Version 4

January 2018

RAVENSTHORPE GOLD PROJECT ENVIRONMENTAL SCOPING DOCUMENT

Ravensthorpe, WA

Kundip Mine Site:

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

Myamba Mine Site:

M74/176, L74/35

Prepared on behalf of ACH Minerals Pty Ltd by:

Animal Plant Mineral Pty Ltd

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

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PROJECT TERMS

Abbreviation	Meaning
ACH	ACH Minerals Pty Ltd
RGP	Ravensthorpe Gold Project
The Project	Includes the Kundip Mine Site and the Myamba Mine Site.

LIST OF ABBREVIATIONS

Abbreviation	Meaning
AMD	Acid and metalliferous drainage
APM	Animal Plant Mineral Pty Ltd
CIL	Carbon-in-Leach
DBCA	Department of Biodiversity Conservation and Attractions
DMAs	Decision Making Authorities
DMIRS	Department of Mines, Industry Regulation and Safety
DoEE	Department of Environment and Energy (Cwlth)
DPLH	Department of Planning, Lands and Heritage
DWER	Department of Water and Environmental Regulation
EP Act	*Environmental Protection Act 1986*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cwlth)
EPA	Environmental Protection Authority
ESD	Environmental Scoping Document
ERD	Environmental Review Document
GHG	Greenhouse Gas
MS	Ministerial Statement
NAF	Non-acid forming
PAF	Potentially acid forming
PEC	Priority Ecological Communities
PER	Public Environmental Review
ROM	Run-of-Mine
TEC	Threatened Ecological Communities
TSF	Tailings Storage Facility
WA	Western Australia
WRL	Waste Rock Landform

UNITS OF MEASURE

Unit	Measure
%	Percentage
a	Annum
ML	Megalitre
ha	Hectare
km	Kilometre
m	Metre
Mt	Million tonnes
MW	Megawatt

ENVIRONMENTAL SCOPING DOCUMENT

Proposal Name:	Ravensthorpe Gold Project
Proponent:	ACH Minerals Pty Ltd (ABN: 89 609 225 023)
Assessment Number:	2117
Location:	Kundip, 550 km southeast of Perth
Local Government Area:	Shire of Ravensthorpe
Public Review Period:	Environmental Review Document – 4 weeks
EPBC Reference Number:	2005/2000 Not a Controlled Action

1 INTRODUCTION

The Environmental Protection Authority (EPA) has determined that the above proposal is to be assessed under Part IV of the *Environmental Protection Act 1986* (*EP Act*) by way of a Public Environmental Review (PER) level of assessment.

ACH has prepared this Environmental Scoping Document (ESD) in accordance with the EPA's *Procedures Manual* (Part IV Divisions 1 and 2). The purpose of this ESD is to define the form, content, timing and procedure of the Environmental Review Document (ERD), required by s. 40(3) of the *EP Act*.

1.1 FORM

The form of the report on the ERD required under s. 40 of the *EP Act* will be in accordance with the *Environmental Review Document* template.

1.2 CONTENT

The ERD will include the content outlined in sections 2 to 6 of this ESD.

1.3 TIMING

Table 1-1 outlines a timeline for the assessment of the RGP, as guided by the EPA's *Instructions: Environmental Scoping Document, December 2016*.

Table 1-1: Indicative Assessment Timeline

Key assessment milestones	Completion Date
EPA approves Environmental Scoping Document	February 2018
Proponent submits first draft Environmental Review Document	February 2018
EPA provides comment on first draft Environmental Review Document *[6 weeks from receipt of ERD]*	April 2018
Proponent submits revised draft Environmental Review Document	April 2018
EPA authorises release of Environmental Review Document for public review *[2 weeks from EPA approval of ERD]*	May 2018
Proponent releases Environmental Review Document for public review for 4 weeks	June 2018
Close of public review period	June 2018
EPA provides Summary of Submissions *[3 weeks from close of public review period]*	July 2018
Proponent provides Response to Submissions	July 2018
EPA reviews the Response to Submissions *[4 weeks from receipt of Response to Submissions]*	August 2018
EPA prepares draft assessment report and completes assessment *[7 weeks from EPA accepting Response to Submissions]*	October 2018
EPA finalises assessment report (including two weeks consultation on draft conditions) and gives report to Minister *[6 weeks from completion of assessment]*	November 2018

1.4 PROCEDURE

The EPA requires that ACH undertake an environmental review according to the *Administrative Procedures* and the *Procedures Manual*.

The proposal was referred, and the level of assessment set, under the *Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures 2016* and therefore these are the relevant administrative procedures for this assessment.

This draft ESD will not be released for public review. The ESD will be available on the EPA website (www.epa.wa.gov.au) upon endorsement and will be appended to the ERD.

1.5 PARALLEL PROCESSING

1.5.1 Environment Protection and Biodiversity Conservation Act Referral

The Project has previously been assessed through the *Environment Protection and Biodiversity Conservation Act 1999* (*EPBC* Act) in 2005 and received "*Not a Controlled Actio*n" level of assessment.

2 THE PROPOSAL

2.1 BACKGROUND

ACH Minerals Pty Ltd (ACH) (the Proponent) proposes to develop the Ravensthorpe Gold Project (RGP) (the Project), located in the Fitzgerald subregion of the Esperance Interim Biogeographic region (IBRA) of Western Australia (WA), approximately 550 km southeast of Perth within the Shire of Ravensthorpe (Figure 1).

The RGP will occur in two distinct locations; Kundip Mine Site and Myamba Mine Site (Figure 1). The Kundip Mine Site is situated approximately 17 km southeast of the town of Ravensthorpe and has a long history of mining, with the site containing both native vegetation and historic mining legacies (see Plates 1-3). The Myamba Mine Site is situated a further 9 km south of the Kundip Mine Site within freehold agricultural land, and is devoid of vegetation. Both sites are accessible from the Hopetoun-Ravensthorpe Road, and would be joined via a 7.5 km overland water pipeline (Figure 4), which runs parallel to the Hopetoun-Ravensthorpe Road corridor and the Kundip Nature Reserve.

The anticipated overall project life of the proposal is approximately seven years in total with a proposed disturbance footprint across both sites of 197 within a 512 ha envelope.

Kundip Mine Site will host open pits, underground operations, waste rock landforms (WRLs), run-of-mine (ROM) pad, processing plant, TSF, water storage facilities, landfill site, office/crib and workshop facilities. The Kundip Mine Site is expected to have a mine life of approximately seven years with a proposed disturbance footprint of 151.8 ha within a 363 ha envelope.

The Myamba Mine Site, will host a single open pit (Trilogy oxide pit), evaporation pond, WRL, ROM pad and office and workshop facilities. The existing exploration offices at the site will host additional support facilities. The ore at this site is proposed to be mined within two years, this will be mined consecutively with Kundip. The Myamba mine site will have a proposed disturbance footprint of 45.2 ha, within a 149 ha envelope.

The RGP is a revised proposal of the previously approved Phillips River Project (Ministerial Statement 716). There are a number of Project changes that have occurred during the planning stages of the RGP that have resulted in some key differences between the Phillips River Proposal and the RGP. In the first instance, processing will be contained within the Kundip Mine Site, negating the requirement for a haul road to traverse the adjacent proposed Nature Reserve, as was previously planned in the Phillips River Proposal. In addition, mining and processing of gold bearing ore will be focussed on proposed open-pits and underground deposits at Kundip Mine Site for an initial duration of seven years; and a single, shallower open-pit within cleared pasture at Myamba Mine Site for a duration of two years.

