235
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	251106	6887138
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	251411	6890235
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	254140	6899770
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	254109	6900805
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	254117	6900854
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	253152	6899108
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	254000	6900081

Coordinates of Conservation Significant Flora recorded in Level 1 Flora and Vegetation Survey					
Area	Taxon	Status	Zone	Easting	Northing
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	253152	6899108
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270897	6891665
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	269990	6891980
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270023	6892000
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270063	6892027
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270101	6892047
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270135	6892072
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	269980	6891962
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270013	6891983
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270044	6892002
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270082	6892025
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270124	6892052
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270161	6892078
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270167	6892093
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270190	6892095
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270192	6892107
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	269754	6892203
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	251496	6890478
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	251095	6887138
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	251095	6887127
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	251083	6887138
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	251095	6887148
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	251411	6890235
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	251106	6887138
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	251411	6890235
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	254140	6899770
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	254109	6900805
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	254117	6900854
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	253152	6899108
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	254000	6900081
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	253152	6899108
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270897	6891665
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	269990	6891980
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270023	6892000
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270063	6892027
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270101	6892047
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270135	6892072
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	269980	6891962

Coordinates of Conservation Significant Flora recorded in Level 1 Flora and Vegetation Survey					
Area	Taxon	Status	Zone	Easting	Northing
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270013	6891983
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270044	6892002
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270082	6892025
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270124	6892052
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270161	6892078
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270167	6892093
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270190	6892095
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270192	6892107
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	269754	6892203
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	251496	6890478
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	251095	6887138
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	251095	6887127
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	251083	6887138
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	251095	6887148
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	251411	6890235
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	251106	6887138
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	251411	6890235
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	254140	6899770
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	254109	6900805
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	254117	6900854
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	253152	6899108
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	254000	6900081
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	253152	6899108
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270897	6891665
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	269990	6891980
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270023	6892000
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270063	6892027
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270101	6892047
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270135	6892072
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	269980	6891962
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270013	6891983
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270044	6892002
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270082	6892025
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270124	6892052
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270161	6892078
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270167	6892093
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270190	6892095
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270192	6892107

Coordinates of Conservation Significant Flora recorded in Level 1 Flora and Vegetation Survey					
Area	Taxon	Status	Zone	Easting	Northing
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	269754	6892203
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	251496	6890478
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	251095	6887138
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	251095	6887127
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	251083	6887138
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	251095	6887148
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	251411	6890235
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	251106	6887138
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	251411	6890235
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	254140	6899770
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	254109	6900805
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	254117	6900854
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	253152	6899108
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	254000	6900081
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	253152	6899108
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270897	6891665
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	269990	6891980
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270023	6892000
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270063	6892027
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270101	6892047
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270135	6892072
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	269980	6891962
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270013	6891983
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270044	6892002
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270082	6892025
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270124	6892052
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270161	6892078
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270167	6892093
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270190	6892095
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270192	6892107
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	269754	6892203
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	251496	6890478
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	251095	6887138
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	251095	6887127
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	251083	6887138
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	251095	6887148
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	251411	6890235
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	251106	6887138

Coordinates of Conservation Significant Flora recorded in Level 1 Flora and Vegetation Survey					
Area	Taxon	Status	Zone	Easting	Northing
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	251411	6890235
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	254140	6899770
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	254109	6900805
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	254117	6900854
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	253152	6899108
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	254000	6900081
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	253152	6899108
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270897	6891665
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	269990	6891980
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270023	6892000
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270063	6892027
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270101	6892047
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270135	6892072
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	269980	6891962
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270013	6891983
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270044	6892002
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270082	6892025
Hidden Secret	<i>Eremophila pungens</i>	Priority 4	51J	270124	6892052
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270161	6892078
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270167	6892093
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270190	6892095
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270192	6892107
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	269754	6892203
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	251496	6890478
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	251095	6887138
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	251095	6887127
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	251083	6887138
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	251095	6887148
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	251411	6890235
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	251106	6887138
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	251411	6890235
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	254140	6899770
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	254109	6900805
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	254117	6900854
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	253152	6899108
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	254000	6900081
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	253152	6899108
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270897	6891665

Coordinates of Conservation Significant Flora recorded in Level 1 Flora and Vegetation Survey					
Area	Taxon	Status	Zone	Easting	Northing
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	269990	6891980
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270023	6892000
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270063	6892027
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270101	6892047
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270135	6892072
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	269980	6891962
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270013	6891983
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270044	6892002
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270082	6892025
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270124	6892052
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270161	6892078
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270167	6892093
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270190	6892095
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270192	6892107
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	269754	6892203
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	251496	6890478
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	251095	6887138
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	251095	6887127
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	251083	6887138
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	251095	6887148
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	251411	6890235
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	251106	6887138
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	251411	6890235
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	254140	6899770
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	254109	6900805
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	254117	6900854
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	253152	6899108
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	254000	6900081
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	253152	6899108
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270897	6891665
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	269990	6891980
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270023	6892000
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270063	6892027
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270101	6892047
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270135	6892072
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	269980	6891962
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270013	6891983
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270044	6892002

Coordinates of Conservation Significant Flora recorded in Level 1 Flora and Vegetation Survey					
Area	Taxon	Status	Zone	Easting	Northing
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270082	6892025
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270124	6892052
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270161	6892078
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270167	6892093
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270190	6892095
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270192	6892107
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	269754	6892203
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	251496	6890478
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	251095	6887138
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	251095	6887127
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	251083	6887138
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	251095	6887148
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	251411	6890235
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	251106	6887138
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	251411	6890235
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	254140	6899770
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	254109	6900805
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	254117	6900854
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	253152	6899108
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	254000	6900081
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	253152	6899108
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270897	6891665
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	269990	6891980
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270023	6892000
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270063	6892027
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270101	6892047
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270135	6892072
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	269980	6891962
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270013	6891983
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270044	6892002
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270082	6892025
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270124	6892052
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270161	6892078
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270167	6892093
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270190	6892095
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270192	6892107
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	269754	6892203
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	251496	6890478

Coordinates of Conservation Significant Flora recorded in Level 1 Flora and Vegetation Survey					
Area	Taxon	Status	Zone	Easting	Northing
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	251095	6887138
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	251095	6887127
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	251083	6887138
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	251095	6887148
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	251411	6890235
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	251106	6887138
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	251411	6890235
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	254140	6899770
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	254109	6900805
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	254117	6900854
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	253152	6899108
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	254000	6900081
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	253152	6899108
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270897	6891665
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	269990	6891980
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270023	6892000
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270063	6892027
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270101	6892047
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270135	6892072
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	269980	6891962
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270013	6891983
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270044	6892002
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270082	6892025
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270124	6892052
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270161	6892078
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270167	6892093
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270190	6892095
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	270192	6892107
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	269754	6892203
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	251496	6890478
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	251095	6887138
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	251095	6887127
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	251083	6887138
Hidden Secret	<i>Thryptomene</i> sp. Leinster	Priority 3	51J	251095	6887148
Leviathan	<i>Calotis</i> sp. Perrinvale Station* ¹	Priority 3	51J	251411	6890235

Footnotes:

*1 – Recorded at site LEV 06, ~270 m south of the revised boundaries of the Leviathan PSA

Coordinates of Weeds recorded in Level 1 Flora and Vegetation Survey					
Area	Taxon	Status	Zone	Easting	Northing
Hidden Secret	<i>*Centaurea melitensis</i>	weed	51J	254140	6899770
Hidden Secret	<i>*Rumex vesicarius</i>	weed	51J	254109	6900805
Hidden Secret	<i>*Rumex vesicarius</i>	weed	51J	254117	6900854
Hidden Secret	<i>*Rumex vesicarius</i>	weed	51J	253152	6899108
Hidden Secret	<i>*Rumex vesicarius</i>	weed	51J	254000	6900081
Hidden Secret	<i>*Rumex vesicarius</i>	weed	51J	253152	6899108
Leviathan	<i>*Cuscuta epithymum</i>	weed	51J	270897	6891665
Leviathan	<i>*Sonchus oleraceus</i>	weed	51J	269990	6891980
Leviathan	<i>*Rumex vesicarius</i>	weed	51J	270023	6892000
Leviathan	<i>*Rumex vesicarius</i>	weed	51J	270063	6892027
Leviathan	<i>*Rumex vesicarius</i>	weed	51J	270101	6892047
Leviathan	<i>*Rumex vesicarius</i>	weed	51J	270135	6892072
Leviathan	<i>*Rumex vesicarius</i>	weed	51J	269980	6891962
Leviathan	<i>*Rumex vesicarius</i>	weed	51J	270013	6891983
Leviathan	<i>*Rumex vesicarius</i>	weed	51J	270044	6892002
Leviathan	<i>*Rumex vesicarius</i>	weed	51J	270082	6892025
Leviathan	<i>*Rumex vesicarius</i>	weed	51J	270124	6892052
Leviathan	<i>*Rumex vesicarius</i>	weed	51J	270161	6892078
Leviathan	<i>*Rumex vesicarius</i>	weed	51J	270167	6892093
Leviathan	<i>*Rumex vesicarius</i>	weed	51J	270190	6892095
Leviathan	<i>*Rumex vesicarius</i>	weed	51J	270192	6892107
Leviathan	<i>*Rumex vesicarius</i>	weed	51J	269754	6892203
Songvang	<i>*Citrullus lanatus</i>	weed	51J	251496	6890478
Songvang	<i>*Cuscuta epithymum</i> ^{*1}	weed	51J	251095	6887138
Songvang	<i>*Lysimachia arvensis</i>	weed	51J	251095	6887127
Songvang	<i>*Rumex hypogaeus</i>	weed	51J	251083	6887138
Songvang	<i>*Rumex vesicarius</i>	weed	51J	251095	6887148
Songvang	<i>*Rumex vesicarius</i>	weed	51J	251411	6890235
Songvang	<i>*Salvia verbenaca</i>	weed	51J	251106	6887138
Songvang	<i>*Sonchus oleraceus</i>	weed	51J	251411	6890235

Footnotes:

*1 – Recorded at site LEV 06, ~270 m south of the revised boundaries of the Leviathan PSA

Appendix 7 Flora Relevé Site Descriptions

HIDDEN SECRET – RELEVÉ SITE HS 01

Project: AGMC Hidden Secret		Date: 24/09/2016		Botanist: Conrad Slee	
Site Name: HS 01		Size/Type: Relevé		Waypoint: WP 010 CS	
Zone: 51 J	254108 mE	6900805 mN	Error: ± 4 m	Elevation: 513 m	
Datum: WGS84 / GDA94			GPS number / initials: CS		
Site photo number(s): P9240043 (Olympus) – Looking South					
Location description: Gold Fields Ltd Agnew - New Holland Mine Site (Hidden Secret lease), ~200 m east of mine office, 1 km NNW of Agnew town site.					
Landform description: Stony plain / undulating quartz plain					
Aspect: Flat to gently north			Slope: Gentle		
Soil type: Gravelly / stony clay			Soil colour: Red-orange		
Rock type: Quartz with ferrous / laterite / sandstone			Rock size: 20 mm to 150 mm		% rock cover: 50%
Other geological features:					
Vegetation description: <i>Acacia aptaneura</i> scattered low trees over <i>Eremophila galeata</i> / <i>Acacia tetragonophylla</i> sparse medium shrubs, over <i>Ptilotus obovatus</i> / mixed chenopod sparse low shrubland.					
Cover: 15%	Condition: Degraded		Disturbances: Previous clearing, mine workings, exploration lines.		

HIDDEN SECRET – RELEVÉ SITE HS 02

Project: AGMC Hidden Secret		Date: 25/09/2016		Botanist: Conrad Slee	
Site Name: HS 02		Size/Type: Relevé		Waypoint: WP 033 CS	
Zone: 51 J	254063 mE	6899774 mN	Error: ±4 m	Elevation: 509 m	
Datum: WGS84 / GDA94			GPS number / initials: CS		
Site photo number(s): P9250061 to P9250068 (Olympus)					
Location description: 1.5 km NW of Agnew, Gold Fields Ltd New Holland Minesite (Hidden Secret lease), ~40 km SW of Leinster					
Landform description: Stony plain					
Aspect: Flat			Slope: Flat		
Soil type: Clay loam			Soil colour: Pale brown		
Rock type: Quarts / Sandstone sedimentary			Rock size: 20 mm – 150 mm		% rock cover: 20%
Other geological features:					
Vegetation description: <i>Acacia aptaneura</i> sparse low woodland / tall shrubland, over <i>Hakea preissii</i> sparse tall shrubs, over <i>Ptilotus obovatus</i> / chenopod open low shrubs.					
Cover: 35%	Condition: Poor to Good		Disturbances: Localised clearing and scattered Ruby Dock (weed)		

HIDDEN SECRET – RELEVÉ SITE HS 03

Project: AGMC Hidden Secret		Date: 25/09/2016	Botanist: Conrad Slee	
Site Name: HS 03		Size/Type: Relevé	Waypoint: WP 041 CS	
Zone: 51 J	253098 mE	6900503 mN	Error: ±4 m	Elevation: 511 m
Datum: WGS84 / GDA94		GPS number / initials: CS		
Site photo number(s): P9250084 (Olympus)				
Location description: Gold Fields Ltd Agnew – New Holland Minesite (Hidden Secret lease, ~300 m SW of minesite office, ~150 km NW of Agnew town site.				
Landform description: Lateritic breakaway / rock outcrop and slope.				
Aspect: North		Slope: Steep / moderate		
Soil type: Sandy clay		Soil colour: Pale brown		
Rock type: Laterite / sedimentary		Rock size: 10-20 cm	% rock cover: 60%	
Other geological features: Boulders, slabs				
Vegetation description: <i>Acacia incurvaneura</i> sparse tall shrubland over sparse shrubs such as <i>Ptilotus obovatus</i> , over <i>Eriachne mucronata</i> (dwarf form) sparse tussock grasses.				
Cover: 30%	Condition: Good	Disturbances: Cattle grazing.		

