

## APPENDIX 6: BIOLOGICAL SURVEY OF THE RGCP – ANIMAL PLANT MINERAL (2016)



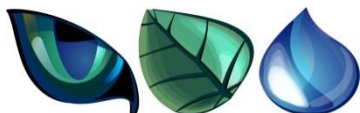
2016

# RAVENSTHORPE GOLD COPPER PROJECT Biological Survey

## Ravensthorpe, WA



Prepared on behalf of ACH Minerals Pty Ltd by:



**Animal Plant Mineral Pty Ltd**

### **Kundip Mine Site:**

M74/41, M74/51, M74/53, M74/135, M74/180,  
L74/34, L74/45

### **Myamba Mine Site:**

M74/176, L74/35

---

Completed by: Animal Plant Mineral Pty Ltd

ABN: 86 886 455 949

Tel: (08) 6296 5155

Fax: (08) 6296 5199

Address : 47 Caroline Retreat

Henley Brook, Western Australia 6055

Website: [www.animalplantmineral.com.au](http://www.animalplantmineral.com.au)

For further information on this report please contact:

Dr Mitchell Ladyman

Tel: 0437 307 008

Email: [mitch@animalplantmineral.com.au](mailto:mitch@animalplantmineral.com.au)

#### **Disclaimer**

*This document is protected by legal professional privilege. To ensure privilege is not waived, please keep this document confidential and in a safe and secure place. This document should not be distributed to, nor any reference to it made to any person or organization not directly involved in making decisions upon the subject matter of this document. If this document is requested by a third party, legal advice should be immediately obtained prior to that person viewing or taking the document to ensure that any necessary disclosure occurs in an appropriate manner.*

---

## Executive Summary

---

ACH Minerals Pty Ltd, a wholly owned subsidiary of ACH Global, are the current owners of the Ravensthorpe Gold Copper Project located in the Goldfields-Esperance region of Western Australia approximately 550 km southeast of Perth near Ravensthorpe. ACH are progressing with a proposal to mine and process gold and copper bearing ore from pits at the Kundip and Myamba Mine Sites.

Animal Plant Mineral Pty Ltd was engaged by ACH to provide a Level 1 fauna and Level 1 botanical survey and targeted flora survey for conservation significant flora at the Kundip Mine Site.

Much of the area surrounding the Kundip Mine Site is either currently nature reserve or proposed nature reserve. However, the Kundip Mine Site has been heavily impacted by historic mining activities and as such the vegetation is not representative of the surrounding landscape. Two conservation significant flora were identified in the Project area; *Marianthus mollis* listed as Priority 4 under the *Wildlife Conservation Act 1950* and Endangered under the Environment Protection and Biodiversity Conservation Act 1999, and *Hydrocotyle* sp. *Decipiens* Priority 2. Four vegetation communities were identified as potentially representing TEC's or PEC's listed by the Department of Parks and Wildlife; Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia (TEC/PEC) and Very Open Mallee over *Melaleuca* sp. Kundip Dense Heath (PEC). ACH has moved the location of the proposed waste dump to reduce impacts to these vegetation communities. As a result less than 2% of two communities will be impacted regionally within the Ravensthorpe Range area.

Vegetation of the Ravensthorpe Range (encompassing the ACH tenements) had previously been mapped by the Department of Environment and Conservation. The 2016 survey served as ground-truthing to this mapping, provided context of the vegetation units present with the regional (Ravensthorpe range) vegetation, no changes to vegetation boundaries were required. As a result of the legacy of mining the vegetation within the survey area has come to reflect a mosaic of conditions, ranging from 'Good' to 'Degraded' in recently disturbed areas, 'Very Good' in historically disturbed areas and 'Excellent' condition in undisturbed vegetation.