Following closure of the site, it is currently proposed that the Kundip Mine Site will be rehabilitated back to native vegetation (apart from the pits which will remain as voids) and returned to Crown Land. This is in line with the surrounding land uses, including the adjacent Nature Reserve. The Myamba Mine Site will be returned to the pre-existing land use of agricultural pasture (apart from the Trilogy pit which will remain as a permanent pit void), and returned to private land.

2.2 KEY PROPOSAL CHARACTERISTICS

A summary of the proposal is provided in Table 2-1.

The development envelope and indicative footprint of proposed mining activities (elements) is delineated in Figure 2 (Kundip Mine Site), Figure 3 (Myamba Mine Site) and Figure 4 (power and water corridor).

Areas of estimated disturbance are provided in Table 2-2 for physical elements of the Project and Table 2-3 for the operational elements of the Project.

The key proposal characteristics and disturbance areas may change as a result of the findings of future studies and investigations conducted and the application of the mitigation hierarchy by ACH.

Table 2-1: Summary of the Proposal

Proposal Title	Ravensthorpe Gold Project
Proponent Name	ACH Minerals Pty Ltd
Short Description	The proposal is to revise the Phillips River Gold Proposal, located approximately 17 km south-east of Ravensthorpe in the Shire of Ravensthorpe. The proposal involves the development and operation of a gold and copper mine at the Kundip and Myamba sites. The proposal includes mining from multiple open-cut pits and underground, a processing facility, waste rock landforms, a tailings storage facility and associated infrastructure. The Kundip and Myamba sites will be connected via a 7.5 km overland water pipeline that runs parallel to the Hopetoun-Ravensthorpe Road to the west, and Kundip Nature Reserve to the east.

Table 2-2: Location and Proposed Extent of Physical Elements

Element	Location	Approved Project (MS 716)	Amendment (This Proposal)	Proposed Extent (Revised Proposal)
PHYSICAL ELEMENTS				
KUNDIP MINE SITE				
Mine Pit (Kaolin)	Figure 2	Total clearing of up to 110 ha of native vegetation.	**Additional clearing of 41.8 ha** of native vegetation within a development envelope of 363 ha.	Clearing of up to 46.3 ha of native vegetation within a development envelope of 512 ha, mining over a 7 year timeframe.
Mine pit (Hillsborough)				
Mine Pit (Harbour View)				
Mine Pit (Flag)				
Waste Rock Landform	Figure 2			Clearing of up to 40.1 ha of native vegetation within a development envelope of 512 ha.
Tailings Storage Facility	Figure 2			Clearing of up to 21.9 ha of native vegetation within a development envelope of 512 ha.
Site Access Road	Figure 2			Clearing of up to 2.5 ha of native vegetation within a development envelope of 512 ha.
Water pipeline corridor	Figure 4			Clearing of up to 4.7 ha of native vegetation within a development envelope of 512 ha.
Ancillary Support Infrastructure	Figure 2			Clearing of up to 36.3 ha of native vegetation within a development envelope of 512 ha.
MYAMBA MINE SITE				
Mine Pit (Trilogy)	Figure 3	No more than 29 ha of previously cleared land.	No more than an additional **16.2 ha** of previously cleared land within a development envelope of 149 ha.	No more than 7 ha of previously cleared land within a development envelope of 512 ha, mining over a 2 year timeframe. No additional clearing required.
Waste Rock Landform	Figure 3			No more than 4.4 ha of previously cleared land within a development envelope of 512 ha. No additional clearing required.
Site Access Road	Figure 3			No more than 2.7 ha of previously cleared land within a development envelope of 512 ha. No additional clearing required.
Ancillary support infrastructure	Figure 3			No more than 31.1 ha of previously cleared land within a development envelope of 512 ha. No additional clearing required.

Table 2-3: Location and Proposed Extent of Operational Elements

Element	Location	Approved Project (MS 716)	Amendment (This Proposal)	Proposed Extent (Revised Proposal)
OPERATIONAL ELEMENTS				
Pit Dewatering	Figure 2 and Figure 3	Water abstraction of up to 40 ML per annum.	An **additional 20 ML** per annum water extraction.	Up to **60 ML per annum** of Combined water abstraction.
Waste Rock	Figure 2 and Figure 3	9.7 Mt of waste rock to be generated over the life of mine.	An **additional 5.6 Mt** of waste rock to be generated over the life of mine	Up to **15.3 Mt** of waste rock to be generated over the life of mine.
Tailings Storage	Figure 2	No amount specified.	**1500 ML** tailings to be deposited throughout the Life of mine.	**1500 ML** tailings to be deposited throughout the Life of mine.
Power Supply	NA	Supplied via the Hopetoun power grid and diesel generators.	No change.	Supplied via the Hopetoun power grid and diesel generators.
Transport	NA	One truck per hour, seven days a week, via Ravensthorpe Hopetoun Road to Esperance Port or Perth.	20 truck movements per month to Esperance Port or Perth. 12 truck movements per day between sites, via the Ravensthorpe Hopetoun Road.	60 tonne capacity semi-trailers generating approximately 20 truck movements per month to Esperance Port or Perth. 12 truck movements per day between sites, via the Ravensthorpe Hopetoun Road.

3 PRELIMINARY KEY ENVIRONMENTAL FACTORS & REQUIRED WORK

The EPA Chairman's determination for the original proposal was released on 22 March 2017, with the following preliminary key environmental factors identified as relevant for the environmental review:

- Flora and Vegetation;
- Terrestrial Fauna;
- Terrestrial Environmental Quality;
- Hydrological Processes; and
- Inland Waters Environmental Quality.

Table 3-1 outlines the work required for each key environmental factor, taking into consideration comments from other Departments, and contains the following elements for each factor:

- EPA objective;
- Relevant activities – the proposed activities that may have a significant impact on the factor;
- Potential impacts and risks to the factor;
- Required work;
- Relevant policy and guidance – EPA (and other) guidance and policy relevant to the assessment.

