

Appendix N

Mine development biodiversity assessment report

Biodiversity Assessment Report

McPhillamys Gold Project

Prepared for LFB Resources NL
August 2019

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Biodiversity Assessment Report

McPhillamys Gold Project

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23 August 2019

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Executive Summary

ES1 The project

LFB Resources NL, a 100% owned subsidiary of Regis Resources Limited (Regis), is seeking development consent for the construction and operation of the McPhillamys Gold Project, a greenfield open-cut gold mine and associated water supply pipeline in the Central West region of New South Wales (NSW).

The project for which development consent is sought comprises two key components; the mine site where the ore will be extracted, processed and gold produced for distribution to the market (the mine development), and an associated water pipeline which will enable the supply of water from near Lithgow to the mine site (the pipeline development). The mine development project area (referred to herein as the project area) is approximately 8 kilometres (km) north-east of Blayney, within the Blayney and Cabonne local government areas, and within the Orange sub-region of the former Lachlan Catchment Management Authority (CMA).

EMM Consulting Pty Limited (EMM) was engaged by Regis to prepare a biodiversity assessment for the mine development component of the McPhillamys Gold Project. The potential impacts on biodiversity associated with the pipeline development component are addressed in a separate study by OzArk Environment and Heritage (refer to Appendix Y of the Environment Impact Statement for the McPhillamys Gold Project). For the purposes of this report, the mine development component, to which this assessment applies, is referred to as the project.

ES2 Ecological values

Field surveys revealed that vegetation within the mine site, which has experienced historic pastoral use, mainly comprises open paddocks with some fragmented patches of timbered natural vegetation scattered throughout. Field surveys also recorded four native plant community types (PCT), comprising:

- Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion (PCT 1330);
- Broad-leaved Peppermint – Brittle Gum – Red Stringybark dry open forest of the South Eastern Highlands Bioregion (PCT 727);
- Mountain Gum – Manna Gum open forest of the South Eastern Highlands Bioregion (PCT 951); and
- Carex sedgeland of the slopes and tablelands (PCT 766).

All native plant community types recorded were in moderate to good condition in accordance with the *Framework for Biodiversity Assessment* (FBA) (OEH 2014a) but varied from higher condition patches to poor condition patches within this classification.

One PCT, Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion, represents White Box Yellow Box Blakely's Red Gum Woodland, is listed as an endangered ecological community (EEC) under the NSW *Biodiversity Conservation Act 2016*. Patches of this PCT in moderate/good (high) and moderate/good (medium) condition also represent White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grasslands, which is listed as a critically endangered ecological community (CEEC) under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

A number of ecosystem credit species were predicted to be associated with the PCTs in the project area by the BioBanking Calculator. Two candidate species, comprising the Koala (*Phascolarctos cinereus*) and Squirrel Glider (*Petaurus norfolcensis*) were also recorded in the project area. The Koala is associated with two PCTs across the

site, namely PCT 951 and PCT 1330. PCT 951 contains Manna Gum (*Eucalyptus viminalis*), a primary Koala food tree in the central and southern tablelands Koala management area, in which the project is located. PCT 1330 contains secondary food tree species; Apple Box (*E.bridgesiana*; PCT 1330) and Yellow Box (*E.melliodora*; PCT 1330). The NSW VIS Classification Version 2.1 also lists PCT 727 as containing Brittle Gum (*E. mannifera*); however, this was not noted as being abundant on site. The Squirrel Glider has been associated with all woody communities on site.

Approximately 31.55 hectares (ha) of primary and 44.22 ha of secondary Koala habitat (total of 75.77 ha) and 129.3 ha of Squirrel Glider habitat occurs in the disturbance footprint of the mine development.

Three species listed under the EPBC Act were recorded in the project area. These comprised two species listed as vulnerable (Koala and Superb Parrot *Polytelis swainsonii*) and one migratory species (Latham's Snipe (*Gallinago hardwickii*)). PCTs 727, 951 and 1330 in the project area were assessed against the Koala habitat assessment tool in the EPBC Act referral guidelines for the vulnerable Koala (DoE 2014). With a total score of seven, vegetation in the project area represents Koala habitat, in accordance with the referral guidelines (ie a score greater than five).

One Superb Parrot was recorded directly south of the project area. The breeding range is concentrated on the NSW South Western Slopes and Riverina Bioregions; however, the project area does not occur within any of the three main breeding areas identified by the species recovery plan. The species may occasionally forage in the project area; however, the project area does not comprise habitat critical to the species survival as it does not contain the required vegetation types stated in the species recovery plan and is not considered core breeding habitat.

Latham's Snipe was recorded directly adjacent to the project area. This species breeds in Japan and in far eastern Russia during the northern summer and then migrates to Australia, where it remains for the duration of the northern winter. Latham's Snipe is a non-breeding visitor to south-eastern Australia, that migrates through northern Australia to reach non-breeding areas located further south. Only one site in Australia, Seaford Swamp in Victoria, is recognised as an internationally important wetland for the species (Bamford et al 2008). The internationally important habitat occurs outside the project area.

ES3 Impact avoidance, minimisation and mitigation

Numerous alternative designs have been prepared and evaluated for the mine development. This process has facilitated the development of a considered project design which will efficiently recover a highly valuable resource, while minimising environmental impacts and potential land use conflicts and delivering socio-economic benefits to the local and broader communities. The disturbance footprint originally proposed for the mine development was reduced by 118.8 ha to avoid and minimise biodiversity impacts, particularly impacts to White Box Yellow Box Blakely's Red Gum Woodland EEC and threatened species habitat.

Key avoidance measures implemented by Regis into the project design comprise:

- avoidance of all areas of PCT 1330 Moderate/Good (High) condition within the project area, apart from a small area in the direct footprint of the open cut mine. This area was impossible to avoid due to this being the location of the gold deposit targeted by the project;
- development of a tailings storage facility (TSF) which avoids almost all White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grasslands identified within the TSF investigation area identified in the Preliminary Environmental Assessment (PEA) of the project, resulting in a clearing reduction to that originally proposed of 5.1 ha; and
- purchase of additional land in the north-west of the project area to accommodate a recirculation water storage, minimising impact to White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grasslands EEC in other parts of the project area.

ES4 Biodiversity impacts

Following the implementation of avoidance and minimisation measures, the project will remove 132.36 ha of native vegetation. The project will remove 44.22 ha of vegetation (PCT 1330) that represents White Box Yellow Box Blakely's Red Gum Woodland EEC listed under the NSW BC Act; 18.5 ha of which also represents White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grasslands CEEC listed under the Commonwealth EPBC Act. This represents a 3.9% reduction in White Box Yellow Box Blakely's Red Gum Woodland listed under the BC Act, and a reduction in 1.6% ha of White Box Yellow Box Blakely's Red Gum Woodland CEEC listed under the EPBC Act, within a 5 km buffer of the project area. These impacts will be compensated through the implementation of the project's biodiversity offset strategy.

Three PCTs, comprising retained patches of 1330, 727 and 951 north, south-west and south-east of the disturbance footprint, overlie shallow groundwater ranging from 0 to 20 metres below ground level. Accordingly, these PCTs were identified as opportunistic users of groundwater during times of low rainfall. The extent of groundwater drawdown is predicted to be steep and localised around the void and limited in extent to the project area.

A conservative approach was used in the groundwater assessment (Appendix K of the EIS) to simulate seepage from the TSF. Seepage is predicted to result in a shallower depth to groundwater below and around the TSF and a rise of groundwater toward the ground surface. If this predicted change occurs, it would lead to an increase in the area of terrestrial vegetation that could access groundwater.

As stated above, the TSF is simulated in the groundwater using a conservative approach. The model predicts mounding of the watertable during and post -mining operations. The conservative simulation suggests that without effective seepage interception, seepage from the TSF may flow south-west and south of the TSF. Seepage from the TSF is expected to be contained to the saprolite rock zone and the flow direction will mainly be horizontal. Some seepage that flows south from the TSF and that is not intercepted by the seepage interception system, is expected to flow to the pit due to the large hydraulic gradient between the TSF and the void. Some seepage is predicted to flow in the direction of the Belubula River; however, the distance that the seepage will move over 100 years is approximately 50 m and is contained within the disturbance footprint of the mine.

By the time TSF seepage migrates through the ground and reaches the Belubula River, the seepage water chemistry will mix with groundwater, become diluted along the flow path and will undergo other hydrogeochemical reactions. Dilution calculations were conducted to provide a conservative estimate of the concentration of SO₄, Se, CN-Total, CN-WAD and Al within the saturated saprock, based on the predicted peak seepage rate.

ES5 Biodiversity credits and offset strategy

The project requires 5,927 ecosystem credits to compensate for impacts on native PCTs and ecosystem credit species. In addition to ecosystem credits, the project also requires 1,970 species credits for the Koala and 2,845 species credits for the Squirrel Glider.

Regis will meet this offset obligation through one, or a combination of, the following:

1. purchase and retire credits available on the biodiversity credit register;
2. establishment of a biodiversity stewardship site; or
3. payment into the Biodiversity Conservation Fund.