HIDDEN SECRET – RELEVÉ SITE HS 04

Project: AGMC Hidden Secret		Date: 25/09/2016	Botanist: Conrad Slee	
Site Name: HS 04		Size/Type: Relevé	Waypoint: WP 582 CS	
Zone: 51 J	253133 mE	6900644 mN	Error: ±4 m	Elevation: 507 m
Datum: WGS84 / GDA94		GPS number / initials: CS		
Site photo number(s): P9250094 (Olympus)				
Location description: Gold Fields Ltd Agnew – New Holland Minesite (Hidden Secret lease). Low alluvial area east / north of breakaways, ~1.5 km NW of Agnew town site.				
Landform description: Washout plains below breakaway / low alluvia slopes and stony gravel.				
Aspect: Gentle north		Slope: Gentle		
Soil type: Fine sandy clay		Soil colour: Orange-brown		
Rock type: Quartz		Rock size: 2-10 cm	% rock cover: 50%	
Other geological features:				
Vegetation description: Mixed mid-dense chenopod low shrubland of <i>Tecticornia doliiformis</i> / <i>Maireana</i> spp. / <i>Sclerolaena</i> / <i>Frankenia laxiflora</i>				
Cover: 50%	Condition: Excellent	Disturbances: Light Cattle Grazing		

HIDDEN SECRET – RELEVÉ SITE HS 05

Project: AGMC Hidden Secret		Date: 25/09/2016	Botanist: Conrad Slee	
Site Name: HS 05		Size/Type: Relevé	Waypoint: WP 593 CS	
Zone: 51 J	253194 mE	6900268 mN	Error: ±4 m	Elevation: 520 m
Datum: WGS84 / GDA94		GPS number / initials: CS		
Site photo number(s): P9250098 (Olympus)				
Location description: Gold Fields Ltd Agnew – New Holland Minesite (Hidden Secret lease), ~1.5 km NW of Agnew town site.				
Landform description: Mesa crest (stony flat-topped plateau) metamorphic sedimentary rock surrounded by breakaways.				
Aspect: Flat		Slope: Flat		
Soil type: Skeletal sandy loam / stony gravel		Soil colour: Pale brown / orange		
Rock type: Metamorphic sedimentary sandstone with quartz stones.		Rock size:		% rock cover: 85%
Other geological features:				
Vegetation description: <i>Acacia incurvaneura</i> (terete form) / <i>Acacia incurvaneura</i> (sub-terete/flattened form) scattered / sparse low woodland – tall shrubs, over <i>Thryptomene</i> sp. Leinster (B.J. Lepschi & L.A. Craven 4362) (Priority 3 flora) and/or other scattered medium to low shrubs.				
Cover: 5%	Condition: Poor to Good	Disturbances: Cattle grazing, possible clearing.		

HIDDEN SECRET – RELEVÉ SITE HS 06

Project: AGMC Hidden Secret		Date: 29/09/2016	Botanist: Conrad Slee	
Site Name: HS 06		Size/Type: Relevé	Waypoint: WP 810 CS	
Zone: 51 J	253152 mE	6899108 mN	Error: ±4 m	Elevation: 513 m
Datum: WGS84 / GDA94		GPS number / initials: CS		
Site photo number(s):				
Landform Description:		Soil type:	Soil colour:	
Vegetation description:				
Cover:	Condition:	Disturbances:		
Notes: WP 810 CS small patch of Ruby Dock ~30 plants: Recommend control spraying and monitoring				

LEVIATHAN – RELEVÉ SITE LEV 01

Project: AGMC Leviathan		Date: 26/09/2016	Botanist: Conrad Slee	
Site Name: LEV 01		Size/Type: Relevé	Waypoint: WP 629 CS	
Zone: 51 J	270643 mE	6892373 mN	Error: ±4 m	Elevation: 501 m
Datum: WGS84 / GDA94		GPS number / initials: CS		
Site photo number(s): P9260136 (Olympus)				
Location description: Several kilometres east of old Lawler site / old Fairyland Gold Mine, ~20 km South of Agnew. Leviathan tenement.				
Landform description: Flat plain				
Aspect: Flat		Slope: Flat / very gentle		
Soil type: Fine sandy clay – fine gravel		Soil colour: Red-orange		
Rock type: Fine ferrous / quartz gravels		Rock size: 5 mm to 30 mm	% rock cover: 60 %	
Other geological features:				
Vegetation description: <i>Ptilotus obovatus</i> / mixed chenopods / <i>Eremophila</i> spp. sparse low shrubs, over open mixed tussock grassland.				
Cover: 35%	Condition: Excellent	Disturbances: Localised clearing, cattle grazing.		

LEVIATHAN – RELEVÉ SITE LEV 02

Project: AGMC Leviathan		Date: 26/09/2016	Botanist: Conrad Slee	
Site Name: LEV 02		Size/Type: Relevé	Waypoint: WP 630 CS	
Zone: 51 J	270622 mE	6892307 mN	Error: ±3 m	Elevation: 502 m
Datum: WGS84 / GDA94		GPS number / initials: CS		
Site photo number(s): P9260140, P9260141, P9260142 (Olympus)				
Location description: Several kilometres east of old Lawler site / old Fairyland Gold Mine, ~20 km south of Agnew town site.				
Landform description: Flat plain				
Aspect: Flat		Slope: Negligible		
Soil type: Sandy clay loam		Soil colour: Red-brown		
Rock type: Limited ferrous / quartz gravel		Rock size: 5 mm to 20 mm	% rock cover: 20 %	
Other geological features:				
Vegetation description: <i>Acacia aptaneura</i> / <i>Acacia incurvaneura</i> / <i>Acacia ayersiana</i> / <i>Acacia</i> spp. mixed open low woodland / tall shrubland, over mixed <i>Eremophila</i> spp. and other shrubs/grasses. This vegetation type occurs as sparse patches within the grassland plains vegetation as described for site LEV 01.				
Cover: 65%	Condition: Excellent	Disturbances: Some signs of cattle grazing.		

LEVIATHAN – RELEVÉ SITE LEV 03

Project: AGMC Leviathan		Date: 26/09/2016		Botanist: Conrad Slee	
Site Name: LEV 03		Size/Type: Relevé		Waypoint: WP 640 CS	
Zone: 51 J	269843 mE	6892379 mN	Error: ±3 m	Elevation: 499 m	
Datum: WGS84 / GDA94			GPS number / initials: CS		
Site photo number(s): P9260159 (Olympus)					
Location description: Several kilometres east of old Lawler site / old Fairyland Gold Mine, ~20 km south of the town of Agnew.					
Landform description: Flat / Plain, clayey with patches of gravel					
Aspect: Flat			Slope: Negligible		
Soil type: Loamy clay			Soil colour: Red		
Rock type: Limited ferrous gravel			Rock size: Ferrous gravel	% rock cover: 2%	
Other geological features:					
Vegetation description: <i>Acacia aneura</i> / <i>Acacia tetragonophylla</i> / <i>Acacia craspedocarpa</i> sparse tall/medium shrubland, over scattered low shrubs and herbs.					
Cover: 15%	Condition: Good		Disturbances: Cattle grazing / old fire.		

LEVIATHAN – RELEVÉ SITE LEV 04

Project: AGMC Leviathan		Date: 26/09/2016		Botanist: Conrad Slee	
Site Name: LEV 04		Size/Type: Relevé		Waypoint: WP 654 CS	
Zone: 51 J	270104 mE	6892097 mN	Error: ±3 m	Elevation: 499 m	
Datum: WGS84 / GDA94			GPS number / initials: CS		
Site photo number(s): P9260166					
Location description: Several kilometres east of old Lawler site / old Fairyland Gold Mine, ~20 km South of Agnew town site.					
Landform description: Flat/Plain					
Aspect: Flat			Slope: Negligible		
Soil type: Sandy clay			Soil colour: Red-orange		
Rock type: Ferrous / quartz gravel			Rock size: 10 mm to 20 mm	% rock cover: 15%	
Other geological features:					
Vegetation description: <i>Acacia aptaneura</i> / <i>Acacia incurvaneura</i> open low trees / woodland, over <i>Acacia craspedocarpa</i> / <i>Acacia tetragonophylla</i> sparse tall shrubs, over scattered chenopods.					
Cover: 15%	Condition: Good		Disturbances: Cattle		

LEVIATHAN – RELEVÉ SITE LEV 05

Project: AGMC Leviathan		Date: 27/09/2016		Botanist: Conrad Slee	
Site Name: LEV 05		Size/Type: Relevé		Waypoint: WP 700 CS	
Zone: 51 J	271555 mE	6892759 mN	Error: ±3 m	Elevation: 511 m	
Datum: WGS84 / GDA94			GPS number / initials: CS		
Site photo number(s): P9270226, P9270227, P9270228 (Olympus)					
Location description: Several kilometres east of old Lawler site / old Fairyland Gold Mine, ~20 km south of Agnew town site.					
Landform description: Flat stony/gravelly plain.					
Aspect: Flat		Slope: Negligible			
Soil type: Fine sandy clay		Soil colour: Red-orange			
Rock type: Ferrous and quartz gravels		Rock size: 5 mm – 5 cm		% rock cover: 30%	
Other geological features:					
Vegetation description: Mixed <i>Acacia aptaneura</i> / <i>Acacia incurvaneura</i> (Mulga varieties) open tall shrubland, over <i>Eremophila galeata</i> / <i>Acacia tetragonophylla</i> sparse medium shrubs, over scattered chenopods and other shrubs.					
Cover: 15%	Condition: Excellent		Disturbances: Historic cattle grazing.		

LEVIATHAN – RELEVÉ SITE LEV 06

Project: AGMC Leviathan		Date: 27/09/2016		Botanist: Conrad Slee	
Site Name: LEV 06		Size/Type: Relevé		Waypoint: WP 730 CS	
Zone: 51 J	270882 mE	6891665 mN	Error: ±4 m	Elevation: 502 m	
Datum: WGS84 / GDA94			GPS number / initials: CS		
Site photo number(s): P9270250 (Olympus)					
Location description: 'Mulga' patch, southern half of the site.					
Landform description: Flat/plain ?drainage depression					
Aspect: Flat		Slope: Negligible			
Soil type: Loamy clay		Soil colour: Red-orange			
Rock type: Limited gravel / ferrous		Rock size: 20 mm		% rock cover: 5%	
Other geological features:					
Vegetation description: <i>Acacia caesaneura</i> low forest, over mixed shrubs and herbs including <i>Eremophila spectabilis</i> subsp. <i>brevis</i> open low shrubs. Localised patch.					
Cover: 85%	Condition: Pristine		Disturbances: None obvious		

SONGVANG CORRIDOR – RELEVÉ SITE SNV 01

Project: AGMC Songvang Corridor		Date: 28/09/2016		Botanist: Conrad Slee	
Site Name: SNV 01		Size/Type: Relevé		Waypoint: WP 735 CS	
Zone: 51 J	261496 mE	6890478 mN	Error: ± 4m	Elevation: 468 m	
Datum: WGS84 / GDA94			GPS number / initials: CS		
Site photo number(s): P9280281, P9280282 (Olympus)					
Location description: Songvang Corridor, west side of access road, ~8 km to 10 km south of Agnew.					
Landform description: Minor channel / modified drainage culvert on undulating plain					
Aspect: Gentle slope to NW			Slope: Gentle (NW)		
Soil type: Sandy clay			Soil colour: Orange		
Rock type: Alluvial			Rock size: Surface gravels		% rock cover:
Other geological features:					
Vegetation description: <i>Acacia aptaneura</i> scattered low trees, over <i>Acacia craspedocarpa</i> / <i>Hakea leucoptera</i> subsp. <i>sericipes</i> open tall shrubland over <i>Senna</i> sp. Meekatharra (E. Bailey 1-26) / <i>Eremophila youngii</i> subsp. <i>youngii</i> with chenopods.					
Cover:	Condition:		Disturbances:		

SONGVANG CORRIDOR – RELEVÉ SITE SNV 02

Project: AGMC Songvang Corridor		Date: 28/09/2016		Botanist: Conrad Slee	
Site Name: SNV 02		Size/Type: Relevé		Waypoint: WP 797 CS	
Zone: 51 J	251 411 mE	6890235 mN	Error: ± 4 m	Elevation: 470 m	
Datum: WGS84 / GDA94			GPS number / initials: CS		
Site photo number(s): P9280284, P9280285, P9280286					
Location description: ~10 km south of Agnew corridor, 20m west of Songvang gold minesite access road.					
Landform description: Minor drainage line on undulating plain.					
Aspect: North-west			Slope: Gentle		
Soil type: Clayey sand / fine gravel and stones			Soil colour: Red-brown		
Rock type: Ferrous / mixed alluvial			Rock size: 5 mm – 150 mm		% rock cover: 50%
Other geological features:					
Vegetation description: <i>Acacia fuscaneura</i> / <i>Acacia aptaneura</i> sparse low woodland / tall shrubland, over <i>Eremophila galeata</i> / <i>Senna artemisioides</i> subsp. <i>helmsii</i> open medium to low shrubs, with grasses and herbs.					
Cover: 35%	Condition: Excellent		Disturbances: None obvious.		