Several weed species including; *\*Arctotheca calendula*, *\*Asparagus asparagoides*, *\*Hypochaeris glabra*, *\*Oxalis pes-caprae*, *\*Cotula coronopifolia*, *\*Trifolium* spp., *\*Carpobrotus aequilaterus* were detected on or in proximity to the proposed disturbance footprint. *\*Asparagus asparagoides* is classified as a Weed of National Significance.

Three fauna habitat types were identified within the Project area, one of which, Low woodland mallee and heath, is well represented across the Project area and supports a number of conservation significant fauna including Heath Rat, Chuditch and Malleefowl which were recorded during the 2016 survey and Ravensthorpe Range Slider Skink recorded by Biota in 2004. Low dense forest /forest is located in isolated areas but the majority (>90%) of this habitat will not be disturbed by the proposed development. The Drainage and Damplands habitat is located in drainage lines of the Project area. Although few species were captured in this habitat type it provides intrinsic value as connective habitat.

The Kundip Mine Site Project is not likely to have significant impact on site specific flora, vegetation and fauna values. The proposal to recommence mining presents a unique opportunity to improve conservation and land management through the implementation of mining and mine site related environmental management practices, such as feral fauna, fire and weed management and the management of land access to the proposed conservation reserve to the east of the Project area.



---

## CONTENTS

---

<b>1</b>	<b>INTRODUCTION .....</b>	<b>9</b>
1.1	Project and Location .....	9
1.2	Scope of Work.....	11
1.3	Background and Supporting Information .....	14
1.4	Existing Environment .....	14
1.4.1	Climate .....	14
1.4.2	Biogeographic Regionalisation.....	15
1.4.3	Land Systems .....	16
1.4.4	Surface Water .....	16
1.4.5	Wetlands.....	17
1.4.6	Previous Surveys .....	17
<b>2</b>	<b>METHODOLOGY.....</b>	<b>19</b>
2.1	Contributing Authors .....	19
2.2	Desktop Methodology .....	19
2.2.1	Database Searches .....	19
2.2.2	Refining Field Searches .....	20
2.3	Field Survey.....	20
2.3.1	Flora and Vegetation Survey Methodology .....	20
2.3.2	Terrestrial Vertebrate Fauna Survey Methodology .....	21
2.3.2.1	Transect Observation .....	24
2.3.2.2	Funnel and Pit Trapping .....	24
2.3.2.3	Call Play-back .....	25
2.3.2.4	Acoustic Monitoring.....	25
2.3.2.5	Thermal Trigger Fauna Cameras .....	25
2.3.2.6	Aluminium Box Traps .....	26
2.3.2.7	Cage Traps.....	27
2.3.2.8	Turtle traps.....	27
2.3.2.9	Opportunistic Hand Searching .....	27
2.3.2.10	Short Range Endemics Methodology .....	27
<b>3</b>	<b>FLORA AND VEGETATION RESULTS .....</b>	<b>28</b>
3.1	Desktop Survey .....	28
3.1.1.1	Climate .....	28
3.1.1.2	Previous Surveys .....	28
3.1.1.3	Conservation Significant Flora .....	28
3.1.1.4	Conservation Significant Vegetation Communities.....	36
3.1.1.5	Introduced Flora.....	38
3.2	Field Survey.....	38

3.2.1	Flora and Vegetation Associations.....	38
3.2.2	Threatened and Priority Ecological Communities.....	41
3.2.3	Vegetation Condition .....	45
3.2.4	Conservation Significant Flora .....	47
3.2.5	Introduced Flora.....	48
<b>4</b>	<b>TERRESTRIAL VERTEBRATE FAUNA RESULTS .....</b>	<b>51</b>
4.1	Desktop Survey .....	51
4.2	Field Survey.....	58
4.2.1	Avifauna Records .....	58
4.2.2	Fauna Trapping .....	58
4.2.3	Bat Acoustic Recording .....	67
4.2.4	Conservation Significant Fauna.....	67
4.2.5	Fauna Habitats .....	69
<b>5</b>	<b>DISCUSSION AND CONCLUSION .....</b>	<b>75</b>
<b>6</b>	<b>REFERENCES .....</b>	<b>77</b>
<b>7</b>	<b>APPENDICES .....</b>	<b>79</b>