ES6 Conclusion

This Biodiversity Assessment Report has been prepared in accordance with the FBA, biodiversity-related Environmental Assessment Requirements issued by the Department of Planning and Environment and agency-specific assessment requirements. Regis has carried out annual biodiversity surveys within the mine development project area since acquiring Exploration Licence 5760 in 2012. These surveys have been carried out in parallel with, and have informed the evolution of, the mine development design. This process has ensured the avoidance of biodiversity constraints as far as practicable.

The project requires 5,927 ecosystem credits to compensate for residual impacts on PCTs and their associated threatened species. In addition to ecosystem credits, the project also requires 1,970 species credits for the Koala and 2,845 species credits for the Squirrel Glider. Regis will compensate for these residual impacts through the implementation of a biodiversity offset strategy.

The Biodiversity Assessment Report has also considered impacts on species and ecological communities listed under the EPBC Act. The project is expected to result in significant impacts on White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grasslands and the Koala. As the McPhillamys Gold Project is being assessed in accordance with the bilateral agreement made between the NSW and the Commonwealth under Section 45 of the EPBC Act, impacts on this listed ecological community and species will be compensated through the implementation of the biodiversity offset strategy.

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Glossary

The following definitions and acronyms are used within this report.

Item	Description
ASL	Above Sea Level
BAR	Biodiversity Assessment Report
BC Act	<i>NSW Biodiversity Conservation Act 2016</i>
BCD	Biodiversity and Conservation Division of the Department of Planning, Industry and Environment
BVT	Biometric Vegetation Type
c.	Circa
Core koala habitat	refers to areas of land with a resident population of koalas, evidenced by attributes such as breeding females and recent sightings of and historical records of a population.
Disturbance footprint	The area within the boundary of the proposed gold mining and processing operation
EMM	EMM Consulting Pty Ltd
EP&A Act	<i>Environment Planning and Assessment Act 1979</i> (NSW)
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1995</i> (Commonwealth)
FBA	Framework for Biodiversity Assessment
HBT	Hollow Bearing Tree
Locality	Area located within 20 kilometres radius from the project area
MBGL	Metres below ground level
OEH	Office of Environment and Heritage, now the Biodiversity and Conservation Division of the Department of Planning, Industry and Environment (BCD)
PCT	Plant Community Type
PMST	Protected Matters Search Tool
Potential koala habitat	refers to areas of native vegetation where the trees of the types listed in Schedule 2 of the policy constitute at least 15% of the total number of trees in the upper or lower strata of the tree component.
Regis Resources	LFB Resources NL, a 100% owned subsidiary of Regis Resources Limited (Regis)
SEPP 44	NSW State Environmental Planning Policy No. 44 – Koala Habitat Protection
The project	The proposed gold mining and processing operation known as McPhillamys Gold Project
Weeds and biosecurity	<i>NSW Biosecurity Act 2015</i>

Stage 1 – Biodiversity Assessment

1 Introduction

1.1 Background

LFB Resources NL, a 100% owned subsidiary of Regis Resources Limited (Regis), proposes to develop the McPhillamys Gold Project, a greenfield open cut gold mine and water supply pipeline in Central West NSW. The project application area is illustrated at a regional scale in Figure 1.1.

The McPhillamys Gold Project is a State significant development (SSD) pursuant to the provisions of the State Environmental Planning Policy (State and Regional Development) 2011 (SRD SEPP). Therefore, a development application (DA) for the proposal is required to be submitted to the NSW Department of Planning and Environment under Part 4, Division 4.1 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). An environmental impact statement (EIS) is required to identify and assess potential environmental, social and economic impacts and benefits of the proposal.

The project for which development consent is sought comprises two key components; the mine site where the ore will be extracted, processed and gold produced for distribution to the market (the mine development), and an associated water pipeline which will enable the supply of water from near Lithgow to the mine site (the pipeline development). The mine development project area (referred to herein as the project area) is approximately 8 kilometres (km) north-east of Blayney, within the Blayney and Cabonne local government areas, and within the Orange sub-region of the former Lachlan Catchment Management Authority (CMA).

EMM Consulting Pty Limited (EMM) was engaged by Regis to prepare a biodiversity assessment for the mine development component of the McPhillamys Gold Project. The potential impacts on biodiversity associated with the pipeline development are addressed in a separate study by OzArk Environment and Heritage (refer to Appendix Y of the Environment Impact Statement for the McPhillamys Gold Project). For the purposes of this report, the mine development component to which this assessment applies, is referred to as the project.

This biodiversity assessment report (BAR) supports the EIS and has been prepared to assess the impacts of the mine development on biodiversity and to identify measures to avoid, mitigate and/or offset any potential impacts. The biodiversity assessment is subject to the Biodiversity Conservation (Savings and Transitional) Regulation 2017. As such, this report has been prepared in accordance with the *Framework for Biodiversity Assessment* (FBA, OEH 2014a). It follows the required format prescribed by Appendix 7 of the FBA and includes the calculation of credit requirements to compensate for the project's impacts that cannot be avoided or minimised.

1.2 Development proposal

The mine development project area boundary is illustrated in Figure 1.2 and covers the mining lease application area for the project as well as the parts of the project that do not require a mining lease.

A full project description is provided in Chapter 2 of the EIS (EMM 2019). The key components of the McPhillamys Gold Project comprise:

- Development and operation of an open cut gold mine, comprising approximately one to two years of construction, approximately 10 years of mining and processing and a closure period (including the final rehabilitation phase) of approximately three to four years, noting there may be some overlap of these phases. The total project life for which approval is sought is 15 years.
- Development and operation of a single circular open cut mine with a maximum diameter of approximately 1,050 metres (m) and a final depth of approximately 460 m, developed by conventional open cut mining

methods encompassing drill, blast, load and haul operations. Up to 8.5 Million tonnes per annum (Mtpa) of ore will be extracted during the project life.

- Construction and use of a conventional carbon-in-leach processing facility with an approximate processing rate of 7 Mtpa to produce approximately 200,000 ounces, and up to 250,000 ounces, per annum of product gold. The processing facility will comprise a run-of-mine (ROM) pad and crushing, grinding, gravity, leaching, gold recovery, tailings thickening, cyanide destruction and tailings management circuits. Product gold will be taken off-site to customers via road transport.
- Placement of waste rock into a waste rock emplacement which will include encapsulation of material with the potential to produce a low pH leachate. A portion of the waste rock emplacement will be constructed and rehabilitated early in the project to act as an amenity bund.
- Construction and use of an engineered tailings storage facility to store tailings material.
- Construction and operation of associated mine infrastructure including:
 - administration buildings and bathhouse;
 - workshop and stores facilities, including associated plant parking, laydown and hardstand areas, vehicle washdown facilities, and fuel and lubricant storage;
 - internal road network;
 - explosives magazine and ammonium nitrate emulsion storage facilities;
 - topsoil, subsoil and capping stockpiles;
 - ancillary facilities, including fences, access roads, car parking areas and communications infrastructure; and
 - on-site laboratory.
- Establishment and use of a site access road and intersection with the Mid Western Highway.
- Construction and operation of water management infrastructure, including water storages, clean water and process water diversions and sediment control infrastructure.
- A peak construction workforce of approximately 710 full-time equivalent (FTE) workers. During operations, an average workforce of around 260 FTE employees will be required, peaking at approximately 320 FTEs in around years four and five of the project.
- Installation and use of environmental management and monitoring equipment.
- Progressive rehabilitation throughout the mine life.

At the end of mining, mine infrastructure will be decommissioned, and disturbed areas will be rehabilitated to integrate with natural landforms, as far as practicable, consistent with relevant land use strategies of the relevant local government areas (LGAs). The visual bund for the pit and the waste rock emplacement will be rehabilitated to achieve positive biodiversity outcomes (see Appendix U of the EIS).