Table 3-1: Preliminary Key Environmental Factors and Required Work

FLORA AND VEGETATION	
EPA Objective	To protect flora and vegetation so that biological diversity and ecological integrity are maintained.
Relevant Activities	• Disturbance of up to 151.8 ha within Kundip Mine Site. • Vehicle and/or machinery movements and the movement of ore, topsoil or waste.
Potential Impacts and Risks	• Loss of individuals of Threatened or Priority flora known to occur in the Project area. • Potential impact to Threatened Ecological Communities (TEC's)/Priority Ecological Communities (PEC's) known to occur in the RGP area. • Spread of weeds resulting in the competitive exclusion of native flora and vegetation. • Spread of *Phytophthora cinnamomi* [Dieback] causing the death of a number of species, changing the dynamic of the vegetation which can, in turn, impact other species. • Potential increase in the frequency, extent or intensity of fire events changing the structure of vegetation, which ultimately impacts species richness and diversity. • Direct impacts to native vegetation from clearing and secondary impacts on remaining vegetation immediately adjacent the RGP area. • Broader secondary impacts to vegetation from dust.
Required Work	1. Identify and characterise flora and vegetation within the proposed development envelope through Flora and Vegetation Surveys. Survey areas should include vegetation that may be indirectly impacted to assist in determination of local and regional impacts. For surveys already undertaken, demonstrate alignment with *Technical Guidance Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA, December 2016). 2. Undertake baseline mapping of weed affected areas in any area likely to be directly or indirectly impacted as a result of the proposal. 3. Provide an analysis of flora and vegetation present within the development envelope and also present within the indirect disturbance areas outside of the development envelope. Where relevant, include in this analysis the conservation significance of flora and vegetation in a local and regional context. Analysis of impacts on vegetation to include: – The area (in ha) of each vegetation unit to be impacted (directly and indirectly) in a 'worst case' scenario; – The total area (in ha) of each significant vegetation unit to be impacted (directly and indirectly) in a 'worst case' scenario; and – Identification of vegetation units which may represent a component of threatened or priority ecological communities, including but not limited to, the *Melaleuca* sp. Kundip Heath and *Proteaceae* dominated Kwongkan Shrubland Priority Ecological Communities (PEC). Analysis of impacts on significant flora to include: – Identification of any significant flora present or likely to be present; – The number of plants, and the number of populations of plants and habitat, to be impacted (directly and indirectly) as a result of the

	proposal in a 'worst case' scenario, i.e. if no mitigation measures were taken; – The total number of plants and populations within the local area or study area; and – A summary of the known populations of the species including distribution, number of populations and the number of plants or an estimate of the number of plants in the regional area. 4. Provide tables and figures of the proposed direct impact, or predicted extent of loss, and the predicted indirect impact to flora and vegetation, including but not limited to threatened and/or priority ecological communities, potential groundwater dependent ecosystems, threated flora, priority flora and unnamed or new flora species. 5. Provide figures to identify and display nearby conservation areas (i.e. Kundip Nature Reserve and other DBCA-managed land. 6. Provide a detailed description of the cumulative impacts associated with the proposal on flora and vegetation, including direct impacts from clearing, and indirect impacts such as groundwater drawdown, altered drainage, changes in water quality, spread of weeds, dieback, fragmentation of vegetation, altered fire regime and dust. 7. Discuss and determine significance of potential direct, indirect (such as dust, downstream impacts and weed invasion etc.) and cumulative impacts to flora and vegetation as a result of the proposal at a local and regional level. 8. Discuss management measures, outcomes/objectives sought to ensure residual impacts (direct and indirect) are not greater than predicted. 9. Demonstrate that all practicable measures have been taken to reduce both the area of the proposed disturbance footprint and the development envelope based on progress in the proposal design and understanding of the environmental impacts. 10. Provide a Flora and Vegetation management plan to address significant residual impacts to flora and vegetation. The following should be addressed in the plan: – Invasive species control – control of weeds, in particular through construction of infrastructure, transport and/or entry and exit points, vegetation units considered to have high local significance (e.g. rare units, habitat for conservation significant species) and in areas identified as in 'Excellent condition'; – Monitoring program – to monitor the significant flora and vegetation communities identified; – Management program – develop adaptive management actions to be triggered should monitoring show a decline as a result of implementing the proposal; – Rehabilitation and closure – to address potential indirect impacts persisting after mining has finished (e.g. pit lakes); and – Management of offset (if applicable). 11. Prepare and submit a Dieback management plan addressing Dieback risks, impacts and management strategies. The management plan will include a commitment to update mapping of dieback affected areas at the Kundip Site prior to construction activities commencing. 12. Prepare and submit a Mine Closure Plan (MCP) consistent with DMP and EPA *Guidelines for Preparing Mine Closure Plans* (2015), which includes methodologies and criteria to ensure progressive rehabilitation of disturbed areas with vegetation composed of native species of local provenance.

	13. Demonstrate application of the mitigation hierarchy to avoid and minimise impacts to flora and vegetation. 14. Determine and quantify any significant residual impacts by applying the Residual Impact Model and WA Offset Template in the *WA Environmental Offsets Guidelines*. 15. Where significant residual impacts remain, propose an appropriate offsets package that is consistent with the *WA Environmental Offsets Policy* and *WA Environmental Offsets Guidelines*. Spatial data defining the area of significant residual impacts should also be provided. 16. Demonstrate and document in the ERD how the EPA's objectives for this factor can be met.
Relevant Policy and Guidance	**EPA Policy and Guidance** • EPA (2016) Environmental Factor Guideline – *Flora and Vegetation*. • EPA (2016) Environmental Impact Assessment (Part IV Divisions 1 and 2) *Administrative Procedures 2016*. • EPA (2016) Environmental Impact Assessment (Part IV Divisions 1 and 2) *Procedures Manual 2016*. • EPA (2016) *Statement of Environmental Principles, Factors and Objectives*. **Other Policy and Guidance** • EPA (2016) *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment*. • EPA (2013) Environmental Protection Bulletin No. 20: *Protection of Naturally Vegetated Areas through Planning and Development*. • EPA (2006) *Rehabilitation of Terrestrial Ecosystems – Guidance for the assessment of Environmental Factors (GS 6).* • Government of Western Australia (2011) *WA Environmental Offsets Policy.* • Government of Western Australia (2014) *WA Environmental Offsets Guidelines.* • DoEE. How to use the Offsets Assessment Guide: http://www.environment.gov.au/system/files/resources/12630bb4-2c10-4c8e-815f-2d7862bf87e7/files/offsets-how-use.pdf. • DMP and EPA (2015) *Guidelines for Preparing Mine Closure Plans*. • DPaW, Relevant policy and guidelines relating to management of Phytophthora (Dieback) and invasive weeds.
TERRESTRIAL FAUNA	
EPA Objective	To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.
Relevant Activities	• Clearing of native vegetation for construction. • Presence and movement of vehicles, plant and machinery. • Domestic waste generation. • Light emissions from 24-hour processing activities. • Noise emissions from drill and blast activities. • General mining related activities. • Tailings storage management.
Potential Impacts and Risks	• Direct clearing of fauna habitat: – Up to 151.8 ha is proposed to be disturbed within the Kundip Mine Site. • An expected low risk of changed fire regimes, caused by an increase in spot fires started by the operation of heavy machinery and equipment, may reduce the amount of habitat available to fauna. • Impacts on fauna from habitat fragmentation.