## FIGURES

Figure 1-1:	Location of ACH Minerals Pty Ltd Ravensthorpe Gold Copper Project .....	10
Figure 1-2:	Proposed and Current Disturbance at Kundip Mine Site .....	12
Figure 1-3:	Proposed and Current Disturbance at Myamba Mine Site.....	13
Figure 1-4:	Ravensthorpe Weather Station meteorological data (BoM 2016).....	15
Figure 2-1:	Fauna Trap Locations.....	23
Figure 3-1:	Monthly Ravensthorpe mean rainfall leading up to the survey .....	28
Figure 3-2:	Vegetation Communities of the Project Area.....	40
Figure 3-3:	Vegetation Condition of the Project Area .....	46
Figure 3-4:	Location of Conservation Significant Flora Recorded in the Project Area.....	49
Figure 3-5:	Location of Asparagus asparagoides and Other Annual Weeds.....	50
Figure 4-1:	Capture Rates for Honey Possum in the Scott River National Park (Bradshaw in prep) .....	58
Figure 4-2:	Low Dense Forest / Forest Fauna Habitat .....	70
Figure 4-3:	Damplands and Drainage Fauna Habitat.....	72
Figure 4-4:	Low Woodland Mallee and Heath Fauna Habitat .....	74

## TABLES

Table 1-1:	Disturbance at the Ravensthorpe Gold Copper Project .....	11
Table 1-2:	Rainfall and temperature averages for Ravensthorpe Weather Station (010633).....	15

---

Table 1-3: Existing surveys and investigations of the Ravensthorpe Gold Copper Project Area and surrounds .....	17
Table 2-1: Target fauna species and method of trapping.....	22
Table 2-2: Funnel trap survey effort .....	24
Table 2-3: Pit trap survey effort.....	24
Table 2-4: Acoustic monitoring survey effort .....	25
Table 2-5: Bat acoustic monitoring survey effort .....	25
Table 2-6: Thermal trigger camera survey effort.....	26
Table 2-7: Aluminium box trap survey effort .....	26
Table 2-8: Cage trap survey effort .....	27
Table 2-9: Turtle trap survey effort .....	27
Table 3-1: Conservation significant flora potentially occurring in the Ravensthorpe Gold Copper Project Area .....	29
Table 3-2: Priority and Threatened Ecological Communities potentially in the Ravensthorpe Gold Copper Project Area.....	37
Table 3-3: Summary of vegetation communities in the Kundip Mine Site .....	39
Table 3-4: Full description of the Craig et al. (2008) vegetation communities that could be representative of local TECs and PECs .....	41
Table 3-5: Threatened and Priority Ecological Communities impact assessment .....	44
Table 4-1: Conservation significant fauna potentially occurring in the Ravensthorpe Gold Copper Project Area .....	52
Table 4-2: Avifauna census data .....	60
Table 4-3: Fauna captured or recorded through opportunistic searching .....	64
Table 4-4: Bat species recorded in the Ravensthorpe Gold Copper Project Area .....	67
Table 4-5: Conservation significant fauna expected and recorded in the Ravensthorpe Gold Copper Project Area .....	68

## PLATES

---

Plate 1: <i>Marianthus mollis</i> (DPaW, 2016).....	47
Plate 2: A zonal weed patch (APM, 2016) .....	48

## APPENDICES

---

Appendix 1: Conservation codes for Western Australia flora and fauna
Appendix 2: 2004 Biota Biological Survey Report
Appendix 3: 2005 Biota Biological Survey Report
Appendix 4: EPBC Act Protected Matters Search
Appendix 5: Naturemap Search – 10 km buffer
Appendix 6: Atlas of Living Australia Database Search – 10 km buffer
Appendix 7: Department of Parks and Wildlife Threatened (Declared Rare) and Priority Flora Database Search
Appendix 8: Department of Parks and Wildlife Fauna Database Search