The following terms are used throughout this report to describe different areas, and shown on Figure 1.2:

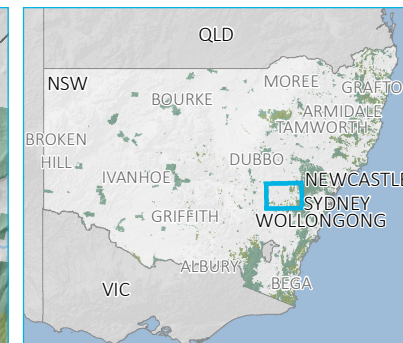
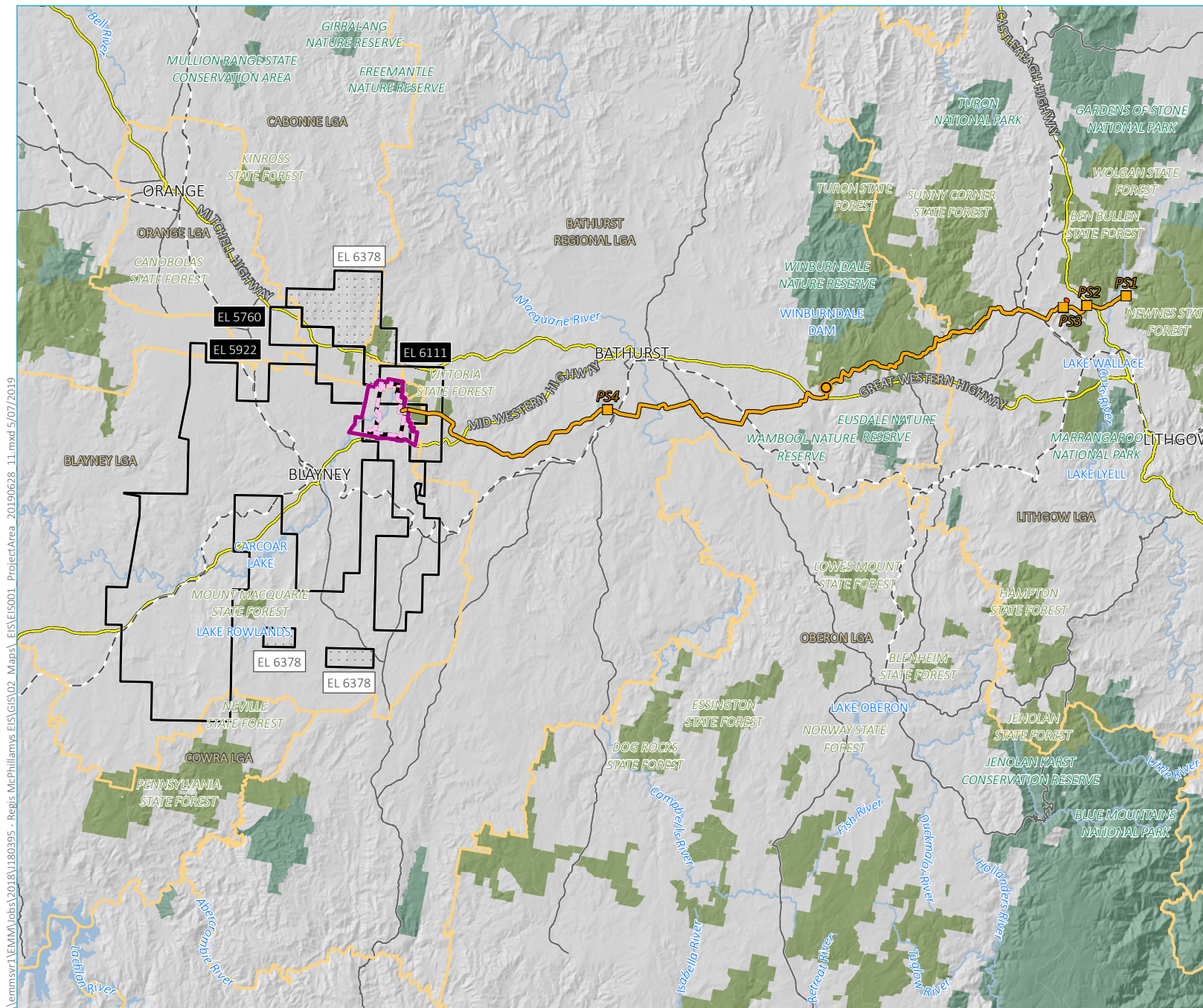
- Mining Lease Application Area;
- Mine Development Project Area (project area); and
- Disturbance footprint (area in which direct impacts and clearance will occur).

Biodiversity surveys were undertaken within the mine development project area to identify biodiversity constraints and allow consideration of these constraints during mine planning. The resulting disturbance footprint, nested within the project area, considers these identified constraints and has avoided them where practical. As a result, direct impacts will be restricted to the disturbance footprint.

1.2.1 Water supply pipeline

Water will be supplied to the mine via a pipeline approximately 90 km long, transferring surplus water from Centennial Coal's Angus Place Colliery, Springvale Coal Services Operations and Energy Australia's Mt Piper Power Station, near Lithgow, to the mine.

As noted in Section 1.1, this component of the project is being assessed separately under the *Biodiversity Conservation Act 2016* (BC Act) and associated Biodiversity Assessment Method (BAM, OEH 2017). The water supply pipeline is not discussed further within this BAR.

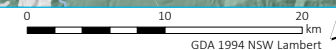


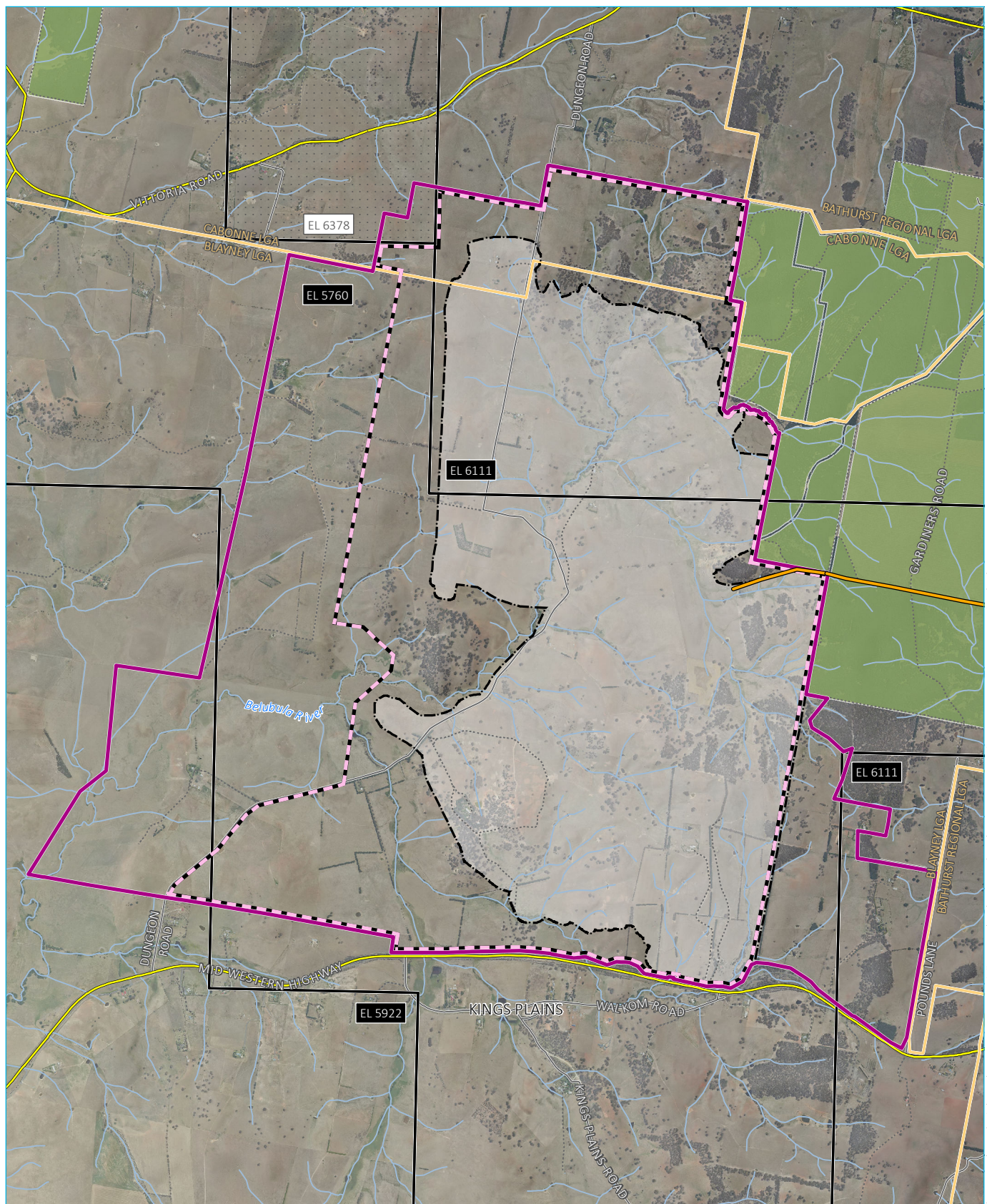
- KEY**
- Mine development project area (2,513.47 ha)
 - Mining lease application area (1,812.99 ha)
(Note: boundary offset for clarity)
 - Pressure reducing system
 - Pumping station facility
 - Pipeline corridor
 - Pipeline corridor (Blowdown Pond)
 - Existing environment
 - Rail line
 - Primary road
 - Arterial road
 - River
 - Waterbody
 - NPWS reserve
 - State forest
 - Local government area
 - Exploration lease boundaries (of interest)
 - Held by LFB Resources NL (Regis)
 - Held by others

Project application area – regional setting

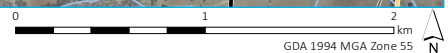
McPhillamys Gold Project
Biodiversity assessment report
Figure 1.1

Source: EMM (2019); Regis Resources (2019); DPE (2018); DFSI (2017); GA (2011)