SONGVANG CORRIDOR – RELEVÉ SITE SNV 03

Project: AGMC Songvang Corridor		Date: 29/09/2016	Botanist: Conrad Slee	
Site Name: SNV 03		Size/Type: Relevé	Waypoint: WP 738 CS	
Zone: 51 J	253152 mE	6899108 mN	Error: ±4 m	Elevation: 478 m
Datum: WGS84 / GDA94		GPS number / initials: CS		
Site photo number(s): P9280293, P9280294, P9280295 (Olympus)				
Landform Description: Undulating stony plain		Soil type: Sandy clay	Soil colour: Red-brown	
Vegetation description: <i>Acacia fuscaneura</i> / <i>Acacia aptaneura</i> sparse open woodland / tall shrubland, over mixed <i>Acacia</i> / <i>Eremophila</i> / <i>Senna</i> sparse mid to low shrubs.				
Cover: 20%	Condition: Excellent	Disturbances: Light cattle grazing.		
Notes:				

SONGVANG CORRIDOR – RELEVÉ SITE SNV 04

Project: AGMC Songvang Corridor		Date: 29/09/2016	Botanist: Conrad Slee	
Site Name: SNV 04		Size/Type: Relevé	Waypoint: WP 774 CS	
Zone: 51 J	250788 mE	6888048 mN	Error: ±3 m	Elevation: 458 m
Datum: WGS84 / GDA94		GPS number / initials: CS		
Site photo number(s): P9280318 (Olympus)				
Landform Description: Drainage line/channel		Soil type: Clayey sand	Soil colour: Red	
Vegetation description: <i>Acacia incurvaneura</i> / <i>Acacia aneura</i> (mixed Mulga species) mid dense tall shrubland, with <i>Grevillea berryana</i> , over <i>Eremophila spectabilis</i> subsp. <i>brevis</i> open low shrubs and <i>Eragrostis setifolia</i> grasses.				
Cover: 20%	Condition: Excellent	Disturbances: Light cattle grazing.		
Notes:				

SONGVANG CORRIDOR – RELEVÉ SITE SNV 05

Project: AGMC Songvang Corridor		Date: 29/09/2016	Botanist: Conrad Slee	
Site Name: SNV 05		Size/Type: Relevé	Waypoint: WP 778 CS	
Zone: 51 J	250777 mE	6887825 mN	Error: ±3 m	Elevation: 454 m
Datum: WGS84 / GDA94		GPS number / initials: CS		
Site photo number(s): P9280321 (Olympus)				
Landform Description: Stony rise		Soil type: Sandy clay	Soil colour: Red-orange	
Vegetation description: <i>Acacia incurvaneura</i> sparse tall shrubland, over <i>Acacia ramulosa</i> var. <i>ramulosa</i> open medium shrubs, over <i>Eremophila spectabilis</i> subsp. <i>brevis</i> / <i>Eremophila latrobei</i> subsp. <i>latrobei</i> / <i>Ptilotus schwartzii</i> open low shrubs.				
Cover: 30%	Condition: Pristine	Disturbances: Limited cattle grazing.		
Notes: 80 m south-east of site SNV 05: Ruby Dock (* <i>Rumex vesicarius</i>) thousands of weed plants along roadside / existing pipeline (WP 780 CS).				

SONGVANG CORRIDOR – RELEVÉ SITE SNV 06

Project: AGMC Songvang		Date:		Botanist: Conrad Slee	
Site Name: SNV 06		Size/Type: Relevé		Waypoint: CS	
Zone: 51 J	251095 mE	6887138 mN	Error: ±4 m	Elevation: 448 m	
Datum: WGS84 / GDA94			GPS number / initials: CS		
Site photo number(s): P9290331					
Location description: Songvang corridor, west side of access road, ~10 km south of Agnew town site / Emu Mine Site – Gold Fields Ltd.					
Landform description: Drainage channel					
Aspect: Slightly west			Slope: Gentle		
Soil type: Clayey sand / sandy clay			Soil colour: Red-brown		
Rock type: Mixed gravels / colluvium			Rock size: 5 mm – 100 mm	% rock cover: 5%	
Other geological features:					
Vegetation description: <i>Acacia aneura</i> / <i>Acacia craspedocarpa</i> mid-dense tall shrubland / low woodland, over <i>Eremophila galeata</i> / <i>Ptilotus obovatus</i> and other open shrubs, herbs and tussock grasses.					
Cover: NR	Condition: NR		Disturbances: NR		

SONGVANG CORRIDOR – RELEVÉ SITE SNV 07

Project: AGMC Songvang Corridor		Date: 29/09/2016		Botanist: Conrad Slee	
Site Name: SNV 07		Size/Type: Relevé		Waypoint: WP 793 CS	
Zone: 51 J	251063 mE	6886981 mN	Error: ±4 m	Elevation: 450 m	
Datum: WGS84 / GDA94			GPS number / initials: CS		
Site photo number(s): P9280321 (Olympus)					
Landform Description: Flat / plain		Soil type: Sandy clay		Soil colour: Red-orange	
Vegetation description: <i>Acacia incurvaneura</i> open tall shrubland over <i>Eremophila galeata</i> sparse medium shrubs, and <i>Ptilotus obovatus</i> low shrubs and <i>Eragrostis eriopoda</i> sparse tussock grassland.					
Cover: 30%	Condition: Excellent		Disturbances: Cattle grazing.		
Notes: 80 m south-east of site SNV 05: Ruby Dock (* <i>Rumex vesicarius</i>) thousands of plants on roadside / pipeline (WP 780 CS).					

Appendix 8 Descriptions of Vegetation Communities recorded in the PSAs

Vegetation Communities recorded in Hidden Secret

Code	Short Description	Full Description
(as per legend of Report Figure 9)		
1	Acacia - <i>Hakea</i> woodland / shrubland. quartz	<i>Acacia aptaneura</i> / <i>Hakea preissii</i> open low woodland trees over <i>Eremophila galeata</i> / <i>Acacia tetragonophylla</i> sparse medium shrubs, over <i>Ptilotus obovatus</i> / <i>Eremophila galeata</i> / mixed chenopod shrubs on a quartz gravel plain.
2	Acacia / <i>Hakea</i> red stony plain	Acacia / <i>Hakea</i> sparse mixed shrubland on red stony plain
3	Acacia / Sheoak / <i>Hakea</i> drainage line	Mixed Mulga/Acacia with Sheoak (<i>Casuarina pauper</i>) and <i>Hakea</i> tall shrubland / low woodland. Drainage line.
4	Acacia- <i>Eremophila</i> shrubland. Gravel.	Acacia spp. sparse mid shrublands with <i>Eremophila</i> spp. shrubs. Gravel.
5	Degraded. Scattered Acacia shrubs.	Degraded. Scattered Acacia shrubs.
6	Mixed Mulga open shrubland on rocky breakaways.	Mixed Mulga sparse to open tall shrubland (<i>Acacia incurvaneura</i> , <i>A. aneura</i> , <i>A. caesaneura</i> , <i>A. craspedocarpa</i>), over <i>Ptilotus obovatus</i> and other mixed shrubs, grasses and herbs on rocky breakaway slopes of mesa.
7	Mixed mid-dense Mulga on mesa slopes.	Mixed mid-dense Mulga tall shrubland (<i>Acacia incurvaneura</i> , <i>A. caesaneura</i> , <i>A. aneura</i>), over other mixed shrubs on southern mesa slopes.
8	Mulga / Acacia / <i>Eremophila</i> . Rocky breakaways.	Mixed Mulga / Acacia (<i>A. incurvaneura</i> , <i>A. aptaneura</i> , <i>A. quadrimarginea</i>), over sparse to open shrubs of <i>Eremophila pantonii</i> / <i>Eremophila latrobei</i> , with scattered plants such as <i>Lepidium platypetalum</i> . Rocky breakaway slopes of sandstone mesa.
9	Mulga / Acacia / <i>Hakea</i> drainage line	<i>Acacia aptaneura</i> / <i>A. craspedocarpa</i> / <i>Hakea preissii</i> open tall shrublands along drainage lines.
10	Mulga / Acacia sparse shrubs. Stony hillcrest	Mulga (<i>Acacia incurvaneura</i>) / <i>Acacia</i> spp. sparse mid-shrubland, over sparse low shrubs on a stony hillcrest.
11	Mulga / <i>Eremophila</i> sparse shrubland. Stony rise.	<i>Acacia incurvaneura</i> / <i>Eremophila</i> spp. sparse shrubland. Stony rise.
12	Mulga / mixed shrubs on gravel	Mulga / mixed sparse medium to low shrubs on sandstone gravels.
13	Mulga 1 / <i>Eremophila</i> / chenopods quartz plain (degraded)	<i>Acacia aptaneura</i> scattered low trees over <i>Eremophila galeata</i> / <i>Acacia tetragonophylla</i> sparse medium shrubs, over <i>Ptilotus obovatus</i> / mixed chenopod sparse low shrubland.

Code	Short Description	Full Description
(as per legend of Report Figure 9)		
14	Mulga 1 / <i>Hakea</i> / <i>Ptilotus</i> / chenopods	<i>Acacia aptaneura</i> sparse low woodland / tall shrubland, over <i>Hakea preissii</i> sparse tall shrubs, over <i>Ptilotus obovatus</i> / chenopod open low shrubs.
15	Mulga 2 sparse woodland/shrubland. Mesa plateau.	<i>Acacia incurvaneura</i> scattered to sparse low woodland/tall shrubs, over <i>Thryptomene</i> sp. Leinster (B.J. Lepschi & L.A. Craven 4362) (Priority flora) and/or other scattered medium to low shrubs (such as <i>Eremophila pungens</i> - Priority flora). Mesa plateau.
16	Mulga low trees on a low rocky outcrop	Mulga sparse low trees, over scattered shrubs of <i>Sida ectogama</i> / <i>Senna</i> / <i>Ptilotus obovatus</i> on a low rocky outcrop
17	Mulga trees - <i>Eremophila pantonii</i> shrubs. Quartz.	<i>Acacia incurvaneura</i> sparse low woodland, over <i>Eremophila pantonii</i> open low shrubland with <i>Scaevola spinescens</i> . Stony quartz rise.
18	Melaleuca tall shrubland on mesa slopes.	<i>Melaleuca interioris</i> sparse / open mid shrubland on mesa slopes
19	Dense Mulga/Melaleuca. Rocky gully.	Dense Mulga (<i>Acacia</i> spp.) / <i>Melaleuca interioris</i> / <i>Psyrdrax</i> dense tall shrubland in small rocky gullies.
20	Mixed chenopod low shrubland. Quartz gravel.	Mixed chenopod open low shrubland of <i>Tecticornia doliiformis</i> / <i>Maireana</i> spp. / <i>Sclerolaena</i> / <i>Frankenia laxiflora</i>
21	<i>Maireana glomerifolia</i> / Chenopod shrubs. Quartz	<i>Maireana glomerifolia</i> / mixed chenopod sparse low shrubland on low quartz slopes.
22	Tecticornia - Frankenia dwarf shrubland	<i>Tecticornia doliiformis</i> - <i>Frankenia laxiflora</i> open dwarf shrubland
23	Tecticornia (samphire) shrubland	<i>Tecticornia doliiformis</i> (samphire) sparse to open dwarf shrubland on quartz gravel.
24	Frankenia / <i>Sclerolaena</i> / <i>Maireana</i> shrubland	<i>Frankenia laxiflora</i> / <i>Sclerolaena</i> spp. / <i>Maireana</i> spp. sparse dwarf shrubland

Vegetation Communities recorded in Leviathan

Code	Short Description (as per Legend of Report Figures)	Full Description
1	Open tussock grassland with mixed shrubs	<i>Ptilotus obovatus</i> / mixed chenopods / <i>Eremophila</i> spp. sparse low shrubs, over open mixed tussock grassland.
2	Mulga woodland, diverse understorey	<i>Acacia aptaneura</i> / <i>Acacia incurvaneura</i> / <i>Acacia ayersiana</i> / <i>Acacia</i> spp. mixed open low woodland / tall shrubland, over mixed <i>Eremophila</i> spp. and other shrubs/grasses.
3	Mulga sparse low woodland 1	<i>Acacia aptaneura</i> / <i>Acacia incurvaneura</i> / <i>Acacia</i> spp. mixed sparse - open low woodland / tall shrubland, over mixed <i>Eremophila</i> spp. and other shrubs/grasses.
4	Mulga woodland, scattered understorey	<i>Acacia aptaneura</i> / <i>Acacia incurvaneura</i> / <i>Acacia</i> spp. mixed open low woodland / tall shrubland, over mixed <i>Eremophila</i> spp. and scattered grasses.
5	Sparse Mulga / <i>Acacia</i> woodland / Shrubland	Mixed woodland / shrubland of Mulga and other <i>Acacia</i> spp with mid-dense mixed shrubs/grasses/herbs.
6	Sparse Mulga woodland / Sparse shrubland	Mixed low woodland / sparse shrubland of Mulga and other <i>Acacia</i> spp in patches.
7	<i>Acacia caesaneura</i> low forest patch	<i>Acacia caesaneura</i> low forest, over mixed shrubs and herbs including <i>Eremophila spectabilis</i> subsp. <i>brevis</i> open low shrubs. Localised patch.
8	Mulga shrubland - <i>Eremophila</i> - Chenopods	Mixed <i>Acacia aptaneura</i> / <i>Acacia incurvaneura</i> (Mulga varieties) open tall shrubland, over <i>Eremophila galeata</i> (LEV 05-11) / <i>Acacia tetragonophylla</i> sparse medium shrubs, over scattered chenopods and other shrubs.
9	Open Mulga / <i>Acacia</i> woodland 1	<i>Acacia aptaneura</i> / <i>Acacia incurvaneura</i> open low trees / woodland, over <i>Acacia craspedocarpa</i> / <i>Acacia tetragonophylla</i> sparse tall shrubs, over scattered chenopods. Few grasses or herbs.
10	Open Mulga / <i>Acacia</i> woodland 2	<i>Acacia aptaneura</i> / <i>Acacia incurvaneura</i> open low woodland / tall shrubland, with abundant grasses and <i>Eremophila</i> spp. shrubs.
11	Open Mulga / <i>Acacia</i> woodland 3	<i>Acacia aptaneura</i> / <i>Acacia incurvaneura</i> open low woodland / tall shrubland, without grasses or herbs.
12	<i>Atriplex</i> / <i>Rhagodia</i> / <i>Acacia</i> shrubland	<i>Atriplex cinerea</i> / <i>Rhagodia eremaea</i> / mixed <i>Acacia</i> open medium shrubland in a water accumulation area near a rock causeway.
13	Sparse Shrubland	<i>Acacia aneura</i> / <i>Acacia tetragonophylla</i> / <i>Acacia craspedocarpa</i> sparse tall/medium shrubland, over scattered low shrubs and herbs.