	• Indirect impacts to fauna from dust. Increased dust generation may impact vegetation adjacent to unsealed roads and mining operations, reducing the value of habitat in these areas. • A loss of individuals as a result of an increased number of predators attracted by waste generated from crib room etc. • Loss of individuals of fauna species that are conservation dependent. • Impacts to fauna from 24-hour light emissions. Constant light emitted from 24-hour mining operations (i.e. processing activities), has the potential to impact upon nocturnal fauna species by deterring them from using habitats adjacent to operations that would normally be available to them. • Impacts to fauna from noise emissions (i.e. drill and blast activities). The greatest impacts from noise are sudden, sharp and stochastic noise events (i.e. blasting), rather than constant noise (i.e. processing plant operations). These noise events may have a short, but potentially measurable, impact on fauna activity. • Impacts to fauna from exposure to cyanide present in TSF.
Required Work	17. Provide a desktop review and analysis of all surveys of the proposal area undertaken, in accordance with EPA policy and guidance. The study should include: – a justification of how those surveys are relevant and representative of the development envelope and if they were carried out using methods consistent with the EPA guidance; and – a comprehensive listing of vertebrate fauna and SRE invertebrate fauna known or likely to occur in the habitats present, and identification of conservation significant fauna species likely to occur in the area. 18. Conduct Level 2 terrestrial fauna and SRE invertebrate surveys in areas that are likely to be directly or indirectly impacted as a result of the proposal. Surveys are to be undertaken in accordance with EPA policy and, where available, species-specific survey guidelines for relevant species listed under the *Wildlife Conservation Act 1950* and the *Environment Protection Biodiversity Conservation Act 1999*. 19. Conduct targeted surveys for conservation significant fauna that are known to or likely to occupy habitats in the project area if demonstrated to be required based on the results of the desktop study and field surveys. 20. For each relevant conservation significant species, including SREs, identified as likely to occur within the proposal area, provide: – Baseline information on distribution (including known occurrences), ecology, and habitat preferences at both the site and regional levels; – Size and the importance of the population from a local and regional perspective and potential percentage loss of the conservation significant species locally due to loss of habitat; and – Maps illustrating the known recorded locations of conservation significant species and SRE invertebrates in relation to fauna habitat and the proposed disturbance and areas to be impacted. 21. Identify the fauna habitat types within and outside the areas of impact. Consider habitat types that provide important ecological function within the proposal area (e.g. geological features which may support unique ecosystems) and the conservation value of each habitat type from a local and regional perspective. 22. Assess the extent of direct and indirect disturbance, including percentages of habitat types to be distributed or otherwise impacted, to assist in determination of significance of impacts. Information, including maps, must also differentiate habitat on the basis of use e.g. breeding habitat,

	migration pathways, and foraging/feeding/dispersal habitat. Consider whether the remaining habitat has adequate carrying capacity. 23. Describe and assess the significance of the potential direct, indirect (including downstream) and cumulative impacts as a result of the proposal on terrestrial fauna at a local and regional scale. 24. For all conservation significant species that are not likely to be impacted by the proposed action, but for which suitable habitat is present which could be impacted by the proposed action, include enough information to demonstrate that an impact on the species will not or is unlikely to occur. 25. Outline the impacts, management and mitigation for conservation significant fauna, including: – Strategies to increase black cockatoo feeding and breeding habitat; and – Habitat requirements of the *Dasyornis longirostris* (Western Bristlebird, VU) and the potential for impact on this species locally. 26. Demonstrate application of the mitigation hierarchy to avoid and minimise impacts to terrestrial fauna. 27. Develop and present a Fauna Management Plan that includes: – Management measures to protect birds and other fauna from being exposed to cyanide from the TSF. Measures must be technically and practically feasible; and – Describe management measures and monitoring to be undertaken (in terms of the mitigation hierarchy) to achieve predicted outcomes. Measures must be technically and practically feasible. 28. Discuss the management and mitigation measures, outcomes/objectives sought to ensure direct and indirect residual impacts (following management and rehabilitation actions) are not greater than predicted. 29. Prepare a MCP consistent with the *Guidelines for Preparing Mine Closure Plans* (DMP and EPA, 2015), which addresses the need for progressive rehabilitation of habitat for conservation significant species. 30. Predict the inherent and residual impacts before and after applying the mitigation hierarchy. 31. Describe proposed monitoring and management (in terms of the mitigation hierarchy) to achieve the predicted outcomes/objectives. 32. Determine and quantify any significant residual impacts by applying the Residual Impact Model and WA Offset template in the *WA Environmental Offsets Guidelines.* 33. Where significant residual impacts remain, propose an appropriate offsets package that is consistent with the *WA Environmental Offsets Policy* and *WA Environmental Offsets Guidelines*. Spatial data defining the area of significant residual impacts should also be provided. 34. Demonstrate and document in the ESD how the EPA's objectives for this factor can be met.
Relevant Policy and Guidance	**EPA Policy and Guidance** • EPA (2016) Environmental Factor Guideline – *Terrestrial Fauna*. • EPA (2016) Environmental Impact Assessment (Part IV Divisions 1 and 2) *Administrative Procedures 2016*. • EPA (2016) Environmental Impact Assessment (Part IV Divisions 1 and 2) *Procedures Manual 2016*. • EPA (2016) *Statement of Environmental Principles, Factors and Objectives*. **Other Policy and Guidance** • EPA (2016) Technical guidance – *Terrestrial Fauna Surveys*.

	• EPA (2016) Technical guidance – *Sampling of short range endemic invertebrate fauna.* • Government of Western Australia (2011) *WA Environmental Offsets Policy*. • Government of Western Australia (2014) *WA Environmental Offsets Guidelines*. • DoEE. How to use the Offsets Assessment Guide: http://www.environment.gov.au/system/files/resources/12630bb4-2c10-4c8e-815f-2d7862bf87e7/files/offsets-how-use.pdf. • International Cyanide Management Institute (2002) International Cyanide Management Code
TERRESTRIAL ENVIRONMENTAL QUALITY	
EPA Objective	To maintain the quality of land and soils so that the environmental values are protected.
Relevant Activities	• Mining and disposal of potentially acid forming (PAF) materials. • Deposition of tailings. • Management of sodic and dispersive materials. • Servicing of mechanical equipment. • Storage and disposal of hydrocarbons and dangerous goods. • Domestic waste disposal.
Potential Impacts and Risks	• Contamination by hydrocarbons and dangerous goods may arise from inappropriate storage and management of such materials. Potential impacts include contamination of soils, surface water or groundwater, and adverse effects to faunal habitats. • Acid and metalliferous drainage (AMD) from inappropriately contained PAF and mineralised materials. AMD could potentially leach bioavailable forms of Cu, Pb and other elements from the soil/waste rock. • Leachate from the TSF potentially contaminating soils. • Contamination by inappropriate handling and disposal of general domestic (non-mining) waste including but not limited to: – Putrescibles, plastics, glass and aluminium from the office and crib room facilities; – General litter from human presence; – Paper and cardboard from office and crib activities; – Incidental tyres; – Hydrocarbon wastes, in particularly waste oil; – Laboratory wastes; – Packaging wastes; and – Sewage related wastes.
Required Work	35. Identify proposed activities which have the potential to adversely impact on terrestrial environmental quality. 36. Include rationale for site selection of key landforms such as WRL and TSF (i.e. favourable meteorological, geological and geographical characteristics). 37. Present a baseline soil quality assessment of the Development Envelope. 38. Include in the ERD, figures of the mapped soil units. 39. Conduct long term (1000 years) Landform Evolution Modelling of behaviour and performance of landforms associated with containment systems including TSFs, modelled under a range of climatic events. Include the modelling of the appropriate Probable Maximum Precipitation (PMP) and associated Probable Maximum Flood (PMF) scenarios.