Source: EMM (2019); Regis Resources (2019); Survey Graphics (2019); DFSI (2017); ELVIS (2014)



KEY

Project application area

Mine development project area (2,513.47 ha)

Mining lease application area (1,812.99 ha)
(Note: boundary offset for clarity)

Disturbance footprint

Pipeline corridor

Exploration lease boundaries (of interest)

Held by LFB Resources NL (Regis)

Held by others

Existing environment

Main road

Local road

Vehicular track

Watercourse/drainage line

Vittoria State Forest

Local government area

Mine development project area

McPhillamys Gold Project
Biodiversity assessment report
Figure 1.2

1.3 Information sources

1.3.1 Publications and databases

In order to provide a context for the project, information about flora and fauna within 15 km of the project area was obtained from relevant public databases. The centre point of the project area was taken as Latitude -33.46, Longitude 149.33. Records from the following databases were collated and reviewed:

- Department of the Environment and Energy (DoEE) Protected Matters Search Tool for matters protected by the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act);
- NSW BioNet - the database for the Atlas of NSW Wildlife for threatened species listed under the EPBC Act and *Biodiversity Conservation Act 2016* (BC Act);
- PlantNET (The Royal Botanic Gardens and Domain Trust) for Rare or Threatened Australian Plants (RoTAP);
- Other sources of biodiversity information:
 - The NSW Plant Community Types, as held within the Vegetation Information System (VIS) Classification 2.1 database;
 - State Vegetation Type Map: Central Tablelands Region Version 0.1. VIS_ID 4778 (OEH 2018); and
 - Groundwater Dependent Ecosystems Atlas (BOM 2013).

The following studies and reports were also reviewed:

- Local setting and biodiversity constraints analysis (EnviroKey 2017), prepared for the project area; and
- A regional assessment (EnviroKey 2013), also prepared for the project.

There are few uncertainties in the site-based studies (EnviroKey 2013 and 2017) as these were detailed studies, conducted at the site scale. The remaining resources are government databases and were used to provide an indication of threatened biodiversity relevant to the project. Threatened biodiversity was then verified as present/absent in the project area during site-based studies (Envirokey 2013, 2017 and this report).

1.3.2 Spatial data

Mapping was conducted using hand-held (uncorrected) GPS units (GDA94), mobile tablet computers running Collector for ArcGIS™ and aerial photo interpretation. The accuracy of this mapping is therefore subject to the accuracy of the GPS units (generally ± 7 metres) and dependent on the limitations of aerial photo rectification and registration. Site plans were supplied by Regis Resources in March 2019.

Mapping has been produced using a Geographic Information System (GIS).

2 Legislative context

2.1 Commonwealth legislation

2.1.1 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act is the Australian Government's key piece of environmental legislation. The EPBC Act applies to developments and associated activities that have the potential to significantly impact on Matters of National Environmental Significance (NES) protected under the Act.

Nine Matters of NES are identified under the EPBC Act:

- world heritage properties;
- national heritage places;
- wetlands of international importance (also known as 'Ramsar' wetlands);
- nationally threatened species and ecological communities;
- migratory species;
- Commonwealth marine areas;
- the Great Barrier Reef Marine Park;
- nuclear actions (including uranium mining); and
- a water resource, in relation to coal seam gas development and large coal mining development.

Under the EPBC Act, activities that have potential to result in significant impacts on Matters of NES must be referred to the Commonwealth Minister for the Environment for assessment.

A referral was made to the Commonwealth Department of the Environment and Energy (DoEE), as the proponent anticipated that the project was likely to result in a significant impact on one threatened species and one threatened ecological community, therefore requiring assessment and approval under the EPBC Act. DoEE confirmed that the project is a controlled action on 28 May 2019, requiring assessment under the EPBC Act as DoEE considered that the project is likely to have a significant impact on the following:

- listed threatened species and communities (sections 18 and 18A);
 - White Box - Yellow Box Blakely's Red Gum Grassy woodland and Derived Native Grassland – Critically Endangered; and
 - Koala (QLD, NSW, ACT) (*Phascolarctus cinereus*) – Vulnerable.

The project will be assessed under the bilateral agreement between the Commonwealth and NSW governments in accordance with Part 5 of the EPBC Act. Supplementary environmental assessment requirements (EARs) for the MNES relevant to the project were provided on 30 May 2019.

Section 2.1.2 discusses how supplementary EARs have been addressed. Threatened species and ecological communities protected by the EPBC Act are outlined in Section 5 of this report. An assessment of potential impacts to all Matters of NES under the provisions of the EPBC Act is provided in Section 8.1.

2.1.2 Supplementary environmental assessment requirements

The supplementary EARs and the section in which they are addressed are provided in Table 2.1.

Table 2.1 **Supplementary EARs**

Requirement	Section addressed
5. The Environmental Impact Statement (EIS) must address the matters outlined in Schedule 4 of the EPBC Regulations and the matters outlined below in relation to the controlling provisions.	The requirements of Schedule 4 of the EPBC Regulations, and where they are addressed, is provided in Table 2.2.
6. The title of the action, background to the action of the action and current status.	Provided in Chapter 2 of the EIS.
7. The precise location and description of all works to be undertaken (including associated offsite works and infrastructure), structures to be built or elements of the action that may have impacts on Matters of National Environmental Significance (MNES).	A summary of all works proposed for the project (including both the mine development and the associated pipeline development) is provided in 1.2.1. A full description is provided in Chapter 2 of the EIS.
8. How the action relates to any other actions that have been, or are being taken in the region affected by the action.	A summary of related actions is provided in 5.4.1 of the EIS.
9. How the works are to be undertaken and design parameters for those aspects of the structures or elements of the action that may have relevant impacts on MNES.	A summary project description is provided in Section 1.2. A full project description is provided in Chapter 2 of the EIS.
10. The EIS must include an assessment of the relevant impacts of the action on the matters protected by the controlling provisions, including: <ul style="list-style-type: none"> i. a description and detailed assessment of the nature and extent of the likely direct, indirect and consequential impacts, including short term and long term relevant impacts; ii. a statement whether any relevant impacts are likely to be unknown, unpredictable or irreversible; iii. analysis of the significance of the relevant impacts; and iv. any technical data and other information used or needed to make a detailed assessment of the relevant impacts. 	Section 8.1 provides a detailed description, analysis and technical data used to assess impacts on MNES.
11. For each of the relevant matters protected that are likely to be significantly impacted by the action, the EIS must provide information on proposed avoidance and mitigation measures to manage the relevant impacts of the action including: <ul style="list-style-type: none"> i. a description, and an assessment of the expected or predicted effectiveness of the mitigation measures, ii. any statutory policy basis for the mitigation measures; iii. the cost of the mitigation measures; iv. an outline of an environmental management plan that sets out the framework for continuing management, mitigation and monitoring programs for the relevant impacts of the action, including any provisions for independent environmental auditing; 	Proposed avoidance and mitigation measures for the project are detailed in Section 7.2. A fully costed EMP would be developed following project approval and would be audited by the DPIE - Biodiversity and Conservation Division.

Table 2.1 **Supplementary EARs**

Requirement	Section addressed
v. the name of the agency responsible for endorsing or approving each mitigation measure or monitoring program.	
12. Where a significant residual adverse impact to a relevant protected matter is considered likely, the EIS must provide information on the proposed offset strategy, including discussion of the conservation benefit associated with the proposed offset strategy.	The proposed offset strategy is described in Section 7.6.
13. For each of the relevant matters likely to be impacted by the action the EIS must provide reference to, and consideration of, relevant Commonwealth guidelines and policy statements including any: <ul style="list-style-type: none"> i. conservation advice or recovery plan for the species or community, ii. relevant threat abatement plan for a process that threatens the species or community iii. wildlife conservation plan for the species iv. any strategic assessment. 	<p>Section 8.1 considers Commonwealth guidelines and policy relevant to the MNES that are likely to be significantly impacted by the project.</p> <p>Section 7.2 outlines the proposed avoidance and mitigation measures specific to MNES, with reference to the relevant recovery plans and conservation advices.</p>
14. The EIS must identify each EPBC Act listed threatened species and community likely to be impacted by the action. For any species and communities that are likely to be impacted, the proponent must provide a description of the nature, quantum and consequences of the impacts. For species and communities potentially located in the project area or in the vicinity that are not likely to be impacted, provide evidence why they are not likely to be impacted.	Section 8.1 considers all MNES that are likely to be impacted by the proposed action. Assessments of significance have been completed in accordance with the relevant criteria in EPBC Act Significant Impact Guidelines 1.1: Matters of National Environmental Significance (DoE 2013).
15. For each of the EPBC Act listed threatened species and communities likely to be impacted by the action the EIS must provide a separate: <ul style="list-style-type: none"> a. description of the habitat (including identification and mapping of suitable breeding habitat, suitable foraging habitat, important populations and habitat critical for survival), with consideration of, and reference to, any relevant Commonwealth guidelines and policy statements including listing advice, conservation advice and recovery plans; b. details of the scope, timing and methodology for studies or surveys used and how they are consistent with (or justification for divergence from) published Australian Government guidelines and policy statements; c. description of the relevant impacts of the action having regard to the full national extent of the species or community's range; d. description of the specific proposed avoidance and mitigation measures to deal with relevant impacts of the action; e. identification of significant residual adverse impacts likely to occur after the proposed activities to avoid and mitigate all impacts are taken into account; f. description of any offsets proposed to address residual adverse significant impacts and how these offsets will be established. g. details of how the current published NSW Framework for Biodiversity Assessment (FBA) has been applied in accordance with the objects of the EPBC Act to offset significant residual adverse impacts; and h. details of the offset package to compensate for significant residual impacts including details of the credit profiles required to offset the action in accordance with the FBA and/or mapping and descriptions of the extent and condition of the relevant habitat and/or threatened communities occurring on proposed offset sites. 	<p>Section 8.1 provides a description of habitat for MNES impacted by the proposed action.</p> <p>Survey methods are described in Section 4.2 and 5.3 for threatened ecological communities and threatened species, respectively.</p> <p>Section 8.1 provides a description of the residual impacts of the proposed action, with regard to the MNES national distribution.</p> <p>Proposed avoidance and mitigation measures for the project are detailed in Section 7.2.</p> <p>The proposed offset strategy is described in Section 7.6 and credit profiles are provided in Section 7.5.</p>