Vegetation Communities recorded in the Songvang Corridor

Code	Short Description (as per Legend of Report Figures)	Full Description
1	Mulga scattered trees / shrubs, diverse (1)	<i>Acacia aptaneura</i> (Mulga 1) scattered low trees, over <i>Acacia craspedocarpa</i> (Mulga 5) / <i>Hakea leucoptera</i> subsp. <i>sericipes</i> open tall shrubland, over <i>Senna</i> sp. Meekatharra (E. Bailey 1-26) / <i>Eremophila youngii</i> subsp. <i>youngii</i> with chenopods.
2a	Mulga sparse woodland / shrubland (2a)	<i>Acacia fusca</i> (Mulga 2) / <i>Acacia aptaneura</i> (Mulga 1) sparse low woodland / tall shrubland, over <i>Eremophila galeata</i> / <i>Senna artemisioides</i> subsp. <i>helmsii</i> open medium to low shrubs, with grasses and herbs.
2b	Mulga sparse woodland / shrubland (2b)	<i>Acacia fusca</i> (Mulga 2) / <i>Acacia aptaneura</i> (Mulga 1) sparse low woodland / tall shrubland, over <i>Eremophila galeata</i> / <i>Senna</i> spp. / <i>Ptilotus obovatus</i> sparse medium to low shrubs on stony/gravelly undulating plains.
3	Mulga open/sparse shrubland (3)	<i>Acacia fusca</i> (Mulga 2) / <i>Acacia aptaneura</i> (Mulga 1) open to sparse low woodland / tall shrubland, over mixed <i>Acacia</i> / <i>Eremophila</i> / <i>Senna</i> sparse mid to low shrubs.
4	Mulga sparse tall shrubland (4)	<i>Acacia incurvaneura</i> (Mulga 3) / <i>Acacia aneura</i> (Mulga 4) mid dense tall shrubland with <i>Grevillea berryana</i> , over <i>Eremophila spectabilis</i> subsp. <i>brevis</i> open low shrubs and <i>Eragrostis setifolia</i> grasses along a drainage line.
5	Mulga / Acacia / Eremophila shrubland (5)	<i>Acacia incurvaneura</i> (Mulga 3) sparse tall shrubland, over <i>Acacia ramulosa</i> var. <i>ramulosa</i> open medium shrubs, over <i>Eremophila spectabilis</i> subsp. <i>brevis</i> / <i>Eremophila latrobei</i> subsp. <i>latrobei</i> / <i>Ptilotus schwartzii</i> open low shrubs on a stony rise.
6	Mulga mid-dense tall shrubland (6)	<i>Acacia aneura</i> (Mulga 4) / <i>Acacia craspedocarpa</i> (Mulga 5) mid-dense tall shrubland / low woodland, over <i>Eremophila galeata</i> / <i>Ptilotus obovatus</i> and other open shrubs, herbs and tussock grasses along a drainage line.
7	Mixed Mulga / Eremophila / Ptilotus (7)	Mixed Mulga (dominated by <i>Acacia incurvaneura</i> - Mulga 3) open tall shrubland, over <i>Eremophila galeata</i> sparse medium shrubs, over <i>Ptilotus obovatus</i> low shrubs on a sandy clay plain. Includes: <i>A. incurvaneura</i> , <i>A. aptaneura</i> , <i>A. caesaneura</i> , <i>A. craspedocarpa</i>
8	Mixed Mulga / Eremophila / Ptilotus (8)	Mixed Mulga (dominated by <i>Acacia aptaneura</i> - Mulga 1) open tall shrubland, over <i>Eremophila galeata</i> sparse medium shrubs, over <i>Ptilotus obovatus</i> low shrubs on a sandy clay plain. Includes: <i>A. incurvaneura</i> , <i>A. aptaneura</i> , <i>A. caesaneura</i> , <i>A. craspedocarpa</i>

Appendix 9 Fauna Survey Results

Scientific Name	Common Name	Hidden Secret	Leviathan	Songvang	Outside
Birds					
<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater	x	x	x	
<i>Acanthiza apicalis</i>	Inland Thornbill	x	x		
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill		x		
<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill		x		
<i>Anthus novaeseelandiae</i>	Australasian Pipit	x			
<i>Aphelocephala leucopsis</i>	Southern Whiteface		x		
<i>Aquila audax</i>	Wedge-tailed Eagle	x		x	
<i>Artamus cinereus</i>	Black-faced Woodswallow		x		
<i>Artamus minor</i>	Little Woodswallow	x			
<i>Charadrius veredus</i>	Oriental Plover				x
<i>Cinclosoma castaneothorax</i>	Chestnut-breasted Quail-thrush	x			
<i>Colluricincla harmonica</i>	Grey Shrike-thrush		x		
<i>Cracticus nigrogularis</i>	Pied Butcherbird		x		
<i>Cracticus tibicen</i>	Australian Magpie		x		
<i>Eolophus roseicapilla</i>	Galah			x	
<i>Eopsaltria griseogularis</i>	Western Yellow Robin			x	
<i>Falco berigora</i>	Brown Falcon			x	
<i>Falco cenchroides</i>	Australian Kestrel	2			
<i>Falco longipennis</i>	Australian Hobby			x	
<i>Hirundo neoxena</i>	Welcome Swallow	2			
<i>Lichenostomus virescens</i>	Singing Honeyeater	2		x	
<i>Malurus lamberti</i>	Variegated Fairy-wren	x	x	x	
<i>Malurus splendens</i>	Splendid Fairy-wren		x		
<i>Manorina flavigula</i>	Yellow-throated Miner	x	x	x	
<i>Ocyphaps lophotes</i>	Crested Pigeon	x	x	x	
<i>Oreoica gutturalis</i>	Crested Bellbird	x	x	x	
<i>Pachycephala rufiventris</i>	Rufous Whistler		x		
<i>Petrochelidon nigricans</i>	Tree Martin	x	x		
<i>Petroica goodenovii</i>	Red-capped Robin		x		
<i>Pomatostomus superciliosus</i>	White-browed Babbler		x	x	
<i>Rhipidura leucophrys</i>	Willie Wagtail	x		x	
<i>Taeniopygia guttata</i>	Zebra Finch	x	x		
<i>Todiramphus sanctus</i>	Sacred Kingfisher	x			
Reptiles					
<i>Ctenophorus caudicinctus</i>	Ring-tailed Dragon	x			

<i>Ctenophorus isolepis</i>	Military Dragon		x		
<i>Gehyra variegata</i>	Variegated Gecko		x		
<i>Heteronotia binoei</i>	Bynoe's gecko	x			
<i>Varanus gouldii</i>	Sand Monitor		x		
Mammals					
<i>Chalinolobus gouldii</i>	Gould's Wattled Bat	x			
<i>Chalinolobus morio</i>	Chocolate Wattled Bat	x			
<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat	x			
<i>Austronomus australis</i>	White-striped Free-tailed Bat	x			
<i>Ozimops (=Mormopterus) sp.</i>	Unidentified free-tailed bat	x			
<i>Bos taurus</i>	Cattle (grazing / scats)	X	x	x	
<i>Canis familiaris</i>	Dog (scat)	x			
<i>Capra hircus</i>	Goat (horn)	x			
<i>Felis catus</i>	Cat (scat)	x			
<i>Oryctolagus cuniculus</i>	Rabbit (scats)	x	x	x	
<i>Sminthopsis sp.</i>	Dunnart (scat)	x			
<i>Macropus robustus</i>	Euro	x	x	x	
<i>Macropus sp.</i>	Kangaroo	x	x	x	

Appendix 10 Bat Call Identification Report



Bat call identification from Agnew, WA

Type: Acoustic analysis

Prepared for: Rapallo Pty Ltd

Date: 30 October 2016

Job No.: SZ416

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SUMMARY

Bat identifications from acoustic recordings are provided from the Agnew project area near Leinster, in the Goldfields region of Western Australia. Five species of bat were identified as being present (**Tables 1 and 2**). Representative echolocation calls are provided (**Figure 1**), as recommended by the Australasian Bat Society (ABS 2006). Further data are available should verification be required.

COMMENTS ON IDENTIFICATIONS

The identification of bat species from full spectrum WAV format recordings of their echolocation calls was based on measurements of characteristic frequency, pulse shape, and the pattern of harmonics.

The calls of long-eared bats *Nyctophilus* spp. are typically difficult to identify to species, and the two faint sequences observed in the recordings were of relatively high frequency, giving a higher likelihood that they were derived from the Lesser Long-eared Bat *Nyctophilus geoffroyi*. Capture would be needed to confirm this attribution.

The calls attributable to a species of free-tailed bat *Ozimops* (= *Mormopterus*) sp. had two possible sources: the Inland Free-tailed Bat *Ozimops petersi* (previously *Mormopterus* sp. 3; Adams et al. 1988), or the Western Free-tailed Bat *Ozimops kitcheneri* (previously *Mormopterus* sp. 3; Adams et al. 1988). Capture would be needed to resolve this ambiguity.

METHODS

Each of the original WAV files recorded in full spectrum lossless WAC0 format with a Wildlife Acoustics SM2BAT bat detector (sampling rate 384 kHz, trigger 6 dB above background; 48 dB gain; set to turn on automatically at sunset and off at sunrise) was inspected in Adobe Audition CS6 version 5.0.2 software. Species were identified based on information in McKenzie and Muir (2000) and Churchill (2008); nomenclature follows Jackson and Groves (2015), and Reardon et al. (2015).

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TABLE 1. Species identified in the present survey from all sites combined.

VESPERTILIONIDAE	
Gould's Wattled Bat	<i>Chalinolobus gouldii</i>
Chocolate Wattled Bat	<i>Chalinolobus morio</i>
Lesser Long-eared Bat	<i>Nyctophilus geoffroyi</i>
MOLOSSIDAE	
White-striped Free-tailed Bat	<i>Austronomus australis</i>
Ambiguous	
Unidentified free-tailed bat	<i>Ozimops (=Mormopterus) sp.</i>

TABLE 2. Species identifications, with the degree of confidence indicated by a code. Date and serial/unit correlates with site; see **Table 1** for full species names.

	<i>A. australis</i>	<i>C. gouldii</i>	<i>C. morio</i>	<i>N. geoffroyi</i>	<i>Ozimops sp.</i>
SM2BAT 7661					
25/09/2016	◆	◆	◆	—	—
26/09/2016	◆	◆	◆	NC	NC
27/09/2016	◆	—	◆	—	NC
28/09/2016	◆	—	◆	NC	NC

Definition of confidence level codes:

— Not detected.

◆ Unambiguous identification of the species at the site based on measured call characteristics and comparison with available reference material. Greater confidence in this ID would come only after capture and supported by morphological measurements or a DNA sequence.

NC Needs Confirmation. Either call quality was poor, or the species cannot be distinguished reliably from another that makes similar calls. Alternative identifications are indicated in the *Comments on identifications* section of this report. If this is a species of conservation significance, further survey work might be required to confirm the record.

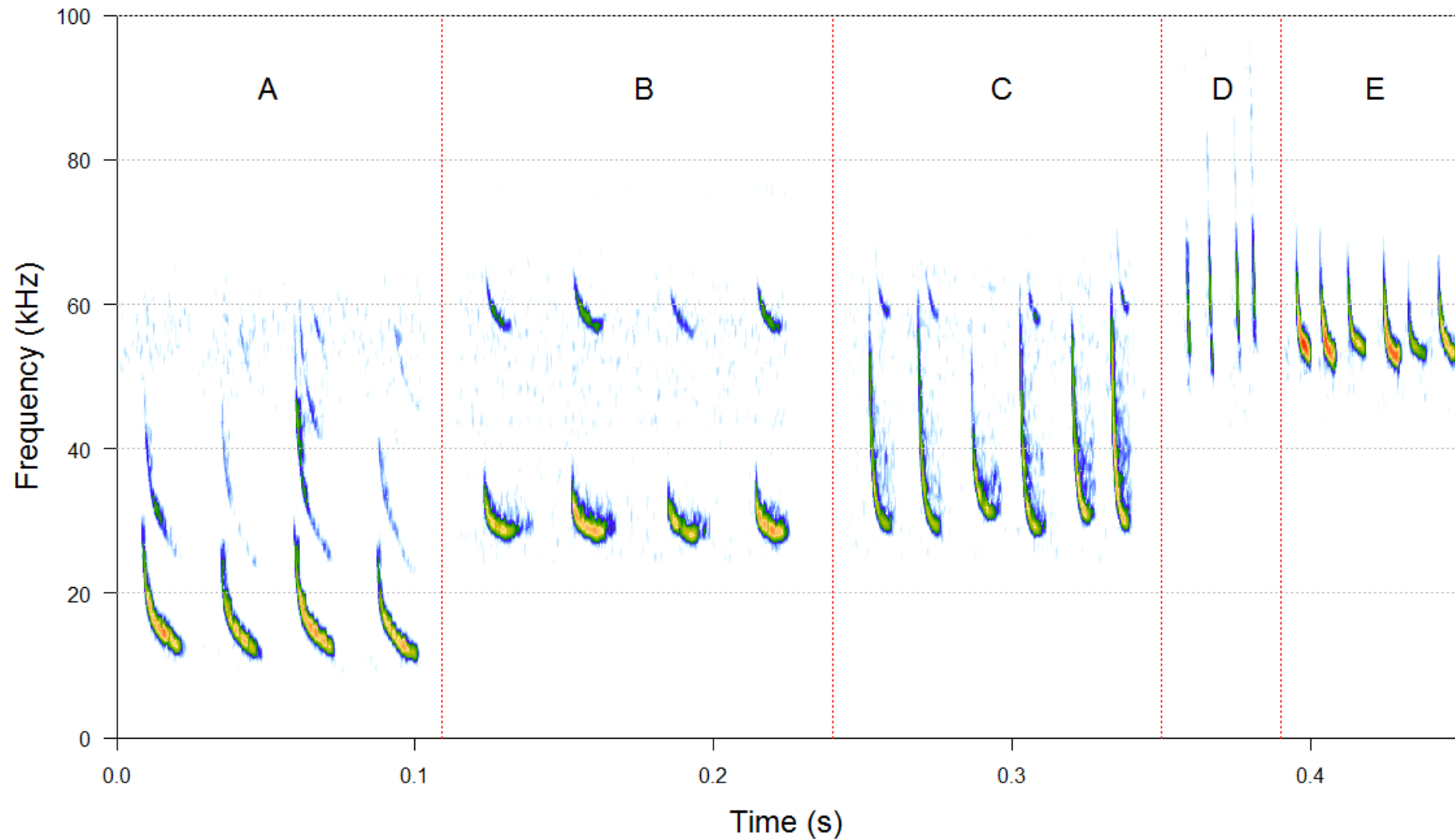


FIGURE 1. Representative call sequence portions of the species identified (**A:** *Austronomus australis*; **B:** *Ozimops* (= *Mormopterus*) sp.; **C:** *Chalinolobus gouldii*; **D:** *Nyctophilus geoffroyi*; **E:** *Chalinolobus morio*; time between pulses has been compressed).