	40. Conduct chemical and physical characterisation of the waste materials, including characterisation of tailings pore water or leachate. 41. Identify for each tailings stream: – Geochemical properties, including acid forming potential; and – Any issues with drainage and tailings consolidation. 42. Undertake appropriate leaching tests on non-PAF wastes to assess the potential to release metals and metalloids to environmental receptors. Appropriate leaching tests include those in the US EPA Leaching Environmental Assessment Framework (LEAF) or sequential extraction tests. 43. Investigate the content and potential mobility of mercury in regolith and waste rock materials at the Ravensthorpe deposits. Investigate the potential for metallic mercury accumulations to occur near the water table on site, and if present, assess the risk for mercury to vaporise and impact nearby wildlife and vegetation. Determine whether a Mercury Management Plan is required. 44. Demonstrate conformance with internationally recognised design criteria for TSF design. Include a conceptual design of the TSF should ensure long-term encapsulation of tailings/wastes that reduced any risks to the environment and environmental values to an acceptable level, noting that more detailed reports will be provided to the DMIRS as part of the Mining Proposal. 45. Provide a graphical conceptual representation of the final TSF. 46. Design an encapsulation zone within the WRL if required, sufficient to contain the volume of materials anticipated. 47. Ascertain the current severity and extent of cyanide contamination potentially occurring from the historic heap leach facility at Kundip Mine Site. Soil samples will be collected from around the facility and tested for contaminants. If deemed necessary, the material of the historic heap leach will be reprocessed, and the resultant tailings disposed of within the proposed engineered TSF. 48. Undertake geotechnical assessment of the TSF area to determine the stability, geochemical characteristics and permeability of the TSF base material. 49. Determine if the TSF is likely to be listed as a contaminated site under the *Contaminated Sites Act 2003* (WA). 50. Demonstrate application of the mitigation hierarchy to avoid and minimise impacts to Terrestrial Environmental Quality. 51. Predict the inherent and residual impacts on terrestrial environmental quality before and after applying the mitigation hierarchy. In predicting impacts of the proposal, both direct and indirect impacts to terrestrial environmental quality will be considered. 52. Describe management measures (in terms of the mitigation hierarchy) to achieve predicted outcomes, and develop a monitoring plan for incorporation into the ERD. 53. Prepare a MCP consistent with the *Guidelines for Preparing Mine Closure Plans* (DMP and EPA, 2015), which addresses the development of completion criteria to maintain the quality of land and soils. 54. Outline the outcomes/objectives, trigger and contingency actions to ensure impacts (direct and indirect) are not greater than predicted. 55. Demonstrate and document in the ERD how the EPA's objectives for this factor can be met.

Relevant Policy and Guidance	**EPA Policy and Guidance** • EPA (2016) Environmental Factor Guideline – *Terrestrial Environmental Quality*. • EPA (2016) *Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures 2016*. • EPA (2016) *Environmental Impact Assessment (Part IV Divisions 1 and 2) Procedures Manual 2016*. • EPA (2016) *Statement of Environmental Principles, Factors and Objectives*. **Other Policy and Guidance** • EPA (2006) *Guidance Statement No. 6: Rehabilitation of Terrestrial Ecosystems*. • DER (2014) *Assessment and Management of Contaminated Sites – Contaminated Sites Guidelines*. • DER (2015) *Notification of waste discharges – Reporting requirements and responsibilities for notifications under the Environmental Protection Act 1986*. • DER (2016) *Environmental Standards for Part V, Division 3 Environmental Protection Act 1986*. • DER (2017) *Decision Making - Part V, Division 3 Environmental Protection Act 1986.* • DER (2016) *Environmental Siting - Part V, Division 3 Environmental Protection Act 1986*. • DER (2017) *Risk Assessments - Part V, Division 3 Environmental Protection Act 1986*. • DMP (2015) *Guide to Departmental requirements for the management and closure of tailings storage facilities (TSFs)*.
HYDROLOGICAL PROCESSES	
EPA Objective	To maintain the hydrological regimes of groundwater and surface water so that environmental values are protected.
Relevant Activities	• Construction of proposed landforms including: – Mine pits; – WRLs; – ROM pads; – TSF; and – Evaporation pond. • RGP proposed activities including: – Pit dewatering; – Surface water diversion; and – Mining/Processing activities including disposal of water at the evaporation pond and tailings deposition.
Potential Impacts and Risks	• Alteration of local drainage patterns through the construction of landforms such as mine pits, WRL's, ROM pads, a TSF and an evaporation pond. Potential impacts may include: – Reduced stability of soils; – Increasing erosion and transport of unstable sediments with surface water flows; and – Impacts on vegetation downstream of diversion structures and key landforms. • Altered groundwater levels: – Dewatering from open pits (Kaolin, Harbour View and Flag) at the Kundip Mine Site, plus dewatering from the Trilogy oxide pit (Myamba Mine Site) will results in a short term decrease in groundwater levels

	or a 'cone of depression' surrounding open pits. At the completion of mining these pits are expected to operate as groundwater sinks (to be confirmed by further investigation). Impacts to groundwater levels will be localised and restricted to no more than a 500 m down-gradient due to low permeability of rocks and mineralised zones in the RGP area. • Disruption of groundwater flow: – Open mine pits (that intersect groundwater) will disrupt local groundwater flows, however, these impacts are considered to be insignificant at a regional scale due to the low permeability of the surrounding country rock.
Required Work	56. Utilise existing knowledge of surface water flow characteristics in the Project area to support a future desktop investigation confirming the number and location of surface water diversion structures required to divert flows around all proposed landforms. 57. Characterise the baseline hydrological and hydrogeological regimes, both in a local and regional context, including, but not limited to, water levels, water chemistry (as it related to groundwater hydrology), stream flows, flood patterns, and water quantity and quality. This is to include a detailed description of the geological framework within the zone impacted by groundwater abstraction and any interdependence between surface and groundwater features/bodies. 58. Provide a detailed description of the design and location of the proposal elements with the potential to impact surface water or groundwater, including proposed waterway diversion. 59. Provide a detailed description of any investigations undertaken to determine potential impacts of proposed abstraction on the aquifer, environment and surrounding users (e.g. investigations via drilling of production and monitoring bores, test pumping, geophysical logging and chemical analysis of groundwater). 60. Provide a conceptual model of the surface and groundwater systems incorporating the results of monitoring conducted, including the extent of connectivity between surface and groundwater systems. 61. Discuss the potential environmental impacts and benefits of identified surplus water management options (i.e. discharge of excess mine dewater, reuse on site, local water supply, aquifer recharge etc.) and discuss the most appropriate water management strategy for the proposal. 62. Analyse, discuss and assess surface water impacts. The analysis should include but not be limited to, changes in groundwater levels and changes to surface water flows associated with the proposal; 63. Model the impact of different flooding scenarios during operations and post-closure on infrastructure and final landforms. 64. Investigate groundwater drawdown due to groundwater abstraction associated with the proposal. Analyse, discuss and assess surface water and groundwater impacts. The analysis should include: – Changes in groundwater levels and changes to surface water flows associated with the proposal; – The nature, extent and duration of impacts; and – Cumulative impacts with other projects and referred proposals, for which relevant information is publicly available. 65. Predict the inherent and residual impacts on hydrological processes before and after applying the mitigation hierarchy. In predicting impacts of the proposal both direct and indirect impacts will be considered.