Table 2.1 **Supplementary EARs**

Requirement	Section addressed
16. Any significant residual impacts not addressed by the FBA may need to be addressed in accordance with the EPBC Act Environmental Offset Policy(http://www.environment.gov.au/epbc/publications/epbc-act-environmental-offsets-policy).	All significant residual impacts will be addressed through the biodiversity offset strategy.
17. Information in relation to any other approvals or conditions required must include the information prescribed in Schedule 4 Clause 5 (a) (b) (c) and (d) of the EPBC Regulations 2000.	Provided in Chapter 3 of the EIS.
18. Information in relation to the environmental record of a person proposing to take the action must include details as prescribed in Schedule 4 Clause 6 of the EPBC Regulations 2000.	See Table 2.4.
19. For information given in an EIS, the EIS must state the source of the information, how recent the information is, how the reliability of the information was tested; and what uncertainties (if any) are in the information.	Provided in Section 1.3.

Requirement 17 (Table 2.1) of the supplementary EARs relates to the matters to be addressed in the environmental impact statement, as prescribed by Schedule 4 of the EPBC Regulations 2000. The requirements and the section in which they are addressed are provided in Table 2.2.

Table 2.2 **Requirements of Schedule 4 of EPBC Regulations 2000**

Requirement	Section addressed
1 General information	Chapter 1 of the EIS (Main Report, Volume 1)
1.01 The background of the action including:	
(a) the title of the action;	This action does not relate to other actions in the region.
(b) the full name and postal address of the designated proponent;	
(c) a clear outline of the objective of the action;	
(d) the location of the action;	
(e) the background to the development of the action;	
(f) how the action relates to any other actions (of which the proponent should reasonably be aware) that have been, or are being, taken or that have been approved in the region affected by the action;	
(g) the current status of the action;	
(h) the consequences of not proceeding with the action.	

Table 2.2 Requirements of Schedule 4 of EPBC Regulations 2000

Requirement	Section addressed
<p>2 Description</p> <p>2.01 A description of the action, including:</p> <ul style="list-style-type: none"> (a) all the components of the action; (b) the precise location of any works to be undertaken, structures to be built or elements of the action that may have relevant impacts; (c) how the works are to be undertaken and design parameters for those aspects of the structures or elements of the action that may have relevant impacts; (d) relevant impacts of the action; (e) proposed safeguards and mitigation measures to deal with relevant impacts of the action; (f) any other requirements for approval or conditions that apply, or that the proponent reasonably believes are likely to apply, to the proposed action; (g) to the extent reasonably practicable, any feasible alternatives to the action, including: <ul style="list-style-type: none"> (i) if relevant, the alternative of taking no action; (ii) a comparative description of the impacts of each alternative on the matters protected by the controlling provisions for the action; (iii) sufficient detail to make clear why any alternative is preferred to another; (h) any consultation about the action, including: <ul style="list-style-type: none"> (i) any consultation that has already taken place; (ii) proposed consultation about relevant impacts of the action; (iii) if there has been consultation about the proposed action—any documented response to, or result of, the consultation; (i) identification of affected parties, including a statement mentioning any communities that may be affected and describing their views. 	<p>A summary of all works proposed for the project (including both the mine development and the associated pipeline development) is provided in Section 1.2. A full description is provided in Chapter 2 of the EIS Main Report, Volume 1.</p> <p>Part D of the EIS Main Report, Volume 1.</p> <p>Part D & Chapter 38 of the EIS Main Report, Volume 1.</p> <p>Chapter 3 of the EIS.</p> <p>Chapter 6 of the EIS.</p> <p>Chapter 4 of the EIS.</p>
<p>3 Relevant impacts</p> <p>3.01 Information given under paragraph 2.01(d) must include:</p> <ul style="list-style-type: none"> (a) a description of the relevant impacts of the action; (b) a detailed assessment of the nature and extent of the likely short term and long term relevant impacts; (c) a statement whether any relevant impacts are likely to be unknown, unpredictable or irreversible; (d) analysis of the significance of the relevant impacts; (e) any technical data and other information used or needed to make a detailed assessment of the relevant impacts. 	<p>Section 8.1 provides a detailed description, analysis and technical data used to assess impacts on MNES.</p>

Table 2.2 Requirements of Schedule 4 of EPBC Regulations 2000

Requirement	Section addressed
<p>4 Proposed safeguards and mitigation measures</p> <p>4.01 Information given under paragraph 2.01(e) must include:</p> <ul style="list-style-type: none"> (a) a description, and an assessment of the expected or predicted effectiveness of, the mitigation measures; (b) any statutory or policy basis for the mitigation measures; (c) the cost of the mitigation measures; (d) an outline of an environmental management plan that sets out the framework for continuing management, mitigation and monitoring programs for the relevant impacts of the action, including any provisions for independent environmental auditing; (e) the name of the agency responsible for endorsing or approving each mitigation measure or monitoring program; (f) a consolidated list of mitigation measures proposed to be undertaken to prevent, minimise or compensate for the relevant impacts of the action, including mitigation measures proposed to be taken by State governments, local governments or the proponent. 	<p>Proposed avoidance and mitigation measures for the project and their statutory/policy basis are detailed in Section 7.2. A fully costed EMP would be developed following project approval, and would be audited by the DPIE – BCD.</p> <p>A consolidated list of mitigation measures and commitments for the project is also provided in Chapter 38 of the EIS (Main report, Volume 1).</p>
<p>5 Other approvals and conditions</p> <p>5.01 Information given under paragraph 2.01(f) must include:</p> <ul style="list-style-type: none"> (a) details of any local or State government planning scheme, or plan or policy under any local or State government planning system that deals with the proposed action, including: <ul style="list-style-type: none"> (i) what environmental assessment of the proposed action has been, or is being, carried out under the scheme, plan or policy; (ii) how the scheme provides for the prevention, minimisation and management of any relevant impacts; (b) a description of any approval that has been obtained from a State, Territory or Commonwealth agency or authority (other than an approval under the Act), including any conditions that apply to the action; (c) a statement identifying any additional approval that is required; (d) a description of the monitoring, enforcement and review procedures that apply, or are proposed to apply, to the action. 	<p>Chapter 3 of the EIS (Main Report, Volume 1).</p>
<p>6 Environmental record of person proposing to take the action</p> <p>6.01 Details of any proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against:</p> <ul style="list-style-type: none"> (a) the person proposing to take the action; and (b) for an action for which a person has applied for a permit, the person making the application. <p>6.02 If the person proposing to take the action is a corporation—details of the corporation’s environmental policy and planning framework.</p>	<p>Not applicable.</p> <p>Regis Resources environmental policy is attached in Appendix D. Further information is available at https://www.regisresources.com.au/Environment/environment.html</p>

Table 2.2 Requirements of Schedule 4 of EPBC Regulations 2000

Requirement	Section addressed
7 Information sources	Refer to Sections 1.3 and 10.
7.01 For information given in a draft public environment report or environmental impact statement, the draft must state:	
(a) the source of the information; and	
(b) how recent the information is; and	
(c) how the reliability of the information was tested; and	
(d) what uncertainties (if any) are in the information.	

2.2 State Legislation

2.2.1 Environmental Planning and Assessment Act 1979

The EP&A Act was enacted to encourage the proper consideration and management of impacts of proposed development or land-use changes on the environment (both natural and built) and the community. The Act is administered by the NSW Department of Planning, Industry and Environment (DPIE) (previously Department of Planning and Environment (DPE)).