---

Appendix 9: Natureap Search – 6 km buffer

Appendix 10: Atlas of Living Australia Database Search – 5 km buffer

Appendix 11: Maximum Entropy Modelling Results

Appendix 12: Location of Conservation Significant Flora in the Project Area

## ABBREVIATIONS

Symbols and Units	Meaning
%	Percentage
*	Introduced plant species
°C	Degrees Celsius
ha	Hectare
km	Kilometre
m	Metre
mm	millimetres

Abbreviation	Meaning
ACH	ACH Minerals Pty Ltd
ANZECC	Australian and New Zealand Environment Conservation Council
AoLA	Atlas of Living Australia
APM	Animal Plant Mineral Pty Ltd
BAM Act	<i>Biosecurity and Agriculture Management Act 2007 (WA)</i>
Biota	Biota Environmental Sciences Pty Ltd
BoM	Bureau of Meteorology
CAMBA	China and Australian Migratory Bird Agreement 1986
Cth	Commonwealth
DEC	Department of Environment and Conservation
DPaW	Department of Parks and Wildlife
DoE	Department of Environment
EPA	Environmental Protection Authority
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)</i>
FRNP	Forest River National Park
GPS	Global Positioning System
IBRA	Interim Biogeographic Regionalisation for Australia
JAMBA	Japan and Australian Migratory Bird Agreement 1974
L	Miscellaneous tenement
M	Mining tenement
MNES	Matters of National Environmental Significance
MS	Ministerial Statement
OEPA	Office of Environmental Protection Authority
PEC	Priority Ecological Community
PMST	Protected Matters Search Tool
PRGP	Phillips River Gold Project
ROKAMBA	The Republic of Korea-Australian Migratory Bird Agreement 2007
sp.	Species (Unspecified)
SRE	Short-range Endemic
subsp.	Sub-species
TEC	Threatened Ecological Community
var.	Variety
WA	Western Australia
WC Act	<i>Wildlife Conservation Act 1950 (WA)</i>
WONS	Weed of National Significance

## 1 INTRODUCTION

### 1.1 PROJECT AND LOCATION

The Kundip Mine Site and Myamba Mine Site form part of the Ravensthorpe Gold Copper Project (RGCP) (the Project) located approximately 550 km southeast of Perth near Ravensthorpe in the Goldfields-Esperance region of Western Australia (WA) (Figure 1-1). ACH Minerals Pty Ltd (ACH), a wholly owned subsidiary of ACH Global, purchased the Project from Silver Lake Resources Ltd (Silver Lake) on 15 July 2016. The former farm-in and joint-venture agreement held between the two parties, allowed for ACH Minerals to acquire the project at any time during the earn in period.

ACH are progressing with a proposal to mine and process gold and copper bearing ore from pits at the Kundip and Myamba Mine Sites. The proposal includes the following:

- Open pit mining of the Kaolin, May and Flag deposits and subsequent underground mining of the Harbour View and Flag deposits at Kundip Mine Site;
- Open pit mining of the Trilogy oxide deposit at Myamba Mine Site;
- Construction of support facilities (offices, workshops) at Kundip Mine Site;
- Construction of processing facilities and processing at Kundip Mine Site; and
- Water pipeline and service road connecting Kundip and Myamba Mine Sites.

#### **Kundip**

The Kundip Mine Site is located within mining tenements (M) 74/41, M74/51, M74/53, M74/135, M74/180 and miscellaneous tenements (L) L74/34 and L74/45 approximately 17 km southeast of Ravensthorpe. The Kundip Mine Site is situated in the foothills of the Ravensthorpe Range. The southern boundary of the Kundip Mine Site lies in close proximity (0.4 - 1 km) north of the Kundip Nature Reserve (No. 31128). The Kundip Mine Site is bounded on the north, east and south by an area recommended by the Environmental Protection Authority (EPA) Red Book (Recommendation 3.8) to become Nature Reserve (No. 56).