	66. Demonstrate application of the mitigation hierarchy to avoid and minimise impacts to Hydrological Processes. 67. Prepare a MCP consistent with the *Guidelines for Preparing Mine Closure Plans* (DMP and EPA, 2015), which addresses the development of completion criteria to maintain the hydrological regimes of groundwater and surface water so that environmental values are maintained post closure. 68. Provide a description of monitoring, management, closure and rehabilitation arrangements. 69. Outline the outcomes/objectives, trigger and contingency actions to ensure (direct and indirect) are not greater than predicted. 70. Demonstrate and document in the ERD how the EPA's objectives for this factor can be met.
Relevant Policy and Guidance	**EPA Policy and Guidance** • EPA (2016) Environmental Factor Guideline – *Hydrological Processes*. • EPA (2016) Environmental Impact Assessment (Part IV Divisions 1 and 2) *Administrative Procedures 2016*. • EPA (2016) Environmental Impact Assessment (Part IV Divisions 1 and 2) *Procedures Manual 2016*. • EPA (2016) *Statement of Environmental Principles, Factors and Objectives*. **Other Policy and Guidance** • DoW (2013) *Western Australian water in mining guideline*. Report no.12. Government of Western Australia. • DoW (2011) *Operational Policy 5.08 - Use of operating strategies in the water licensing process*. Government of Western Australia.
INLAND WATERS ENVIRONMENTAL QUALITY	
EPA Objective	To maintain the quality of groundwater and surface water so that environmental values are protected.
Relevant Activities	• Construction of proposed landforms including: – Mine pits; – WRLs; – TSF; and – Evaporation pond. • RGP proposed activities including: – Pit dewatering; – Surface water diversion; and – Mining/Processing activities.
Potential Impacts and Risks	**Potential impacts and risks to surface water quality** • Alteration of local drainage patterns through the construction of landforms. Potential impacts may include: – Reduced stability of soils; and – Increasing erosion and transport of unstable sediments with surface water flows, • Impact to the surface water quality of downstream waterways. **Potential impacts and risks to ground water quality** • Salinisation of groundwater: – There is potential for saline groundwater to have an adverse effect on the surrounding environment. If, however, mine dewater is used preferentially in processing, conservatively for dust suppression, and any excess water is stored in the Kundip Mine Site water storage facility

	or the Myamba Mine Site evaporation pond, impacts from salinity are expected to be negligible. • Contamination of groundwater: – There is potential for adverse impacts to groundwater quality from spillage of hydrocarbons and chemicals during mine operation and subsequent seepage to the groundwater table. There is also potential for AMD and mobilisation of metals to groundwater if PAF and other mineralised materials are not contained appropriately. – Impact to groundwater quality has the potential to occur through seepage of leachate from the TSF. Tailings and tails supernatant water will require suitable containment.
Required Work	71. Sample water quality of surface waterways/ponds downstream of the historic heap leach facility at Kundip Mine Site. 72. Characterise the baseline surface water, groundwater quality and quantity, both in a local and regional context, including but not limited to, water levels, water chemistry, spring and stream flows, flood patterns, catchment boundaries. This is to include a detailed description of the geological framework within the zone to be impacted by groundwater abstraction and any interdependence between surface and groundwater features/bodies. Include, where relevant influences on water availability. 73. Provide a detailed description of the design and location of the proposal elements with the potential to impact surface water and groundwater quality, including but not limited to, utilisation and storage of chemicals and/or hydrocarbons. 74. Identify a suitable water source and discuss the potential direct and indirect impacts. Identify contingency options and discuss the impact of each option. 75. Provide a conceptual mine water balance over the life of the proposal and discuss the capacity to reuse surplus mine dewater. 76. Document any potential pathways for contamination to occur, including but not limited to, dust from the Run-of-Mine pad, operational leaks and spills, seeping of tailings water, failure of TSF integrity, seepage or overflow from decant and evaporation ponds, drainage from and erosion of WRL surfaces and contamination from the final void pit lake. 77. Provide an assessment on the physical and chemical characteristics of the proposed WRL and pit lake. 78. Provide an assessment of the potential for impacts on downstream aquatic fauna from tailings storage leachate, contamination and salinity changes. 79. Undertake a pit lake risk assessment to determine the potential impact to hydrological processes and surface water from Acid and/or Metalliferous Drainage (AMD). 80. Analyse, discuss and assess surface water and groundwater impacts. The analysis should include but not be limited to: – Changes in groundwater levels and changes to surface water flows associated with the proposal; – The nature, extent and duration of impacts; – The impact of changing water quality or sources on environmental values; and – Cumulative impacts with other projects and referred proposals, for which relevant information is publicly available. 81. Analyse, discuss implications of water filled pit lakes on values (particularly biological) both directly and in the surrounding environment.

	82. Demonstrate application of the mitigation hierarchy to avoid and minimise impacts to Inland Waters Environmental Quality. 83. Prepare a MCP consistent with the *Guidelines for Preparing Mine Closure Plans* (DMP and EPA, 2015), which addresses the development of completion criteria to maintain the quality of groundwater and surface water, and management or removal of artificial sources (i.e. pit lakes), so that environmental values are maintained post closure. 84. Provide a description of monitoring, management, closure and rehabilitation arrangements. 85. Outline the outcomes/objectives, trigger and contingency actions to ensure impacts (direct and indirect) are not greater than predicted. 86. Demonstrate and document in the ERD how the EPA's objectives for this factor can be met.
Relevant Policy and Guidance	**EPA Policy and Guidance** • EPA (2016) Environmental Factor Guideline – *Inland Water Environmental Quality*. • EPA (2016) Environmental Impact Assessment (Part IV Divisions 1 and 2) *Administrative Procedures 2016*. • EPA (2016) Environmental Impact Assessment (Part IV Divisions 1 and 2) *Procedures Manual 2016*. • EPA (2016) *Statement of Environmental Principles, Factors and Objectives*. **Other Policy and Guidance** • DoW (2013) *Western Australian water in mining guideline. Report no.12*. Government of Western Australia. • DoW (2011) *Operational Policy 5.08 - Use of operating strategies in the water licensing process*. Government of Western Australia.

4 OTHER ENVIRONMENTAL FACTORS OR MATTERS

The EPA has identified the following other environmental factors or matters relevant to the proposal that must be addressed during the environmental review and discussed in the ERD:

1. Social Surroundings:

- Consider the impacts of the RGP on social surroundings.
- Provide a description of Tourism assets (e.g. Kundip Nature Reserve) and impacts to visual amenity from the proposal, as well as any proposed avoidance and mitigation measures.
- Provide details regarding the movement of all processed materials offsite. Include the proposed trucking route and port access. Describe any measures or monitoring arrangements that are proposed to mitigate impacts from dust generation.

2. Air Quality:

- Identify potential sources of air quality impacts.
- Determine the nature, extent and duration of impacts.
- Characterise sources of greenhouse gas emissions from the proposal and estimate the expected direct and indirect greenhouse gas emissions in accordance with the *National Greenhouse and Energy Reporting Act 2007*.

- Analyse the intensity of greenhouse gas emissions (i.e. quantify the Carbon Dioxide generated per tonne of product produced) and compare with published benchmarked practice for equivalent operations.
- Demonstrate application of the mitigation hierarchy to avoid or minimise impacts to air quality.

3. Subterranean Fauna:

- A desktop assessment of subterranean fauna will be included in the ERD to determine whether further surveying is required. The desktop assessment will include the following:
  - A search of regional and project/ site specific habitat data, including geological and hydrological information, previous studies of the area (published and unpublished), site photographs and databases including fauna records;
  - A realistic appraisal of the adequacy of the existing data; and
  - Provide regional context, and make conclusions about whether the area is likely to provide habitat for subterranean fauna and consider impacts of the proposal.