As described in Chapter 1, the McPhillamys Gold Project is State significant development (SSD) pursuant to Schedule 1 of the *State Environmental Planning Policy (State and Regional Development) 2011* (State and Regional Development SEPP). Accordingly, approval is required under Part 4, Division 4.1 of the *NSW Environmental Planning and Assessment Act 1979* (EP&A Act) for the project.

i Environmental Assessment Requirements

Secretary's Environmental Assessment Requirements (EARs) were issued by the DPIE on 24 August 2018 and revised on 19 December 2018. The EARs require that biodiversity impacts related to the proposed development are to be assessed and documented in accordance with the *NSW Biodiversity Offsets Policy for Major Projects* (OEH 2014b) and FBA (OEH 2014a) by an appropriately accredited person. This report has therefore been prepared by Accredited BioBanking Assessors Katie Diver and Nathan Garvey.

Following the declaration of the project as a controlled action, supplementary EARs relating to Matters of NES were issued by DPIE on 30 May 2019.

The EARs identify matters which must be addressed in the EIS and essentially form its terms of reference. Table 2.3 lists individual requirements relevant to this biodiversity assessment and where they are addressed in this report.

Table 2.3 Biodiversity assessment-related EARs

Requirement	Section addressed
An assessment of the direct and indirect biodiversity impacts of the development throughout its life, and impacts on biodiversity values in the region, which:	
- for the open cut mine is assessed in accordance with the Framework for Biodiversity Assessment; and includes a strategy to offset any residual impacts in accordance with the NSW Biodiversity Offsets Policy for Major Projects.	This report, which addresses the impacts of the mine development, has been prepared in accordance with the reporting and mapping requirements of the FBA

Table 2.3 Biodiversity assessment-related EARs

Requirement	Section addressed
	and includes an offset strategy in Section 7.6 to offset residual impacts.
- for the water supply pipeline is assessed in a Biodiversity Development Assessment Report in accordance with Section 7.9 of the Biodiversity Conservation Act 2016 (NSW), the Biodiversity Assessment Method, and includes a strategy to offset any residual impacts in accordance with the Biodiversity Conservation Act 2016 (NSW).	A separate Biodiversity Development Assessment Report and offset strategy has been prepared for the water supply pipeline. This report does not address any impacts or offsets relating to the water supply pipeline. The biodiversity development assessment report for the water pipeline is provided as Appendix Y to the EIS.
- an assessment of the likely impacts of the development on aquatic ecology and key Fisheries issues, including Aquatic Biodiversity and Key Fish Habitats.	A separate aquatic ecology assessment has been prepared to address likely impacts of the mine development on aquatic ecology and key fisheries issues. The aquatic assessment is provided as Appendix O to the EIS.
- an assessment of impacts to koalas and koala habitat in accordance with State Environmental Planning Policy No. 44 – Koala Habitat Protection.	Section 8.2.1 of this report provides an assessment on Koalas in accordance with SEPP 44.
- a detailed description of the proposed regime for minimising, managing and reporting on the biodiversity impacts of the development over time.	Section 6.2 details the measures incorporated into the design to avoid and minimise impacts on biodiversity, and the proposed measures to manage biodiversity during construction and operation of the mine development.

To inform the preparation of the EARs, the DPIE invited other government agencies to recommend matters to be address in the EIS. These matters were taken into account by the Secretary for DPIE when preparing the EARs. The Division of Resources and Geoscience and OEH raised matters relevant to the biodiversity assessment. The matters raised are listed in Table 2.4 and have been considered in preparing this assessment.

Table 2.4 Agency project specific assessment recommendations

Requirement	Section addressed
<p>Division of Resources and Geoscience</p> <p>The Division requests that the Proponent consider potential resource sterilisation in relation to any proposed biodiversity offsets areas. Biodiversity offsets have the potential to preclude access for future resource discovery and extraction and could also potentially permanently sterilise access to mineral resources.</p> <p>The EIS must therefore clearly illustrate the location (including offsite locations) of any biodiversity offsets being considered for the project (including both the mine site and pipeline corridor) and their spatial relationship to known and potential mineral and construction material resources and existing mining titles and exploration tenements.</p> <p>The Division requests consultation with both GSNSW and holders of existing mining and exploration authorities affected by planned biodiversity offsets. Evidence of consultation should be included in the EIS.</p>	Section 7.6 of this report provides a strategy to offset residual impacts of the project, and a summary of the proposed offset location.
<p>OEH – Conservation and Regional Delivery</p> <p>Biodiversity impacts related to the proposed McPhillamys Gold Project are to be assessed and documented in accordance with the Framework for Biodiversity Assessment, unless otherwise agreed by OEH, by a person accredited in accordance with s142B(1)(c) of the Threatened Species Conservation Act 1995.</p>	This report has been prepared in accordance with the FBA by Nathan Garvey and Katie Diver (nee Whiting), accredited assessor numbers 0103 and 0196, respectively.

Table 2.4 Agency project specific assessment recommendations

Requirement	Section addressed
A strategy to offset any residual impacts of the development in accordance with the NSW Biodiversity Offset Policy for Major Projects.	Section 7.6 of this report provides a strategy to offset residual impacts of the project.

2.2.2 State Environmental Planning Policy No. 44

The State Environmental Planning Policy (SEPP) No. 44 aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for Koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline by:

- a) requiring the preparation of plans of management before development consent can be granted in relation to areas of core koala habitat;
- b) encouraging the identification of areas of core koala habitat, and
- c) encouraging the inclusion of areas of core koala habitat in environment protection zones.

SEPP 44 classifies areas as ‘potential’ and ‘core’ Koala habitat. *Potential Koala habitat* refers to areas of native vegetation where the trees of the types listed in Schedule 2 of the policy constitute at least 15% of the total number of trees in the upper or lower strata of the tree component. *Core Koala habitat* refers to areas of land with a resident population of koalas, evidenced by attributes such as breeding females and recent sightings of and historical records of a population.

The policy applies to any development application of at least 1 hectare within any of the 107 local government areas (LGAs) specified as Koala habitat in the policy, including the Blayney LGA. The policy also applies to specified feed tree species, of which just one species listed in Schedule 2 of the Policy (Manna Gum, *Eucalyptus viminalis*, also known as Ribbon Gum) is present within the project area. An assessment of the project’s impacts on Koalas and Koala habitat has been provided in Section 8.2.1, in accordance with SEPP 44.

2.2.3 Threatened Species Conservation Act 1995

The TSC Act aimed broadly to conserve ecological diversity through protecting species and their critical habitat, and by managing threatening processes. The Act is administered by the Biodiversity and Conservation Division of DPIE (BCD) (previously the Office of Environment and Heritage (OEH)). This Act is now repealed and has been replaced by the BC Act.

The Biodiversity Conservation (Savings and Transitional) Regulation 2017 sets out “pending or interim planning applications” to which the former planning provisions would continue to apply. This included projects where an environmental impact statement was to be submitted and the proponent had undertaken “substantial environmental assessment” in connection with the statement before the commencement of the BC Act.

Regis received confirmation from the DPIE on 16 January 2018 that the project is considered a pending or interim planning application and that the former planning provisions continue to apply. The project application must be made within 18 months after the determination that the former planning provisions apply.

In accordance with the EARs, the project will be assessed in accordance with the FBA, and the TSC Act provisions still apply.

2.2.4 Biodiversity Conservation Act 2016

The BC Act aims to maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development. Threatened species, populations and communities that were formerly listed under the TSC Act are now listed in Schedule 1 and 2 of the BC Act.

As the project is deemed a pending or interim application, the project will be assessed under the former planning provisions. However, any proposed offset sites will be assessed in accordance with the BC Act and associated BAM (OEH 2017).

2.2.5 Biosecurity Act 2015

The *Biosecurity Act 2015* (Biosecurity Act) replaced the *Noxious Weeds Act 1993* on 1 July 2017. The Biosecurity Act aims broadly to provide a framework for the prevention, elimination and minimisation of biosecurity risks posed by biosecurity matter, carriers and other activities. The Act is administered by the Department of Primary Industries.