Appendix 11 Description of Fauna Habitats recorded in the PSAs

Fauna Habitats Recorded in Hidden Secret

Code	Fauna Habitat Description	Land System	Landscape
M-SP	Sparse / scattered Mulga on stony plain (M-SP)	Nubev / Sherwood / Wyarri	Stony Plain
SM-SR	Sparse Mulga on quartz rise (SM-SR)	Sherwood	Stony Rise
SMW-BP	Sparse Mulga woodland on breakaway plateau. Stony skeletal soil. (SMW-BP)	Sherwood	Breakaway Plateau
SME-SR	Sparse Mulga/Eremophila on stony rise (SME-SR)	Sherwood / Wyarri	Stony Rise
M-BS	Sparse to open tall Mulga shrubland on breakaway slopes (M-BS)	Sherwood	Breakaway Slope
MCh-SP	Tall Mulga shrubland over chenopods on quartz plain (MCh-SP)	Nubev / Sherwood	Stony Plain
MHS-MD	Open Tall Mulga / Hakea shrubland dominated minor drainage (MHS-MD)	Sherwood / Wyarri	Minor Drainage
MM-RG	Dense Mulga/Melaleuca. Rocky gully (MM-RG)	Sherwood	Rocky Gully
OMS-BS	Open Melaleuca shrubland on breakaway slopes (OMS-BS)	Sherwood	Breakaway Slope
AHW-SP	Acacia / Hakea open low woodland on quartz plain (AHW-SP)	Nubev / Sherwood	Stony Plain
AHS-SP	Acacia / Hakea sparse mixed shrubland on red stony plain (AHS-SP)	Nubev	Stony Plain
ASH-MD	Acacia / Sheoak / Hakea on minor drainage line (ASH-MD)	Sherwood	Minor Drainage
AES-SP	Acacia/Eremophila spp. sparse mid shrublands on low quartz slopes (AES-SP)	Sherwood	Stony Plain
Ch-SP	Chenopod shrubland on stony plain (Ch-SP)	Sherwood, Wyarri	Stony Plain
Sam-SP	Open Samphire shrubland on stony plain (Sam-SP)	Sherwood / Wyarri	Stony Plain
SP	Quartz plain (bare) (SP)	Sherwood	Quartz Plain

Fauna Habitats Recorded in Leviathan

Code	Fauna Habitat Description	Land System	Landscape
OMW-P	Open Mulga woodland on hard orange soil plain	Jundee, Violet	Plain
OMS-P	Sparse Mulga shrubland over chenopod dominated plain	Jundee	Plain
OMW-D	Open Mulga woodland On narrow drainage tract	Jundee, Tiger	Drainage Tract
OTG	Open Tussock grassland dominated plain on hard orange soils	Jundee	Plain
ASP	Open tall Acacia shrubland over mixed eremophila patches. Can be areas of water deposition	Jundee	Shrubland Patch
OSA-D	Saltbush with Acacias Open Shrubland On narrow drainage tract	Tiger	Drainage Tract
SAS-D	Sparse Acacia Shrubland On narrow drainage tract	Tiger	Drainage Tract

Fauna Habitats Recorded in Songvang

Code	Fauna Habitat Description	Land System	Landscape
MSD	Mulga shrubland well defined drainage line	Monk	Drainage
OTMS - SCP	Open tall Mulga shrubland on sandy clay plain	Monk	Sandy Clay Plain
SMW-SP	Sparse Mulga woodland / shrubland on stony undulating plain	Leonora	Stony Undulating Plain
SMW-D	Sparse Mulga woodland / shrubland minor drainage	Leonora	Drainage
SMTS-R	Sparse Tall Mulga Shrubland on stony rise	Leonora	Stony Rise

APPENDIX 2: FLORA AND VEGETATION SURVEY (JIM'S SEEDS, WEEDS AND TREES 2004)



Jim's
SEEDS, WEEDS
— & TREES —

FLORA SURVEY

OF THE

LAWLERS GOLD MINE LEASES

September 2004



Prepared by:
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- Photograph 11: *Eucalyptus striaticalyx* Community

Appendices

- Appendix 1: Plant species recorded in the Lawlers Survey Area.
- Appendix 2: Department of Agriculture Weed Control of *Emex australis*.
- Appendix 3: Map of the Lawlers area and Significant Waypoints.
- Appendix 4: Reference to Waypoints

1 Introduction

The Lawlers Gold Mine is located 130km northwest of Leonora and approximately 4km northwest of Agnew. Lawlers Mine includes a number of mine deposits, the most significant being at New Holland and Fairyland. The underground mine is on two mining leases M36/174 (Genesis) and M36/314 (New Holland). The Fairyland pit is on mining lease M36/277.

The Lawlers Gold Mine is located in the Murchison region within the Austin Botanical District of the Eremaean Botanical Province. This region is typified by undulating soils with occasional ranges of low hills, and extensive sand plains in the eastern half (Beard, 1990). The principal soil types are shallow earthy loam overlying a red-brown hardpan, shallow stony loams on hills and red earthy sands on sand plains (Beard, 1990)

1.1 Objectives

Lawlers Gold Mine (LGM) commissioned Jim's Seeds, Weeds and Trees in September 2004, to conduct a Flora Survey of the LGM lease areas, when the optimum time for annual vegetation occurs.

The specific objectives of the survey was to:

- Identify and collect the vascular plant taxa in the Survey Area.
- Undertake intensive field surveys for Declared Rare and Priority Flora taxa within the Proposed Mine Site Disturbance Area (approximately 200km²).
- Identify any weed species known or expected to occur in the Study Area.
- Define and map the native vegetation within the Study Area.
- Recommend management strategies to reduce potential threats to significant flora or plant populations

1.2 Rainfall Data

Rainfall data provided by LGM represented January to August 2004. From this information average monthly rainfall from the period between January and August was 24.7mm. The greatest rainfall recorded occurred in February (93.5mm) while no rainfall was recorded in June and only a total of 6mm fell during the months of July and August.

2 Methods

Prior to fieldwork a database search was carried out using the Department of Conservation and Land Management's (CALM) 2004 Declared Rare and Priority Flora records on species known to occur in the region. These priority species were additionally examined at the Western Australian State Herbarium prior to the field survey being undertaken.

The results of this search revealed the following plants occurred in the area;

- *Baeckea* sp. Sandstone (C.A. Gardener s.n.26 Oct. 1963) (P1)
- *Eucalyptus striatocalyx* ssp. *delicata* (P1)
- *Baeckea* sp. Melita Station (H. Pringle 2738) (P3)
- *Calytrix erosipetala* (P3)
- *Calytrix uncinata* (P3)
- *Acacia balsamea* (P4)
- *Grevillea inconspicua* (P4)
- *Hemigenia exilis* (P4)

Table 1 presents the definitions of Declared Rare and Priority ratings under the Wildlife Conservation Act (1950) as extracted from Department of CALM 2004

Table 1: Definitions of Rare and Priority species.

<p>R: Declared Rare Flora – Extant Taxa Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such.</p>
<p>X: Declared Rare flora – Presumed Extinct Taxa Taxa which have not been collected, or otherwise verified, over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently, and have been gazetted as such.</p>
<p>1: Priority One – Poorly known Taxa Taxa which are known from one or a few (generally <5) populations which are under threat, either due to small populations size, or being on lands under immediate threat, eg road verges, urban areas, farmland, active mineral leases, etc, or the plants are under threat, eg. From disease, grazing by feral animals, etc. May include taxa with threatened populations in protected lands. Such taxa are under consideration for declaration as “rare flora”, but are in urgent need of further survey.</p>
<p>2: Priority Two – Poorly Known Taxa Taxa which are known from one of a few (generally <5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as “rare flora”, but are in urgent need of further survey.</p>
<p>3: Priority Three – Poorly known Taxa Taxa which are known from several populations, and the taxa are not believed to be under immediate threat (i.e. not currently endangered), either due to the number of known populations (generally<5), or known populations being large, and either widespread or protected. Such taxa are under consideration for declaration as “rare flora” but are in need of further survey.</p>
<p>4: Priority Four – Rare Taxa Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5-10 years</p>

The Flora Survey was carried over 4 days by vehicle and on foot where appropriate. For each vegetation unit, the flora was systematically recorded and collections of specific plant specimens were made where further identification was required. Plant specimens were compared to specimens held in the WAHERB and where further identification was required, specialists were consulted.

Vegetation units within the survey area were described in detail and where priority species were located, GPS coordinates were recorded. All flora specimens that were considered to be priority species were further identified by specialist consultants and with the Western Australian Herbarium.

3 Results

A total of 49 families, 86 genera and 165 species were found within the LGM lease (Appendix 1). No Declared Rare Flora species, pursuant to subsection (2) of section 23F of the Wildlife Conservation Act (1950) and as listed in Department of Conservation and Land Management (2004) were found in the area surveyed.

Three Priority Species as defined by the Department of Conservation and Land Management (2004) were located during the survey.

Eight weed species occurred in the survey area, one of which, *Emex australis* is a Declared Weed, although not declared in the Shire of Leonora.

3.1 Significant Flora Species

- *Baeckea sp.* Melita Station (H. Pringle 2738) is a Priority 3 species was recorded at **N6901208 E258645**. This species was also located just south of the LGM lease near Weebo gauge.



Picture 1: *Baeckea sp.* Melita Station (H. Pringle 2738) (P3).

- *Eremophila pungens* (Priority 1) was found at **N6891489 E261936** and verified by Bob Chinnock, an expert in *Eremophila* species. This erect viscid shrub stands 0.5-1.5 m tall, with purple/violet flowers. Usually occurs in sandy loam, sand over laterite, ridges and breakaways throughout the Murchison region.



Picture 2: *Eremophila pungens* (Priority 1).

- *Grevillea inconspicua* is a Priority 4 species and was recorded at numerous locations throughout the LGM lease. This intricately branched shrub stands 0.6-2m tall with white or pink flowers. Often occurs along drainage lines on rocky outcrops and creeklines, distributed throughout the Murchison region.



Picture 3: *Grevillea inconspicua* (P4).

3.2 Vegetation Units

Eight vegetation units were identified throughout the LGM lease (Appendix 3). These units included Granite sand flats, Granite outcrops, Breakaways and rises, Mulga flats, Basalt hills, Granite creek lines and Mulga creek lines. A single community of *Eucalyptus striaticalyx* was singled out as a vegetation unit as this was a unique community with some exclusive species.

3.2.1 Granite Sand Flats

Granite sand flats consist of flat stretching plains of coarse red granite sand. The vegetation is sparse and consists mainly of ground hugging shrubs and some *Acacia anuera* over 2 metres in height. A total of 44 species were encountered within this vegetation unit, a majority of these species noted were low-lying shrubs. Ground hugging plants included *Helipterum craspedioides* and *Ptilotus aervooides*.



Picture 4: Granite sand flats.

3.2.1 Granite Outcrops

Granite outcrops occurred throughout various areas of the LGM lease and were primarily incorporated within granite sand flats. The rocky terrain consisted of many large rocks forming mounds within the sandy plains. These mounds provided habitat to many low-lying shrubs including *Acacia craspedocarpa*, *Eremophila exilifolia* and *Ptilotus obovatus*. A total of 38 species were recorded in this unit.



Picture 5: Granite outcrops

3.2.3 Breakaways and Rises

This vegetation unit consisting of breakaways and rises recorded large species diversity. This diversity is denoted by the 92 different species found within the unit. The vegetation unit consisted of hard crusty granite sand covered with a dense layer of small to large granite rocks. Breakaways occurred within the undulating hills, consequently contributing to its description. Undershrubs in this unit included *Eremophila fraseri*, *Sida calyxhymenia* and *Solanum lasiophyllum*. Trees taller than 2m in height included *Acacia aneura* and *Eucalyptus oleosa*. A Priority 4 species *Grevillea inconspicua* was documented and prominent within this unit.



Picture 6: Breakaways and rises.

3.2.4 Mulga Flats

Mulga Flats occurred relatively south of the LGM lease. These flat sandy plains were densely covered with many herbs and small bushes such as *Cephalopterum drummondii* and *Erodium cygnorum*. A total of 64 species were identified within this vegetation unit. The dominant species occurring in the Mulga Flats was *Acacia aneura*. Patches of *Eucalyptus lucasii* above 2m in height were also found within this vegetation unit.



Picture 7: Mulga flats.

3.2.5 Basalt Hills

The Basalt Hills included 45 species in total. This vegetation unit comprised of exposed basalt rock standing up to 50m tall with rock face inclines ranging from 5° to 30°. Larger rocks upon the slopes act as small collection points for eroding sand and water, and provide a habitat for small shrubs such as *Acacia craspedocarpa* and *Eremophila exilifolia*. At the base of the hill, flat trenches provide large reservoirs where larger trees such as *Acacia tetragonophylla* occur.