It is also important that the proponent be aware that other factors or matters may be identified during the course of the environmental review that were not apparent at the time that this ESD was prepared. If this situation arises, the proponent must consult with the EPA to determine whether these factors and/or matters are to be addressed in the ERD, and if so, to what extent.

5 STAKEHOLDER CONSULTATION

ACH will continue to consult with stakeholders who are affected by, or are interested in the proposal. This includes the decision-making authorities (see section 6), other relevant state (and Commonwealth) government agencies and local government authorities, the local community and interest groups.

This may include consultation with:

- Local Ravensthorpe and Hopetoun residents, groups and organisations; and
- Local Aboriginal families, the Southern Aboriginal Corporation and South West Aboriginal Land and Seas Council.

As well as ongoing consultation with:

- Government Regulators including the Department of Planning, Lands and Heritage (DPLH), DMIRS, DWER and DBCA;
- EPA Services personnel;
- Commonwealth Department of the Environment and Energy (DoEE); and
- Local government and government agencies including the Shire of Ravensthorpe, Main Roads WA, Heritage Council, WA Museum and Water Corporation and any other departments or agencies that have underlying tenure management responsibilities.

ACH will document the following in the ERD:

- Identified stakeholders;
- Stakeholder consultation undertaken and the outcomes of consultation including decision-making authorities' specific regulatory approvals and any adjustments to the proposal as a result of consultation; and
- Any future plans for consultation.

6 DECISION-MAKING AUTHORITIES

At this stage, the following decision-making authorities have been identified for the proposal. Additional DMAs may be identified during the course of the assessment.

Table 6-1: Decision-making authorities

Decision-Making Authority	Relevant Legislation
1. Minister for Environment.	*Wildlife Conservation Act 1950.*
2. Minister for Water.	*Rights in Water and Irrigation Act 1914.*
3. Minister for Mines and Petroleum.	*Mining Act 1978.*
4. Director General, Department of Water and Environmental Regulation.	*Environmental Protection Act 1986* and *Environmental Protection (Clearing of Native Vegetation) Regulations 1974.*
5. Executive Director, Environment Division, Department of Mines, Industry Regulation and Safety	*Mining Act 1978.*
6. Chief Dangerous Goods Officer, Department of Mines, Industry Regulation and Safety.	*Dangerous Goods Safety Act 2004.*
7. State Mining Engineer, Department of Mines, Industry Regulation and Safety.	*Mines Safety and Inspection Act 1994.*
8. Chief Executive Officer, Shire of Ravensthorpe.	*Local Government Act 1995.*