3 Landscape context

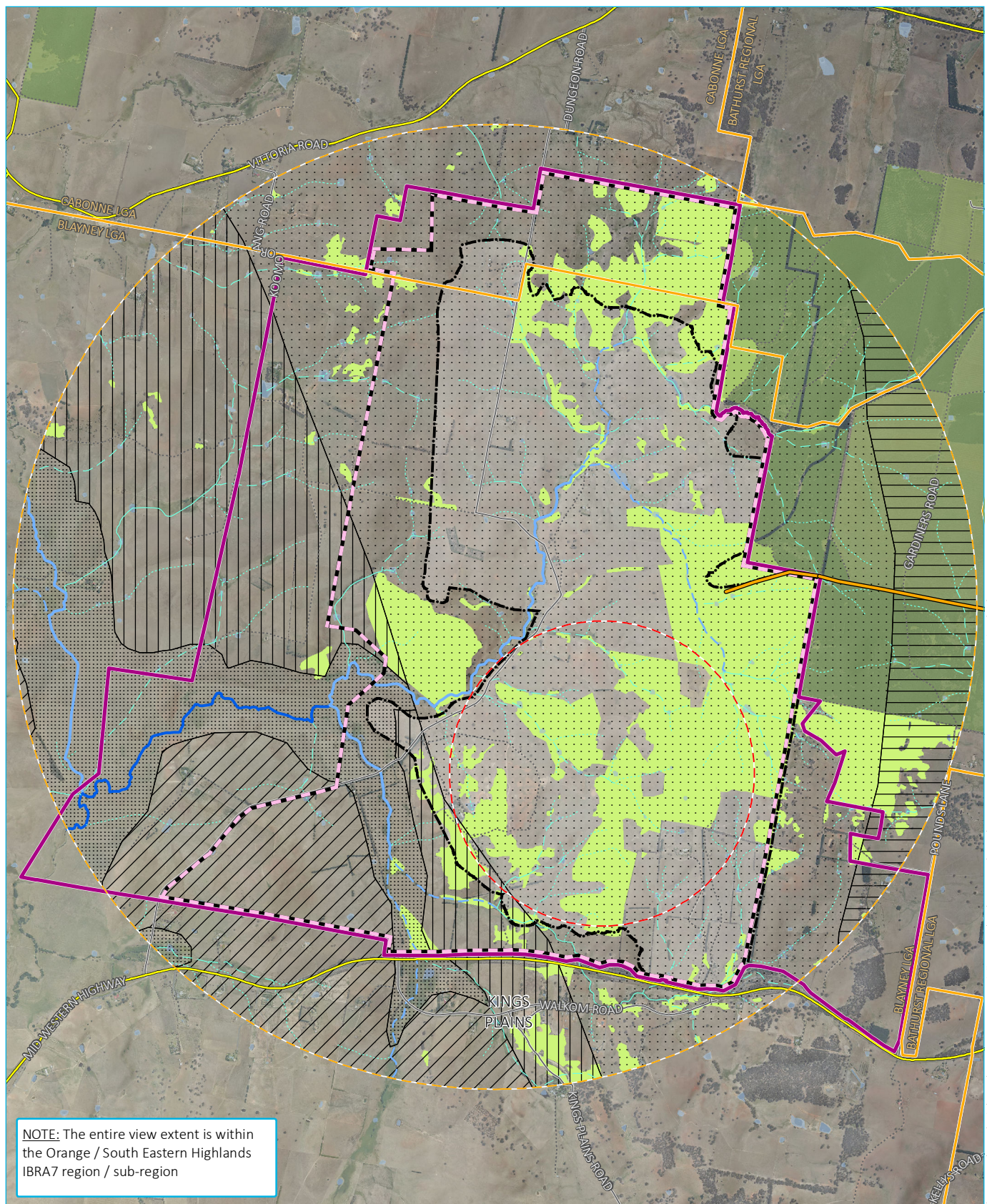
3.1 Site description

The mine development is approximately 8 km north-east of Blayney within the Blayney and Cabonne local government areas (LGAs) and the Orange sub-region of the former Lachlan Catchment Management Authority (CMA) (refer to Figure 3.1 and Figure 3.2).

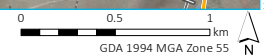
Landform elements within the project area consist of low hills, small plains and gullies which is consistent with the broader locality. Vegetation within the site has experienced historical pastoral use and is therefore mainly open paddock with some fragmented patches of timbered natural vegetation scattered throughout (as shown in Photograph 3.1). The upper reaches of the Belubula River catchment lie within the project area, and several small unnamed tributaries run through the site with some feeding into dams scattered throughout.



Photograph 3.1 The project area, comprising cleared low hills with scattered patches of native vegetation



Source: EMM (2019); Regis Resources (2019); Survey Graphics (2019); DFSI (2017); OEH (2017, 2018); DPI (2015); ELVIS (2014)

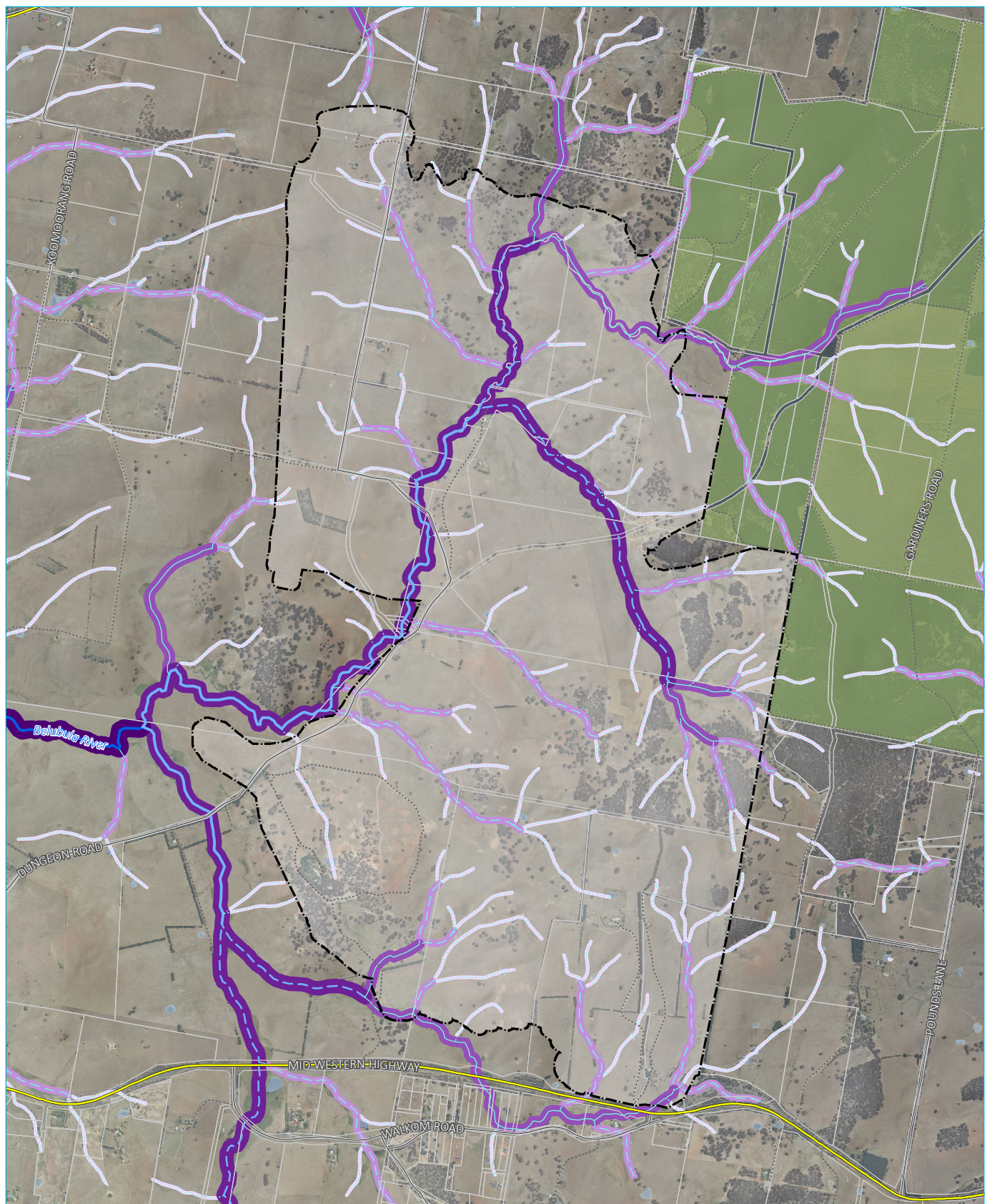


KEY

Project application area	Local government area boundary (LGA)	Mitchell landscape
Mine development project area (2,513.47 ha)	Inner assessment circle (400 ha)	Byng Ultramafics
Mining lease application area (1,812.99 ha)	Outer assessment circle (4,000 ha)	Mandurama Slopes
(Note: boundary offset for clarity)		Mullion Slopes
Pipeline corridor	Native vegetation within assessment circles (OEH, 2018)	Rockley Plains
Disturbance footprint	Strahler stream order	Upper Lachlan Channels and Floodplains
Existing environment	1st order	
Main road	2nd order	
Local road	3rd order	
Vehicular track	4th order	
Waterbody	5th order	
Vittoria State Forest	6th order	

Location map

McPhillamys Gold Project
Biodiversity assessment report
Figure 3.1



Source: EMM (2019); Regis Resources (2019); Survey Graphics (2019); DFSI (2017); DPI (2015); ELVIS (2014)

KEY

Disturbance footprint	Strahler stream order	Riparian buffer
Main road	1st order	10 m
Local road	2nd order	20 m
Vehicular track	3rd order	30 m
Waterbody	4th order	40 m
Cadastral boundary	5th order	50 m
Vittoria State Forest	6th order	

Site map

McPhillamys Gold Project
Biodiversity assessment report
Figure 3.2

3.2 Bioregions and landscape regions

The project area is in the South Eastern Highlands Interim Biogeographic Regionalisation of Australia (IBRA) bioregion, within the Orange IBRA subregion (refer to Figure 3.1). This IBRA subregion covers the entire development and is the subregion used in this assessment. Both the inner and outer assessment circles are also located entirely within this subregion.