Picture 8: Basalt hills.

3.2.6 Granite Creek Lines

Granite creek lines occurred throughout the LGM lease. Few plants actually grew on the bed of the creek line but many shrubs such as *Acacia craspedocarpa* and trees including *Acacia aneura* crowded the creek beds. These beds were usually wide and flat, with *Eucalyptus camaldulensis* also crowding the banks. A total of 41 species were recorded in this vegetation unit.



Picture 9: Granite creek lines.

3.2.7 Mulga Creek Lines

This vegetation unit was situated within the Mulga flats where flat creek lines comprise of crusty sand. *Acacia aneura* was the dominant species along this creek line, with smaller shrubs such as *Eremophila clarkei* and *Sida calyxhymenia* dispersed throughout the creek. A total of 41 species were documented in this unit.



Picture 10: Mulga creek lines.

3.2.8 *E. striatocalyx* Community

The community of *E. striatocalyx* was present within an open field northwest of the Fairylands pit. The flat plain of granite sand provided a habitat for many ground hugging herbs and shrubs such as *Ptilotus exaltatus* and *P. obovatus* respectively. The community stretched from (S28°04'38.3" E120°38'30.5") to (S28°03'59.9" E120°38'50.4") on a slight downslope heading northeast. A Form of *Eucalyptus striatocalyx* is *Eucalyptus striatocalyx subsp delicata*, a priority 1 species, and this is recorded to occur 20km north of Agnew by the Department of CALM. A specimen of the trees within the community was collected and taken to the WA Herbarium to be verified. The community was identified as *Eucalyptus Striatocalyx*, which is not a priority species. Three species exclusive to this area that were not identified elsewhere on the lease were *Acacia jennerae*, *A. victoria* and *Enneapogon caerulescens*. Fifteen species in total were recorded in this vegetation unit.



Picture 11: *E. striatocalyx* community

3.3 Weeds

Of the eight weed species found within the survey area, *Emex australis* is the only Declared Weed, however it is not declared within the Shire of Leonora. Appendix 2 outlines the guidelines required for dealing with this weed in the mentioned council boundaries.

4 Discussion and Recommendations

A total of 49 families, 86 genera and 165 species were found within the LGM lease (Appendix 1). Three Priority Flora were located during the survey undertaken by Jim's Seeds, Weeds and Trees Pty Ltd and their locations noted via GPS coordinates.

The vegetation communities defined and mapped on the survey area reflect the underlying landforms found within the LGM leases. The high diversity of flora is a result of the vast area (approximately 200km²) covered on the leases. This diversity needs to be taken into account when any remedial works are undertaken.

In the event of clearing for mining practices, it is recommended that;

- ◆ Any clearing of an area near or in proximity to any Priority species requires a specific survey of the proposed site, in order to account for the abundance and condition of the specific Priority species;
- ◆ Unnecessary clearing of vegetation beyond that strictly required is avoided, particularly in sections of the surveyed area where trees are present, as they provide habitats for many species.
- ◆ Any viable seed be collected for future rehabilitation work
- ◆ Topsoil should be removed and stored for future use in rehabilitation
- ◆ The risk of introducing invasive weeds minimized by maintaining vehicle hygiene or other suitable control
- ◆ It is also recommended for this report be updated regularly to keep current with the changes in Priority flora status and taxonomical revisions

5 Personnel involved

Jim Williams – Botanist.

Eren Reid – Assistant Botanist.

Catherine Tauss – Consultant Botanist.

Dr Bob Chinock – Eremophila Specialist SA Herbarium

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Appendix 1

Species list of the Flora documented at Lawlers Gold Mine

Family	Genus	Species	Granite Sand Flats	Granite Out Crops	Breakaways and Rises	Mulga Flats	Basalt Hills	Granite Creek Line	Mulga Creek Line	<i>E. striatocalyx</i> community
Adiantaceae	Cheilanthes	austrotenuifolia		*	*		*			
	Cheilanthes	sieberi ssp sieberi		*	*		*			
Apiaceae	Trachymene	ornata					*			
Aramanthaceae	Ptilotus	aeroides	*		*		*		*	
	Ptilotus	exaltatus			*	*			*	*
	Ptilotus	helipteroides			*		*			
	Ptilotus	obovatus	*	*	*	*	*	*		*
	Ptilotus	schwartzii			*	*				
Asclepiadaceae	Marsdenia	australis		*		*				
Asphodelaceae	Asphodelus	fistulosus	*	*		*	*	*		
Asteraceae	Actinobole	oldfieldiana						*		
	Brachyscome	ciliocarpa				*			*	
	Brachyscome	iberidifolia				*				
	#Calotis	hispidula	*	*	*	*	*	*	*	
	Centopeda	pleiocephala				*			*	
	Cephalipterum	drummondii				*				
	Cratystylis	microphylla			*					
	Helipterum	craspedioides	*	*			*		*	
	Olearia	humilis			*					
	Podolepis	canescens				*	*			
	Rhodanthe	charsleyae				*		*	*	
	Rhodanthe	splendida				*			*	
	Boraginaceae	Trichodesma	zeylanicum		*				*	
Boryaceae	Borya	constricta			*					
Brassicaceae	Lepidium	platypetalum							*	
Caesalpiniaceae	Senna	artemisioides ssp filifolia	*	*	*	*	*	*	*	

Family	Genus	Species	Granite Sand Flats	Granite Out Crops	Breakaways and Rises	Mulga Flats	Basalt Hills	Granite Creek Line	Mulga Creek Line	<i>E. striatocalyx</i> community
	Senna	artemisioides ssp helmsii	*	*	*	*	*	*	*	
	Senna	cardiosperma	*		*		*			
	Senna	helmsii	*		*	*	*			
Casuarinaceae	Allocasuarina	dielsiana			*					
Chenopodiaceae	Atriplex	codonocarpa	*		*					
	Atriplex	semilunaris	*		*			*		
	Atriplex	quadriovalvata var. quadriovalvata			*					
	Dysphania	kalpari			*					
	Enchylaena	tomentosa			*					*
	Maireana	brevifolia				*		*		
	Maireana	convexa							*	
	Maireana	georgei	*		*	*			*	*
	Maireana	pentatropis			*					*
	Maireana	pyramidata				*				
	Maireana	thesioides			*	*			*	
	Maireana	tomentosa	*		*		*			
	Maireana	trichoptera			*	*			*	
	Maireana	triptera			*	*				*
	Maireana	villosa	*			*				
	Rhagodia	eremaea	*	*		*		*		
	#Salsola	tragus	*							
	Sclerolaena	cuneata	*		*	*				
	Sclerolaena	densiflora			*	*				
	Sclerolaena	diacantha	*	*	*	*				*
	Sclerolaena	eriacantha	*		*	*			*	
	Sclerolaena	eurotioides			*	*			*	
	Sclerolaena	fusiformis				*				
	Sclerolaena	patenticuspis				*				

Family	Genus	Species	Granite Sand Flats	Granite Out Crops	Breakaways and Rises	Mulga Flats	Basalt Hills	Granite Creek Line	Mulga Creek Line	<i>E. striatocalyx</i> community
Chloanthaceae	Spartothamnella	teucriflora				*				
Compositae	Chthonocephalus	pseudovax		*						
Convolvulaceae	Porana	commixta						*		
Cucurbitaceae	#Citrullus	lanatus		*			*	*		
	#Cucumis	myriocarpus		*				*		
Euphorbiaceae	Euphorbia	drummondii	*		*			*		
	Euphorbia	tannensis ssp. eremophila	*		*			*		
Fabaceae	Indigofera	georgei						*		
Geraniaceae	Erodium	crinitum	*		*	*	*		*	*
	Erodium	cygnorum				*	*		*	
Goodeniaceae	Goodenia	peacockiana		*	*		*		*	
	Scaevola	spinescens			*	*				
	Velleia	rosea						*	*	
Haloragaceae	Haloragis	trigonocarpa		*	*	*		*		
Lamiaceae	Prostanthera	althoferi					*			
	Prostanthera	wilkieana					*			
Liliaceae	Borya	constricta			*					
	Dianella	revoluta				*				
	Stypandra	glauca					*			
Lobeliaceae	Isotoma	petraea		*	*					
Loranthaceae	Ameyema	miquelii						*		
Loranthaceae	Ameyema	pressii						*		
Malvaceae	Abutilon	oxycarpum	*		*		*			
	Lawrencia	glomerata								*
	Sida	calyxhymenia	*	*	*	*		*	*	
	Sida	excedentifolia	*	*	*	*				
Mimosaceae	Acacia	acuminata			*	*			*	
	Acacia	aneura broad leaf	*		*	*		*	*	

Family	Genus	Species	Granite Sand Flats	Granite Out Crops	Breakaways and Rises	Mulga Flats	Basalt Hills	Granite Creek Line	Mulga Creek Line	<i>E. striatocalyx</i> community
	Acacia	aneura fine leaf			*	*		*	*	
	Acacia	burkitti		*						
	Acacia	craspedocarpa	*	*			*	*		
	Acacia	jennerae								*
	Acacia	kalgoorliensis			*					
	Acacia	kempeana			*		*		*	
	Acacia	linophylla			*	*				
	Acacia	quadrimarginea	*	*	*	*		*		
	Acacia	tetragonophylla	*				*		*	
	Acacia	victoriae								*
	Acacia	xanthocarpa			*		*		*	
Myoporaceae	Eremophila	alternifolia			*		*			
	Eremophila	clarkei							*	
	Eremophila	exilifolia		*	*		*			
	Eremophila	forrestii ssp forrestii					*			
	Eremophila	fraserii	*		*			*		
	Eremophila	freelingii			*	*				
	Eremophila	homoplastica				*				
	Eremophila	latrobei	*	*	*	*				
	Eremophila	longifolia			*			*		
	Eremophila	maculata			*					
	Eremophila	platycalyx	*	*		*				
	Eremophila	pungens P1			*					
	Eremophila	pantonii			*		*			
	Eremophila	serrulata		*						
	Eremophila	shonae ssp shonae		*	*					
Myrtaceae	Baeckea sp	Melita station P3			*					
	Calytrix	desolata			*		*			

Family	Genus	Species	Granite Sand Flats	Granite Out Crops	Breakaways and Rises	Mulga Flats	Basalt Hills	Granite Creek Line	Mulga Creek Line	<i>E. striatocalyx</i> community
	Eucalyptus	camaldulensis						*		
	Eucalyptus	carnei			*					
	Eucalyptus	clelandii			*					
	Eucalyptus	lucasii				*			*	
	Eucalyptus	oleosa			*	*				
	Eucalyptus	striatocalyx								*
Oleaceae	Jasminum	calcarium						*		
Papilionaceae	Mirbelia	rhagodioides			*					
	Swainsona	gracilis		*						
	Swainsona	kingii	*							
Pittosporaceae	Pittosporum	phylliraeoides					*	*		
Poaceae	Aristida	contorta	*		*		*		*	
	Austrostipa	elegantissima			*					
	Cymbopogon	ambiguus	*	*			*	*		
	Enneapogon	caerulescens								*
	Eragrostis	dielsii	*		*		*		*	
	Eragrostis	eriopoda				*				
	Eriachne	flaccida	*			*			*	
	Eriachne	ovata				*				
	Eulalia	fulva							*	
	Monachather	paradoxa				*				
	Themeda	triandra						*		
Polygonaceae	#Emex	australis	*	*		*		*		
	#Acetosa	vesicaria	*	*	*	*	*	*		
Portulacaceae	Calandrinia	creethae	*			*			*	
	Calandrinia	polyandra	*	*		*	*	*	*	
Primulaceae	#Anagallis	arvensis			*			*	*	
Proteaceae	Grevillea	berryana			*	*				

Family	Genus	Species	Granite Sand Flats	Granite Out Crops	Breakaways and Rises	Mulga Flats	Basalt Hills	Granite Creek Line	Mulga Creek Line	<i>E. striatocalyx</i> community
	<i>Grevillea</i>	<i>inconspicua</i> P4			*		*		*	
	Hakea	leucoptera ssp sericipes			*					
	Hakea	preissii			*	*				
	Hakea	recurva			*	*				
	Hakea	suberu	*					*		
Rubiaceae	Psyrdrax	suaveolens ms			*	*				
Rutaceae	Philotheca	brucei ssp brucei			*		*			
Santalaceae	Exocarpos	aphyllus			*					
	Santalum	lanceolatum			*			*	*	
	Santalum	spicatum			*		*			
Sapindaceae	Dodonaea	inaequifolia		*						
	Dodonaea	microzyga			*					
	Dodonaea	viscosa ssp. spatulata		*	*			*		
	Dodonaea	rigida		*	*		*			
Solanaceae	Nicotiana	rosulata			*					
	Solanum	lasiophyllum	*	*	*	*	*		*	*
	#Solanum	nigrum			*			*		
	Solanum	nummularium	*	*	*					
	Solanum	orbiculatum			*					
Stackhousiaceae	Stackhousia	muricata			*		*			
Sterculiaceae	Brachychiton	gregori				*	*			
Thymelaceae	Pimelia	microcephala				*		*		
Thymelaceae	Pimelia	trichostachya					*	*		
Violaceae	Hybanthus	floribundus			*					
Zygophyllaceae	Tribulus	astrocarpus	*						*	
	Zygophyllum	iodocarpum			*					

denotes weed species

Appendix 2: Department of Agriculture Weed Control of *Emex australis*.

Doublegee (*Emex australis* and *Emex spinosa*)

Category: P1

location : for the municipal districts of Augusta-Margaret River, Boyup Brook, Bridgetown-Greenbushes, the City of Bunbury, Busselton, Capel, Collie, Dardanup, Donnybrook-Balingup, Dumbleyung, Harvey, Katanning, Manjimup, Mandurah, Murray, Nannup, Serpentine-Jarrahdale, Tambellup, Wagin, Waroona and Woodanilling.