The Kundip mine site has been heavily impacted by historic mining activities. Existing disturbances within the site include; multiple access roads of varying size, abandoned open pit and underground workings, waste dumps, costeaning and trenching, trial pits, numerous shafts and decline tunnels into mineralised targets.

#### **Myamba**

The Myamba Mine Site is located within M74/176 and L74/35 on cleared farmland approximately 1.5 km south of the Kundip Nature Reserve. The site is predominately flat, with little remaining perennial vegetation except for a narrow strip along a drainage line on the eastern extent of the site.

Due to the lack of vegetation at the Myamba site, this biological survey of the Project encompassed only the Kundip Mine Site, herein referred to as the Project area.





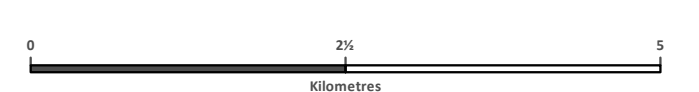
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

**Figure 1-1: Location of ACH Minerals Pty Ltd Ravensthorpe Gold/Copper Project**

- Legend**
- Ravensthorpe Gold/Copper Project Tenements
  - Major roads



Date: 08/12/2016  
Scale: 1:60,000



ems@animalplantmineral.com.au

GDA 1994 MGA Zone 51



## 1.2 SCOPE OF WORK

Animal Plant Mineral Pty Ltd (APM) was engaged by ACH to design and execute the requisite flora, vegetation, fauna and fauna habitat surveys to inform the referral to the Office of the Environmental Protection Authority (OEPA) to enable the OEPA to determine if the Project requires formal assessment. The scope included an on ground assessment of the Kundip Mine Site and a reconnaissance and desktop assessment of the Myamba Mine Site. Table 1-1 identifies the extent of disturbance of the proposed project relative to the existing disturbance at each of the sites. Figure 1-2 and Figure 1-3 shows the proposed Project impact footprint overlain by the current extent of disturbance at each of the sites.

**Table 1-1: Disturbance at the Ravensthorpe Gold Copper Project**

Mine Site	Area (ha <sup>1</sup> )	Proposed Disturbance Footprint (ha)	Existing Disturbance (ha)
Kundip	634.03	366.00	28.09
Myamba	939.02	150.00	939.02