FIGURES AND PLATES

Figure 1: Ravensthorpe Gold Project Location Plan

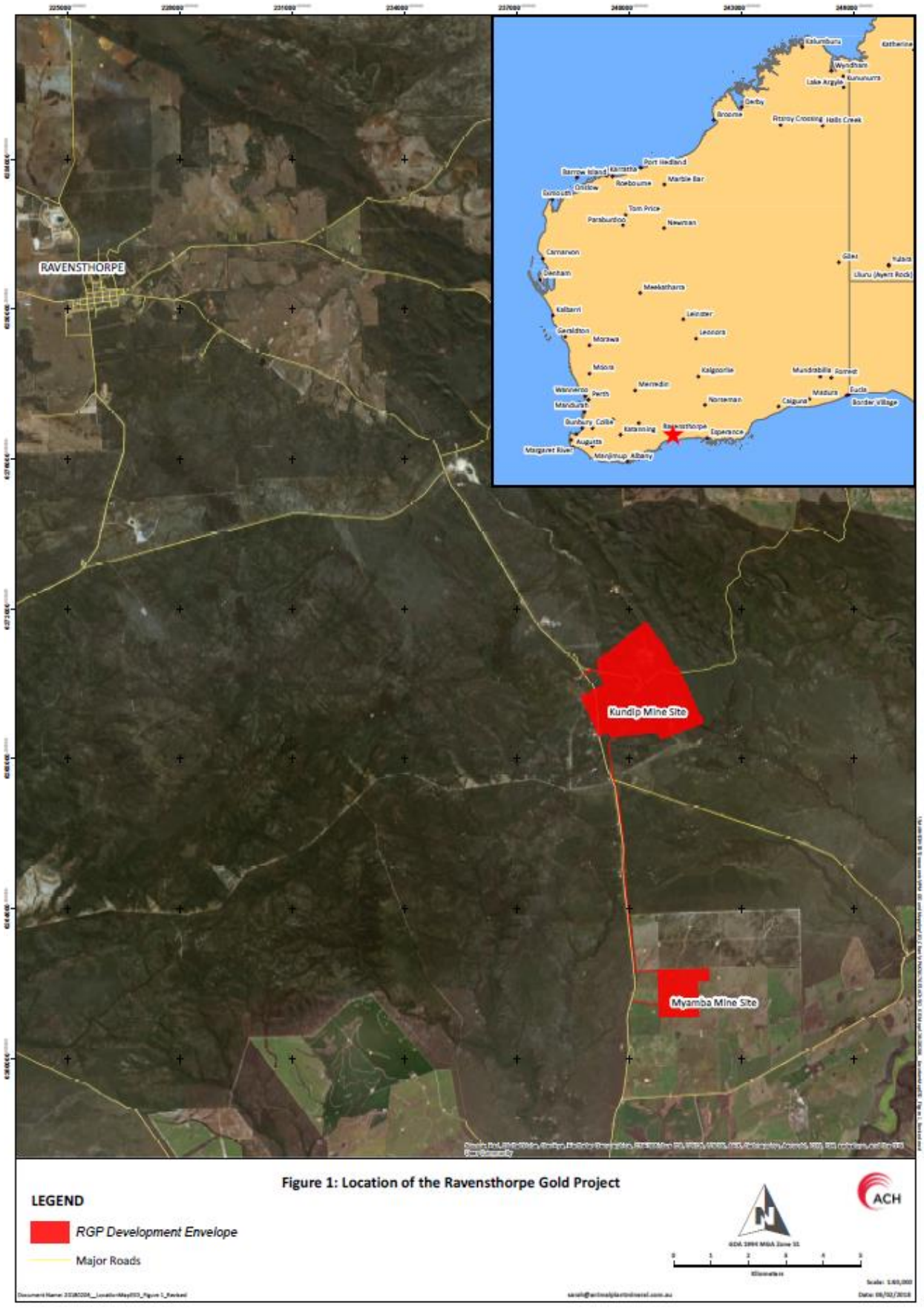

Figure 2: Kundip Mine Site proposed physical and operational elements

Figure 3: Myamba Mine Site proposed physical and operational elements

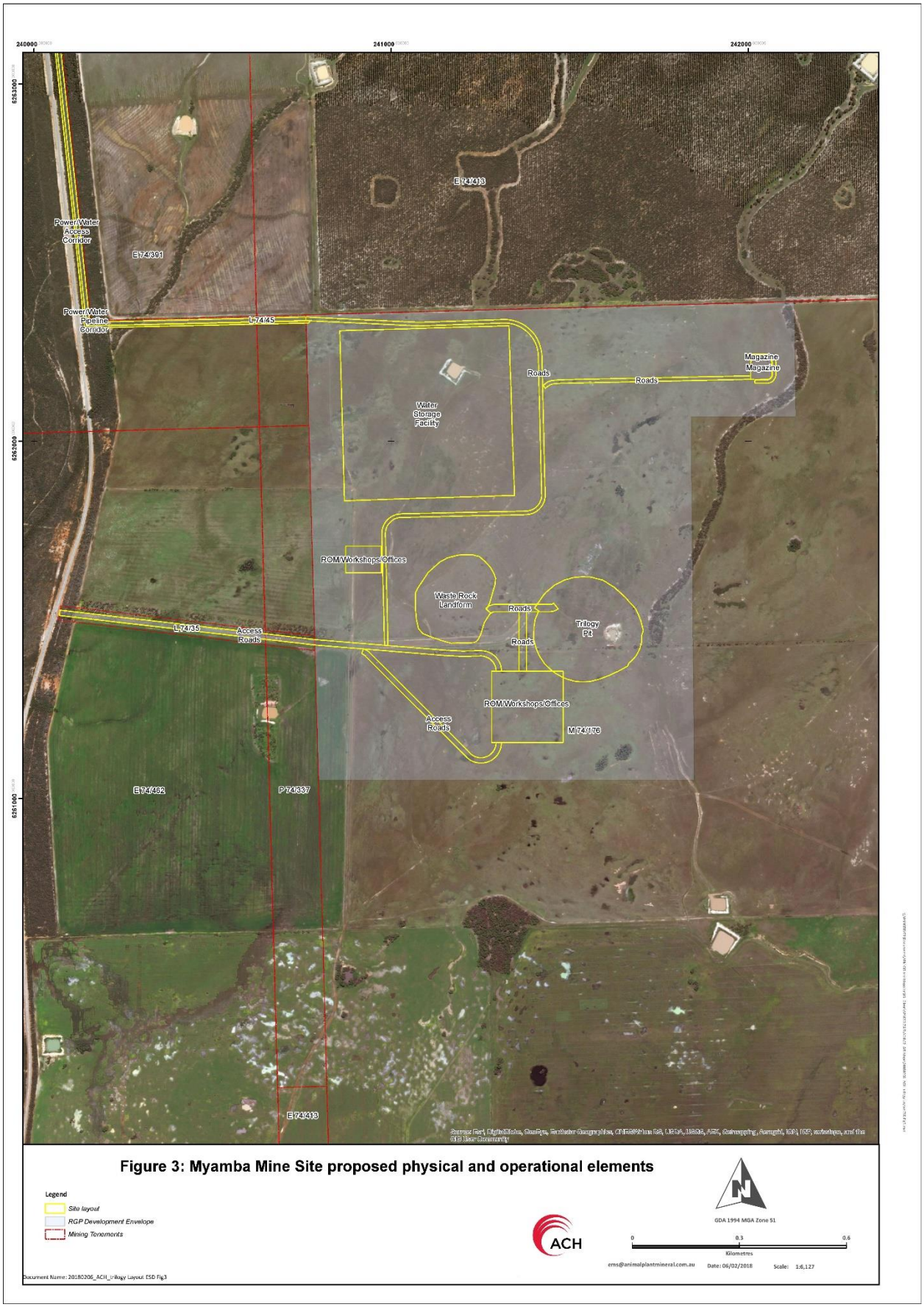

Figure 4: Power and Water Corridor and Access

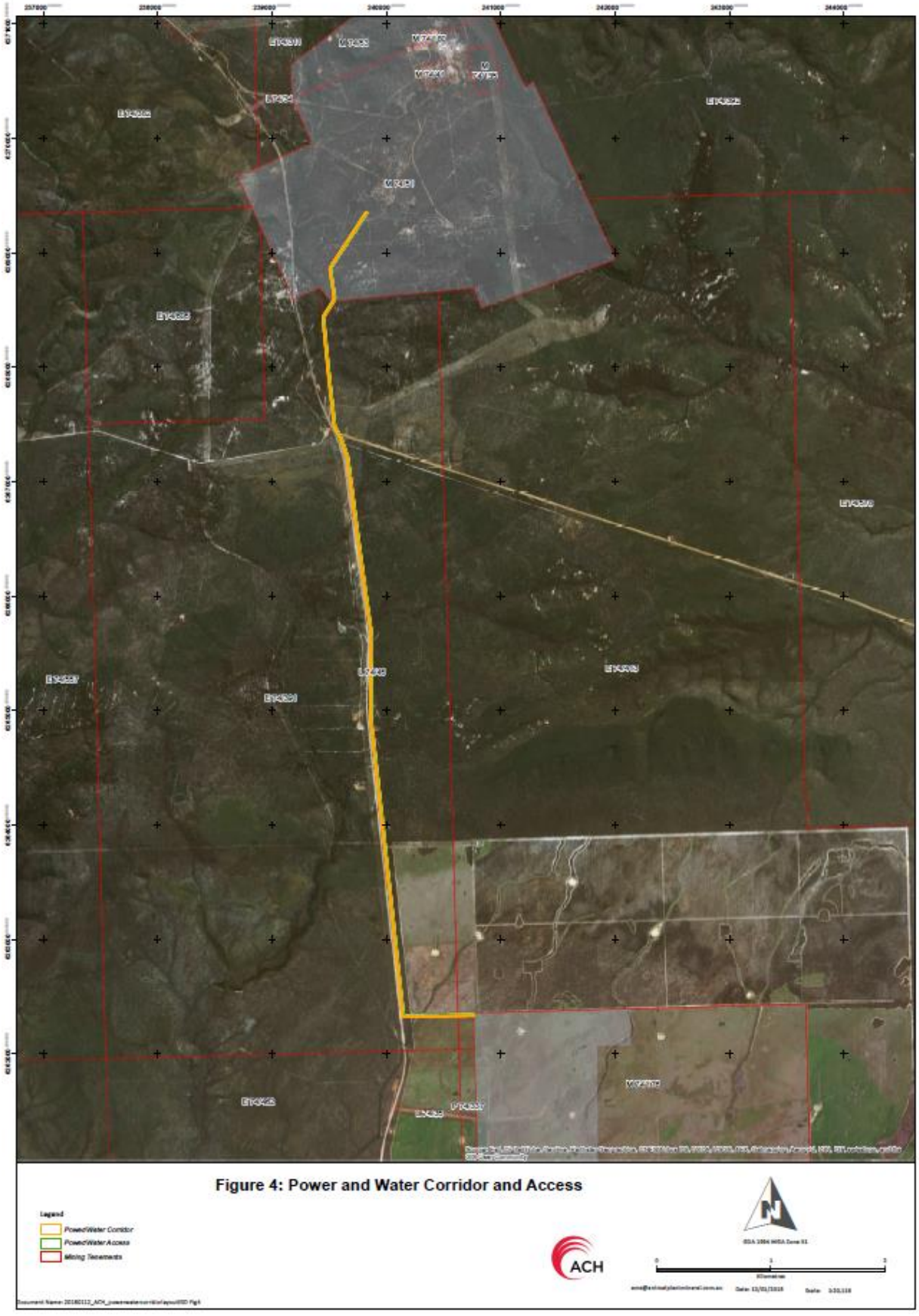

Plate 1: Kundip Mine Site – overlooking Kaolin Pit

Plate 2: Kundip Mine Site – old exploration drill line

Plate 3: Kundip Mine Site – historic shafts

Plate 4: Myamba Mine Site