Category: P1, P3

location : for the municipal districts of Broomehill, Kojonup and West Arthur.

Category: P1, P4

location : for the municipal districts of Jerramungup, Kent and Ravensthorpe.

Category: P5

location : for the municipal districts of Esperance, Gnowangerup, Kondinin, Kulin and Lake Grace.

Landholder obligations for the control of Doublegee

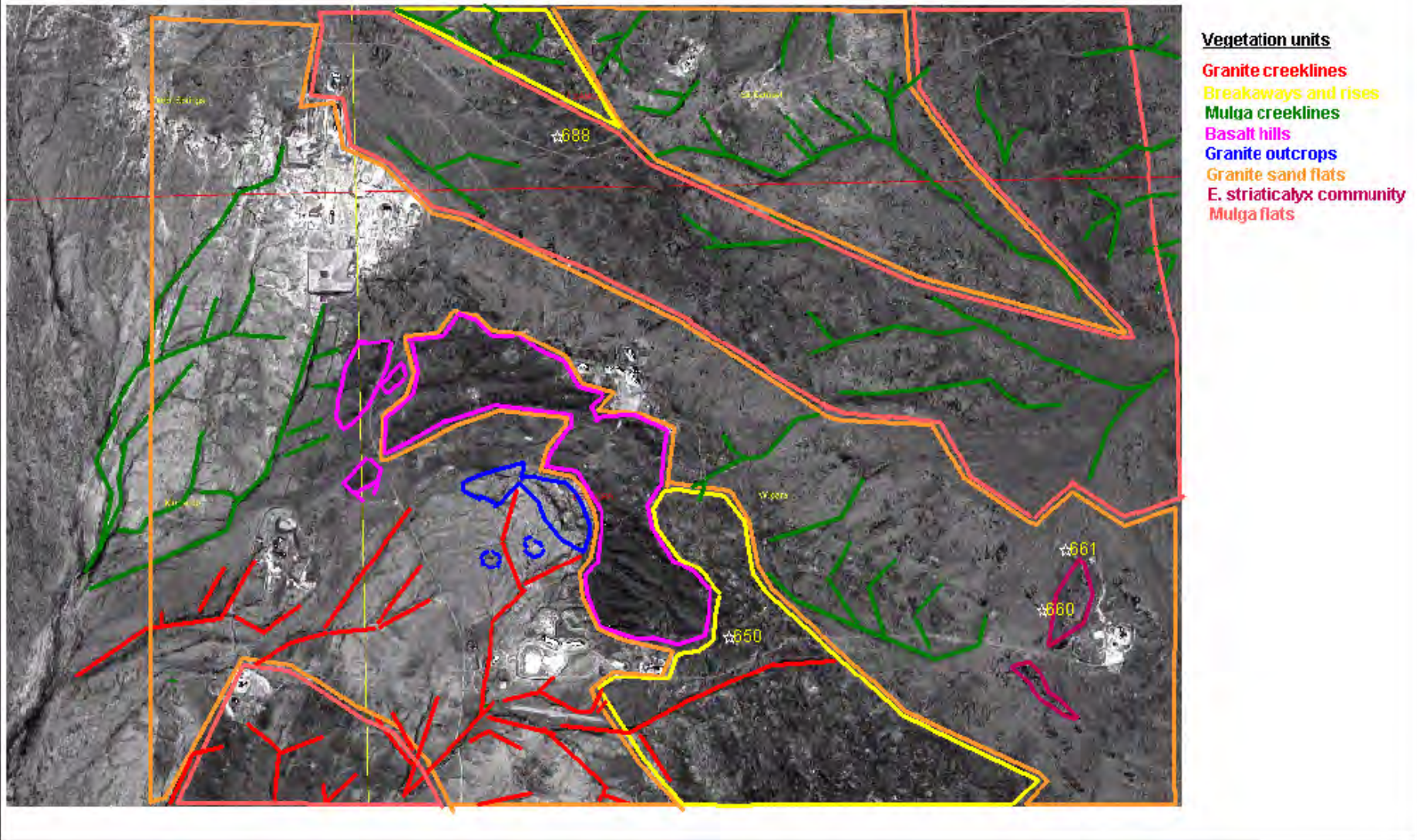
<p>P1 REQUIREMENTS Prohibits movement</p>	<p>The movement of plants or their seeds is prohibited within the State.</p> <p>This prohibits the movement of contaminated machinery and produce including livestock and fodder.</p>
<p>P2 REQUIREMENTS Aim is to eradicate infestation</p>	<p>Treat all plants to destroy and prevent propagation each year until no plants remain. The infested area must be managed in such a way that prevents the spread of seed or plant parts on or in livestock, fodder, grain, vehicles and/or machinery.</p>
<p>P3 REQUIREMENTS Aims to control infestation by reducing area and/or density of infestation</p>	<p>The infested area must be managed in such a way that prevents the spread of seed or plant parts within and from the property on or in livestock, fodder, grain, vehicles and/or machinery.</p> <p>Treat to destroy and prevent seed set all plants:-</p> <ul style="list-style-type: none"> • Within 50 metres inside of the boundaries of the infestation • within 50 metres of roads and highwater mark on waterways • within 50 metres of sheds, stock yards and houses. <p>Treatment must be done prior to seed set each year.</p> <p>Properties with less than 20 hectares of infestation must treat the entire infestation.</p> <p>Additional areas may be ordered to be treated.</p>

<p>P4 REQUIREMENTS Aims to prevent infestation spreading beyond existing boundaries of infestation</p>	<p>The infested area must be managed in such a way that prevents the spread of seed or plant parts within and from the property on or in livestock, fodder, grain, vehicles and/or machinery.</p> <p>Treat to destroy and prevent seed set all plants:-</p> <ul style="list-style-type: none"> • within 50 metres inside of the boundaries of the infested property for one-leaf and 20 metres for two-leaf • within 50 metres of roads and highwater mark on waterways • within 50 metres of sheds, stock yards and houses. <p>Treatment must be done prior to seed set each year. Properties with less than 20 hectares of infestation must treat the entire infestation.</p> <p>Additional areas may be ordered to be treated.</p>
<p>Special considerations</p>	<p>In the case of P4 infestations where they continue across property boundaries there is no requirement to treat the relevant part of the property boundaries as long as the boundaries of the infestation as a whole are treated. There must be agreement between neighbours in relation to the treatment of these areas.</p>



Emex australis

Appendix 3: Map of the LGM survey area.



Appendix 4: Reference to Waypoints

Reference	Waypoint	Easterly GDA	Northerly GDA
Eremophila pungens	650	261936	6891485
<i>Eucalyptus striatycalyx</i> community	660	268264	6891989
<i>Eucalyptus striatycalyx</i> community	661	268785	6893182
<i>Baeckea</i> sp. Melita Station (H. Pringle 2738)	688	258645	6901208

APPENDIX 3: DATABASE SEARCHES - INTERIM NATUREMAP AND PMST (2022)

Protected Matters Search Tool

Report Generated - 12:50PM - 07 December 2022

Matters of National Environment Significance	Count
World Heritage Properties	0
National Heritage Places	0
Wetlands of International Importance (Ramsar Wetlands)	0
Great Barrier Reef Marine Park	0
Commonwealth Marine Area	0
Listed Threatened Ecological Communities	0
Listed Threatened Species	4
Listed Migratory Species	6

Other Matters Protected by the EPBC Act	Count
Commonwealth Lands	0
Commonwealth Heritage Places	0
Listed Marine Species	8
Whales and Other Cetaceans	0
Critical Habitats	0
Commonwealth Reserves Terrestrial	0
Australian Marine Parks	0
Habitat Critical to the Survival of Marine Turtles	0

Extra Information	Count
State and Territory Reserves	0
Regional Forest Agreements	0
Nationally Important Wetlands	0
EPBC Act Referrals	1
Key Ecological Features	0
Biologically Important Areas	0
Bioregional Assessments	0
Geological and Bioregional Assessments	0

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected and is accurate at the time of generation. Please see the caveat for interpretation of information provided here. Consider carefully the age of information for decision making.

Report Metadata	Caveat
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Listed Threatened Species

Species ID	Scientific Name	Common Name	Class	Simple Presence	Presence Text	Threatened Category	Migratory Status	Migratory Category	Marine Status	Cetacean Status	Website	Buffer Status
59350	<i>Pezoporus occidentalis</i>	Night Parrot	Bird	May	Species or species habitat	Endangered					Species Profile and Threat	In feature area
929	<i>Falco hypoleucos</i>	Grey Falcon	Bird	May	Species or species habitat	Vulnerable					Species Profile and Threat	In feature area
758	<i>Polytelis alexandrae</i>	Princess Parrot,	Bird	May	Species or species habitat	Vulnerable					Species Profile and Threat	In feature area
934	<i>Leipoo ocellata</i>	Malleefowl	Bird	Likely	Species or species habitat	Vulnerable					Species Profile and Threat	In feature area

Listed Migratory Species

				Presence								
Species ID	Scientific Name	Common Name	Class	Rank	Text	Threatened Category	Migratory Status	Migratory Category	Marine Status	Cetacean Status	Website	Buffer Status
59309	<i>Actitis hypoleucos</i>	Common Sandpiper	Bird	May	Species or species habitat		Migratory	Migratory Wetlands	Listed		Species Profile and Threat	In feature area
882	<i>Charadrius veredus</i>	Oriental Plover, Oriental	Bird	May	Species or species habitat		Migratory	Migratory Wetlands	Listed - overfly marine		Species Profile and Threat	In buffer area only
858	<i>Calidris melanotos</i>	Pectoral Sandpiper	Bird	May	Species or species habitat		Migratory	Migratory Wetlands	Listed - overfly marine		Species Profile and Threat	In feature area
874	<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	Bird	May	Species or species habitat		Migratory	Migratory Wetlands	Listed		Species Profile and Threat	In feature area
644	<i>Motacilla flava</i>	Yellow Wagtail	Bird	May	Species or species habitat		Migratory	Migratory Terrestrial	Listed - overfly marine		Species Profile and Threat	In feature area
642	<i>Motacilla cinerea</i>	Grey Wagtail	Bird	May	Species or species habitat		Migratory	Migratory Terrestrial	Listed - overfly marine		Species Profile and Threat	In feature area

[Back to Summary](#)

EPBC Act Referrals

Reference Number	Title of referral	Jurisdiction	Industry Type	Stage	Stage Description	Referral Outcome	Website	Buffer Status
2015/7522	Improving rabbit	NSW	Natural Resources	Completed	Referral Decision Made	Not Controlled Action	EPBC Referral List	In feature area

Listed Marine Species

Species ID	Scientific Name	Common Name	Class	Presence		Threatened Category	Migratory Status	Migratory Category	Marine Status	Cetacean Status	Website	Buffer Status
				Rank	Text							
670	<i>Merops ornatus</i>	Rainbow Bee-eater	Bird	May	Species or species habitat				Listed - overfly marine		Species Profile and Threat	In feature area
83425	<i>Chalcites osculans</i>	Black-eared Cuckoo	Bird	Likely	Species or species habitat				Listed - overfly marine		Species Profile and Threat	In feature area
59309	<i>Actitis hypoleucos</i>	Common Sandpiper	Bird	May	Species or species habitat		Migratory	Migratory Wetlands	Listed		Species Profile and Threat	In feature area
882	<i>Charadrius veredus</i>	Oriental Plover, Oriental	Bird	May	Species or species habitat		Migratory	Migratory Wetlands	Listed - overfly marine		Species Profile and Threat	In buffer area only
858	<i>Calidris melanotos</i>	Pectoral Sandpiper	Bird	May	Species or species habitat		Migratory	Migratory Wetlands	Listed - overfly marine		Species Profile and Threat	In feature area
874	<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	Bird	May	Species or species habitat		Migratory	Migratory Wetlands	Listed		Species Profile and Threat	In feature area
644	<i>Motacilla flava</i>	Yellow Wagtail	Bird	May	Species or species habitat		Migratory	Migratory Terrestrial	Listed - overfly marine		Species Profile and Threat	In feature area
642	<i>Motacilla cinerea</i>	Grey Wagtail	Bird	May	Species or species habitat		Migratory	Migratory Terrestrial	Listed - overfly marine		Species Profile and Threat	In feature area

Row Labels	COUNT
Animalia	82
AMPHI	1
Platyplectrum spenceri	1
BIRD	64
Acanthagenys rufogularis	2
Acanthiza robustirostris	1
Acanthiza uropygialis	1
Aegotheles cristatus subsp. cristatus	1
Anas gracilis	1
Aquila audax	3
Artamus cinereus	1
Barnardius zonarius	1
Cacatua roseicapilla subsp. assimilis	1
Chenonetta jubata	1
Cheramoeca leucosterna	1
Cinlosoma castaneothorax	1
Climacteris affinis subsp. superciliosa	1
Corvus bennetti	2
Corvus orru	1
Cracticus nigrogularis	4
Cracticus tibicen	12
Cracticus torquatus	2
Euseyonis melanops	1
Erythronyx cinctus	1
Falco berigora	1
Falco cenchroides	1
Falco longipennis	1
Gavialis virescens	1
Grallina cyanoleuca	1
Himantopus himantopus	1
Hirundo neoxena	2
Lichenostomus virescens	1
Manorina flavigula	3
Ninox novaeseelandiae subsp. boobook	1
Nymphicus hollandicus	1
Ocyphaps lophotes	1
Oreoica gutturalis	2
Petrochelidon nigricans	1
Petroica goodenovii	1
Pyrrholaemus brunneus	1
Rhipidura leucophrys	1
Smicronis brevirostris	1
Taeniopygia guttata	2
Vanellus tricolor	1