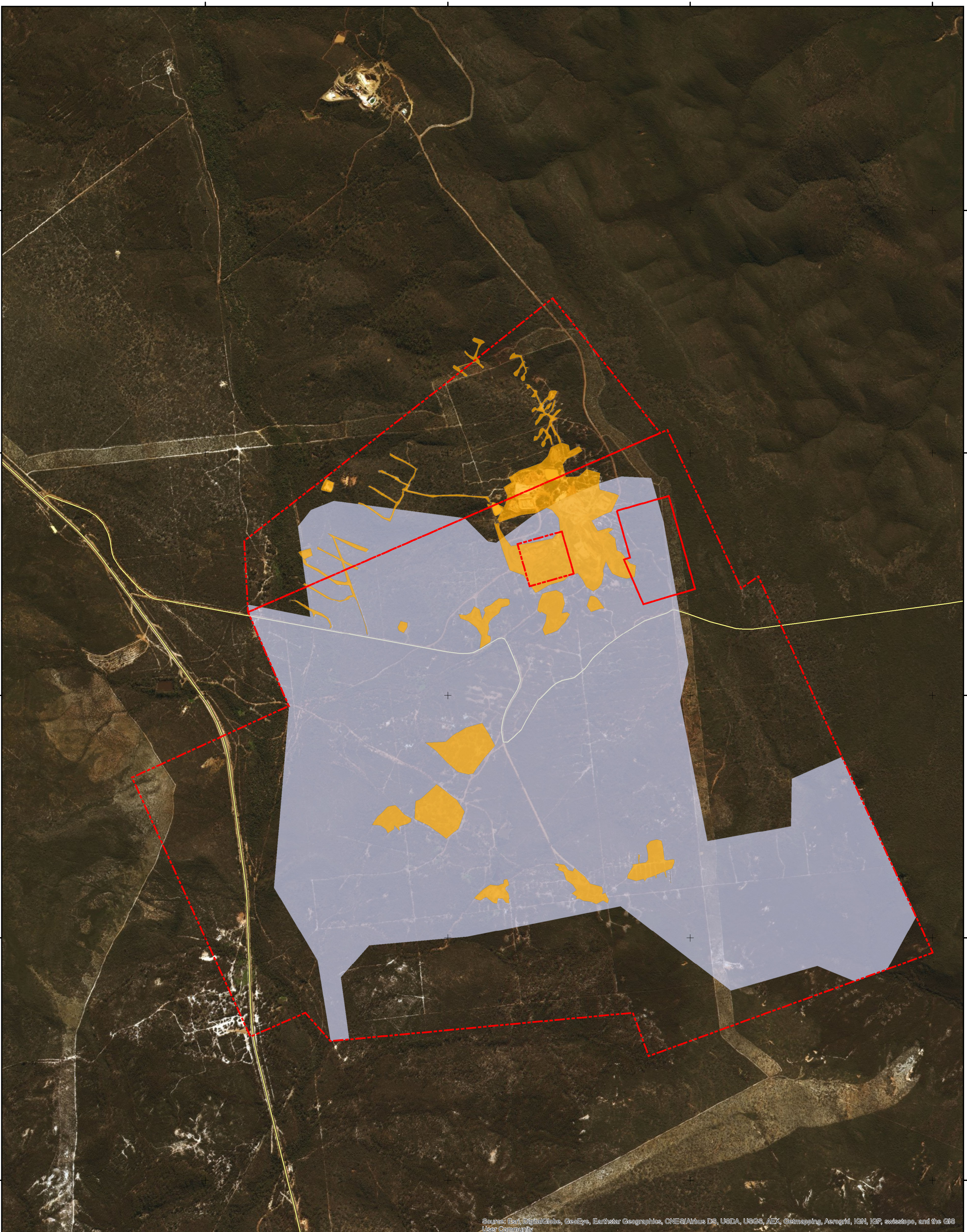
<sup>1</sup> Hectares

The methodology for the Project biological survey was determined by an assessment of the proposed and current disturbance, the location of the site and the context of the proposed development relative to the surrounding land use and the previous biological survey work that had been undertaken as part of a previous environmental assessment process. The survey scope was then discussed in liaison with offices of the OEPA and the Department of Parks and Wildlife (DPaW).

APM undertook a Level 1 botanical survey comprising ground-truthing existing project specific vegetation mapping (Craig *et al.*, 2008), capture of the current existing extent of ground disturbance and a targeted flora survey for conservation significant flora most likely to occur in the Project area.

The terrestrial vertebrate fauna survey of the Project focussed on searches for terrestrial vertebrates of conservation significance previously recorded in the Project area or highly likely to occur.





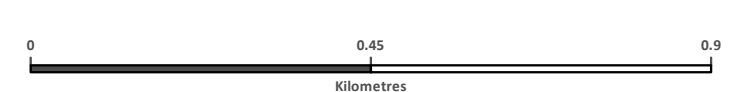
Sources: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

**Figure 1-2: Proposed and Current Disturbance at Kundip Mine Site**

- Legend**
- Current disturbance
  - Proposed disturbance footprint
  - Ravensthorpe Gold/Copper Project Tenement
  - Major roads



Date: 12/12/2016  
Scale: 1:10,000



ems@animalplantmineral.com.au GDA 1994 MGA Zone 51