INVERT	5
Selenotholus foelschei	1
Urodacus armatus	1
Urodacus hoplurus	3
MAMMAL	1
Ningauai ridei	1
REPTILE	11
Furina ornata	1
Gehyra variegata	1
Heteronotia binoei	1
Lerista desertorum	1
Lerista timida	3
Simoselaps bertholdi	1
Suta fasciata	1
Tympanocryptis cephalus	1
Varanus caudolineatus	1
Chromista	19
SLIMEMOULD	19
Comatricha elegans	1
Comatricha ellae	1
Echinostelium apitectum	3
Echinostelium corynophorum	1
Fuligo cinerea	1
Licea denudescens	1
Licea kleistobolus	5
Licea scyphoides	2
Perichaena vermicularis	1
Physarum decipiens	2
Physarum pusillum	1

Plantae	182
DICOT	172
<i>Acacia caesaneura</i>	1
<i>Acacia effusifolia</i>	3
<i>Acacia thoma</i>	1
<i>Acacia victoriae</i>	1
<i>Actinobole oldfieldianum</i>	2
<i>Alyogyne pinoniana</i>	1
<i>Androcalva luteiflora</i>	1
<i>Atriplex codonocarpa</i>	1
<i>Baeckea</i> sp. Sandstone (C.A. Gardner s.n. 26 Oct. 1963)	1
<i>Brachyscome ciliaris</i>	2
<i>Calotis hispidula</i>	1
<i>Calytrix carinata</i>	2
<i>Cephalopterum drummondii</i>	1
<i>Citrullus colocynthis</i>	1
<i>Convolvulus clementii</i>	1
<i>Crassula</i> sp.	1
<i>Dampiera dentata</i>	1
<i>Dicrastylis brunnea</i>	1
<i>Dicrastylis flexuosa</i>	1
<i>Dicrastylis sessilifolia</i>	3
<i>Dicrastylis</i> sp.	2
<i>Dodonaea adenophora</i>	1
<i>Dodonaea rigida</i>	1
<i>Dodonaea viscosa</i> subsp. <i>mucronata</i>	1
<i>Drosera macrantha</i> subsp. <i>macrantha</i>	1
<i>Duperreya commixta</i>	2
<i>Dysphania cristata</i>	1
<i>Eremophila alternifolia</i>	2
<i>Eremophila exilifolia</i>	3
<i>Eremophila forrestii</i> subsp. <i>forrestii</i>	4
<i>Eremophila galeata</i>	1
<i>Eremophila granitica</i>	5
<i>Eremophila homoplastica</i>	1
<i>Eremophila latrobei</i> subsp. <i>glabra</i>	1
<i>Eremophila longifolia</i>	1
<i>Eremophila maculata</i> subsp. <i>brevifolia</i>	1
<i>Eremophila metallicorum</i>	1
<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>	2
<i>Eremophila oppositifolia</i> subsp. <i>angustifolia</i>	1
<i>Eremophila platycalyx</i> subsp. <i>Granites</i> (D.J. Edinger & G. Marsh DJE 4782)	1
<i>Eremophila platycalyx</i> subsp. <i>Leonora</i> (J. Morrisey 252)	3
<i>Eremophila platythamnos</i> subsp. <i>platythamnos</i>	1

<i>Eremophila serrulata</i>	2
<i>Eremophila spectabilis</i> subsp. <i>brevis</i>	1
<i>Erodiophyllum acanthocephalum</i>	1
<i>Erodium aureum</i>	1
<i>Erodium crinitum</i>	1
<i>Erodium cygnorum</i>	2
<i>Eucalyptus camaldulensis</i> subsp. <i>obtusata</i>	2
<i>Eucalyptus clelandiorum</i>	1
<i>Eucalyptus gongylocarpa</i>	1
<i>Eucalyptus oldfieldii</i>	1
<i>Eucalyptus striatocalyx</i>	3
<i>Eucalyptus trichopoda</i>	1
<i>Euphorbia porcata</i>	2
<i>Glischrocaryon aureum</i>	1
<i>Glycine canescens</i>	1
<i>Goodenia peacockiana</i>	1
<i>Hakea leucoptera</i> subsp. <i>sericipes</i>	2
<i>Haloragis trigonocarpa</i>	1
<i>Helipterum craspedioides</i>	1
<i>Homalocalyx thryptomenoides</i>	1
<i>Indigofera georgei</i>	1
<i>Leiocarpa semicalva</i> subsp. <i>semicalva</i>	1
<i>Lepidium oxytrichum</i>	1
<i>Lysiana murrayi</i>	1
<i>Maireana amoena</i>	1
<i>Maireana carnosa</i>	1
<i>Maireana georgei</i>	1
<i>Maireana glomerifolia</i>	1
<i>Micromyrtus flaviflora</i>	1
<i>Minuria integerrima</i>	1
<i>Myriocephalus guerinae</i>	1
<i>Nicotiana rosulata</i> subsp. <i>rosulata</i>	1
<i>Olearia stuartii</i>	1
<i>Pimelea microcephala</i>	1
<i>Pimelea microcephala</i> subsp. <i>microcephala</i>	2
<i>Pimelea subvillifera</i>	3
<i>Pimelea trichostachya</i>	1
<i>Pluchea dentex</i>	1
<i>Prostanthera althoferi</i> subsp. <i>althoferi</i>	1
<i>Ptilotus aevoides</i>	2
<i>Ptilotus exaltatus</i>	1
<i>Ptilotus helipteroides</i>	2
<i>Ptilotus obovatus</i>	1
<i>Ptilotus rotundifolius</i>	1
<i>Rhagodia preissii</i>	1
<i>Rhodanthe chlorocephala</i> subsp. <i>splendida</i>	1
<i>Rhodanthe humboldtiana</i>	1

Rhodanthe polakii	1
Rhodanthe sterilecens	1
Rumex hypogaeus	1
Santalum lanceolatum	2
Sclerolaena cuneata	1
Sclerolaena densiflora	1
Sclerolaena diacantha	1
Sclerolaena eriacantha	1
Senecio glossanthus	1
Senecio magnificus	3
Senna artemisioides	1
Senna artemisioides subsp. x artemisioides	4
Senna artemisioides subsp. x sturtii	1
Senna charlesiana	1
Senna glutinosa subsp. chatelainiana	1
Senna manicula	2
Sida sp. Excedentifolia (J.L. Egan 1925)	1
Solanum cleistogamum	1
Solanum lasiophyllum	3
Solanum nummularium	1
Stackhousia megaloptera	1
Swainsona beasleyana	4
Swainsona incei	4
Swainsona leeana	1
Swainsona oroboides	1
Swainsona tenuis	1
Tetragonia eremaea	1
Teucrium teucriflorum	1
Trachymene cyanopetala	1
Trigonella suavissima	1
Velleia cynopotamica	1
Velleia glabrata	1
Zygophyllum aurantiacum	1
Zygophyllum iodocarpum	1

FERN	2
Cheilanthes lasiophylla	1
Ophioglossum lusitanicum	1
LIVERWORT	1
Asterella drummondii	1
MONOCOT	7
Asphodelus fistulosus	1
Austrostipa trichophylla	1
Eriachne flaccida	1
Juncus aridicola	1
Perotis rara	1
Stipa nitida	1
Thysanotus sp. Eremaean (S. van Leeuwen 1067)	1
Grand Total	283

APPENDIX 4: TENURE OWNERSHIP



MINING TENEMENT SUMMARY REPORT

MINING LEASE 36/27

Status: Live

TENEMENT SUMMARY

Area: 612.55000 HA	Death Reason :
Mark Out : 03/05/1985 10:00:00	Death Date :
Received : 10/05/1985 11:22:00	Commence : 30/10/1985
Term Granted : 21 Years (Renewed)	

CURRENT HOLDER DETAILS

Name and Address

AGNEW GOLD MINING COMPANY PTY LIMITED
GEMMA GLASS / RACHAEL CHALMERS, C/- TENEMENTS, GPO BOX 2731, CLOISTERS SQUARE PO, WA,
6850, xxxxxxxxxxxxxxxx@goldfields.com, xxxxxx204

DESCRIPTION

Locality: AGNEW - EMU MINE
Datum: DATUM PEG SITUATED 855.45 METRES BEARING 90 DEGREES 48 MINUTES, 306.16 METRES BEARING 20 DEGREES 57 MINUTES & 1479.87 METRES BEARING 101 DEGREES 47 MINUTES NORTH WEST CORNER LATE SURVEYED MC 500.
Boundary: THENCE 1513.80 METRES BEARING 180 DEGREES 051 MINUTES 1246.74 METRES BEARING 270 DEGREES 041 MINUTES 0466.24 METRES BEARING 291 DEGREES 049 MINUTES 0350.00 METRES BEARING 288 DEGREES 022 MINUTES 0011.26 METRES BEARING 270 DEGREES 048 MINUTES 0855.45 METRES BEARING 090 DEGREES 048 MINUTES 1479.87 METRES BEARING 101 DEGREES 047 MINUTES 1506.33 METRES BEARING 180 DEGREES 043 MINUTES 0838.24 METRES BEARING 021 DEGREES 049 MINUTES 0792.17 METRES BEARING 289 DEGREES 034 MINUTES 0207.94 METRES BEARING 018 DEGREES 022 MINUTES 1508.28 METRES BEARING 000 DEGREES 048 MINUTES 0306.16 METRES BEARING 020 DEGREES 057 MINUTES BACK TO DATUM

Area :	Type	Dealing No	Start Date	Area
	Surveyed		20/02/1986	612.55000 HA
	Granted		30/10/1985	609.40000 HA
	Applied For		03/05/1985	609.40000 HA

SHIRE DETAILS

Shire	Shire No	Start	End	Area
LEONORA SHIRE	5040	03/05/1985		612.55000 HA



MINING TENEMENT SUMMARY REPORT

MINING LEASE 36/32

Status: Live

TENEMENT SUMMARY

Area: 87.76000 HA	Death Reason :
Mark Out : 13/11/1985 08:40:00	Death Date :
Received : 20/11/1985 14:45:00	Commence : 23/04/1986
Term Granted : 21 Years (Renewed)	

CURRENT HOLDER DETAILS

Name and Address

AGNEW GOLD MINING COMPANY PTY LIMITED
GEMMA GLASS / RACHAEL CHALMERS, C/- TENEMENTS, GPO BOX 2731, CLOISTERS SQUARE PO, WA,
6850, xxxxxxxxxxxxxxxx@goldfields.com, xxxxxx204

DESCRIPTION

Locality: AGNEW
Datum: DATUM PEG SITUATED AT THE SOUTHERN MOST CORNER OF FORMER SURVEYED MC 504
Boundary: THENCE: 1893.96 metres bearing 048 degrees 155.48 metres bearing 70 degrees 25 minutes 127.66 metres bearing 340 degrees 25 minutes 108.03 metres bearing 250 degrees 25 minutes 1127.72 metres bearing 048 degrees 460 metres bearing 90 degrees 48 minutes (along surveyed boundaries of MC 504, G.M.L. 36/1506 and MC 507) 1690 metres bearing 191 degrees 47 minutes 324 metres bearing 101 degrees 47 minutes 349.42 metres bearing 191 degrees 47 minutes 1154.21 metres bearing 200 degrees 59 minutes (along the surveyed boundaries of M 36/2) BACK TO DATUM

Area :	Type	Dealing No	Start Date	Area
	Surveyed		05/05/1987	87.76000 HA
	Granted		23/04/1986	88.00000 HA
	Applied For		13/11/1985	88.00000 HA

SHIRE DETAILS

Shire	Shire No	Start	End	Area
LEONORA SHIRE	5040	13/11/1985		87.76000 HA



MINING TENEMENT SUMMARY REPORT

MINING LEASE 36/314

Status: Live

TENEMENT SUMMARY

Area: 722.25000 HA	Death Reason :
Mark Out : 03/07/1994 11:00:00	Death Date :
Received : 07/07/1994 08:34:00	Commence : 18/10/1994
Term Granted : 21 Years (Renewed)	

CURRENT HOLDER DETAILS

Name and Address

AGNEW GOLD MINING COMPANY PTY LIMITED
GEMMA GLASS / RACHAEL CHALMERS, C/- TENEMENTS, GPO BOX 2731, CLOISTERS SQUARE PO, WA,
6850, xxxxxxxxxxxxxxxx@goldfields.com, xxxxxx204

DESCRIPTION

Locality: Waroonga
Datum: Datum post is situated at the north east corner of surveyed late (SL) MC 506
Boundary: THENCE: 3016.7 metres bearing 180 degrees 48 minutes along eastern boundaries of surveyed late MC 506 and 505 to south east corner of surveyed late MC 505 804.8 metres bearing 270 degrees 48 minutes along southern boundary of surveyed late MC 505 to its south west corner 1394.66 metres bearing 180 degrees 49 minutes 307.63 metres bearing 201 degrees 17 minutes along part of surveyed western boundary of M 36/27 to its south west corner 100 metres bearing 109 degrees 10 minutes along part of southern surveyed boundary of M 36/27 550 metres bearing 180 degrees to most south easterly corner of M 36/241 1260 metres bearing 270 degrees along southern boundary of M 36/241 2960 metres bearing 359 degrees along south western boundary of M 36/241 550 metres bearing 90 degrees to south west corner of surveyed late MC 1352 1524.80 metres bearing zero degrees 1 minute along western boundary of surveyed late MC 1352 to its north west corner 821.42 metres bearing 90 degrees 1 minute along northern boundary of surveyed late MC 1352 to its north east corner 820.71 metres bearing 3 degrees 8 minutes along part of western boundary of surveyed late MC 506 to its north west corner 755.2 metres bearing 90 degrees 48 minutes along northern boundary of surveyed late MC 506 Back to Datum Conversion of Mining Lease 36/241 and Prospecting Licence 36/1260 both of which are to be conditionally surrendered in favour hereof

Area :	Type	Dealing No	Start Date	Area
	Surveyed		15/07/2000	722.25000 HA

Surveyed	26/01/1998	722.25000 HA
Granted	18/10/1994	747.20000 HA
Applied For	03/07/1994	747.20000 HA

SHIRE DETAILS

Shire	Shire No	Start	End	Area
LEONORA SHIRE	5040	03/07/1994		722.25000 HA