The bioregion is bounded by the Australian Alps and South Western Slopes to the south and west, just inland from the coastal bioregions of the South East Corner and the Sydney Basin. This area includes most of the Australian Capital Territory and extends into Victoria. The total area of this bioregion is approximately 8,749,155 ha, 55.9% of which is located in NSW where it occupies about 6.11% of the state (NPWS 2003). The bioregion is dominated by a temperate climate characterised by warm summers and no dry season. Significant areas in the north and south are at higher elevations in a montane climate zone with mild summers and cold winters (NPWS 2003).

The topography of the region includes dissected ranges and plateaus of the Great Dividing Range which are lower in elevation than the Australian Alps to the southwest (NPWS 2003). The highlands are part of the Lachlan Fold Belt with a substrate consisting of Palaeozoic granites, metamorphosed sedimentary rocks and Tertiary basalts. Soils across the region vary in relation to altitude, temperature and rainfall, and the parent material of sedimentary or volcanic material (NPWS 2003).

The project area occurs within the Mitchell Landscapes of the Mullion Slopes, Byng Ultramafics, Upper Lachlan Channels and Floodplains, Mandurama Slopes and Rockley Plains (as shown in Figure 3.1). The Mullion Slopes Mitchell Landscape was used in this assessment as it covers most of the project area and disturbance footprint.

3.3 Waterways and wetlands

The project area is located within the Lachlan catchment, in eastern NSW.

One mapped watercourse, the Belubula River, and several smaller tributaries intersect the project area (Figure 3.1 and Figure 3.2). The headwaters of the Belubula River form to the north-east of the project area, before flowing through the project area and then south-west towards Blayney and, beyond that, Carcoar Dam. In the project area, the Belubula River forms a 4th and then 5th order stream. A 5th order unnamed tributary of the Belubula River occurs within the project area to the south-west of the disturbance footprint. Where these two waterways meet, within the project area but south-west of the disturbance footprint, they become a 6th order stream.

Thirteen nationally important wetlands occur in the South Eastern Highlands Bioregion. None of these wetlands occur in the project area.

3.4 Assessment of landscape value

3.4.1 Assessment of the current extent of native vegetation cover

Vegetation mapping across the project area (this report) and locality (OEH 2018) identify a range of vegetation communities occurring including Blakely's Red Gum Yellow Box grassy tall woodland and Broad-leaved Peppermint - Long-leaved Box Woodland of the Tablelands. The extent of native vegetation cover based on these data sources is shown in Figure 3.1.

The extent of native vegetation cover before development for both outer and inner assessment circles was determined as the sum of the area of native vegetation cover based on the data sources listed above. To determine the extent of native vegetation cover after development, the extent of vegetation required for removal is subtracted from the extent of native vegetation cover before development. Table 3.1 provides a summary of the extent of native vegetation cover within the inner and outer assessments circles, before and after development.

Table 3.1 **Extent of native vegetation cover before and after development**

Assessment circle	Before development		After development	
	Area (ha)	Percentage (%)	Area (ha)	Percentage (%)
Outer assessment circle (4,000 ha)	660.07	16.5	284.54	7.1
Inner assessment circle (400 ha)	177.53	44.4	0	0

3.4.2 Assessment of patch size and connectivity value

The locality is considered highly fragmented with native vegetation often occurring in isolated patches surrounded by a matrix of agricultural land. This is also consistent with the remaining vegetation within and adjoining the project area. It should be noted that previous mapping across the project area is largely based on air photo interpretation.

The project area is located within the riparian buffer of a 5th order stream. The project will impact on a regionally significant biodiversity link, as defined in Appendix 4 of the FBA (OEH 2014a). A riparian buffer 20 m either side of a 4th order stream will be removed for the project, as shown on Figure 3.2.

4 Native vegetation

4.1 Background review

Preliminary biodiversity surveys were conducted by EnviroKey between 2013 and 2017 to identify biodiversity to be considered during project planning (EnviroKey 2017). Surveys included the project area as well as the surrounding lands.

Preliminary vegetation mapping was undertaken by EnviroKey between May 2013 and April 2017. Vegetation mapping across the project area included delineation of biometric vegetation types (BVTs – hereafter referred to as plant community types (PCTs) to align with current requirements) and stratification of PCTs into vegetation zones “based on presence/absence of the over-storey canopy and the condition of the groundcover layer . . .” (EnviroKey 2017, p.3-39). Plot/transect surveys were also undertaken using the methods outlined in the FBA (OEH 2014a).

Surveys identified four PCTs across the project area, and seven vegetation zones (Table 4.1). Vegetation zones were delineated by the presence/absence of canopy and condition of derived grasslands.

Table 4.1 Vegetation zones in project area (EnviroKey 2017)

PCT ID	PCT name	Condition
727	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion (LA124)	Canopy present
		Derived grassland (Mod-good cond.)
951	Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion (LA164)	Canopy present
		Derived grassland (Low cond.)
654	Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands Bioregion (LA103) ¹	Canopy present
		Derived grassland (Low cond.)
1375	Wet tussock grasslands of cold air drainage areas of the tablelands (LA213) ²	-

¹ Envirokey mapped this community as PCT 654, however in this report and the Biobanking Calculator the community it is mapped as PCT 1330. Further discussion and justification is provided in Section 4.3.1.

² Envirokey mapped this community as PCT 1375; however, in this report and the Biobanking Calculator the community it is mapped as PCT 766. PCT 1375 was not available in the BioBanking credit calculator.

Building on EnviroKey’s work, EMM undertook the following additional tasks to inform preparation of this biodiversity assessment report:

- refinement of vegetation mapping to further stratify PCTs into vegetation zones based on broad condition state, using biometric data derived from plot surveys;
- revise vegetation zone mapping to align with condition thresholds under the EPBC Act;
- collect additional plot/transect data to meet minimum requirements of the FBA; and
- undertake targeted flora surveys in accordance with OEH (2016), including transects spaced at 10 m intervals.

4.2 Methods

Native vegetation was assessed in the field by EnviroKey on the following dates:

- 22 – 25 May 2013;
- 10 – 13 September 2013;
- 23 -24 October 2013;
- 6 -7 November 2013;
- 20 – 26 November 2013;
- 24 – 29 March 2014; and
- 27 – 28 April 2017.

Field surveys were undertaken by stratifying the project area by air photo interpretation and on-ground validation into Biometric Vegetation Types. Vegetation mapping involved the area being traversed on foot and by vehicle to maximise the opportunity of detecting significant or sparsely distributed flora species and vegetation communities, using the random meander method (EnviroKey 2017). Vegetation boundaries were mapped on site using the professional mapping software application 'GIS Pro' and an Ipad with internal GPS. Polygons were later checked, and redefined where necessary using ArcGIS software (v10) (Envirokey 2017).

Plot and transects were undertaken in accordance with the methods outlined within the Biobanking Assessment Methodology (OEH 2014c) and the FBA (OEH 2014a). At each survey site, a 50 m x 20 m plot combined with a 50 m step point transect was surveyed in accordance with the methodology (EnviroKey 2017). A total of 53 plots were undertaken by EnviroKey across the project area, with 44 of these plots located within the disturbance footprint (Figure 4.1).

Additional flora surveys were conducted by EMM ecologists over three survey events:

- 4 – 8 February 2019;
- 18 – 22 February 2019; and
- 11 – 15 March 2019.

The first survey event comprised verifying and amending mapped vegetation within the project area, including further stratification of PCTs into vegetation zones. These surveys were carried out on foot and by vehicle. The purpose of this assessment was to review and, where necessary, refine vegetation mapping and undertake an assessment of vegetation condition of all vegetation in accordance with the requirements of the FBA (OEH 2014a). Detailed mapping of vegetation communities was conducted using hand-held (uncorrected) tablet computers using the ArcGIS Collector application and aerial photo interpretation. Areas of native vegetation for which a PCT could validly be assigned were identified and delineated in the field, and their condition determined. Identification of PCTs within the project area was confirmed with reference to the community profile descriptions (and diagnostic species tests) held within the NSW Vegetation Information System (VIS): Classification Version 2.1.

The second survey event focused on targeted surveys for Hoary Sunray (*Leucochrysum albicans* subsp. *tricolor*) with survey methodology outlined below in Section 5.3.1.

The third survey event followed the stratification of vegetation zones. Site values were assessed using data obtained via a series of additional plots and transects to ensure survey effort was consistent with the FBA (OEH 2014a)

requirements. The collection of data from these plots was in accordance with the FBA (OEH 2014a). Plot and transect data were collected and comprised:

- a 20 m x 50 m quadrat and 50 m transect for assessment of site attributes; and
- a 20 x 20 m quadrat, nested within the quadrat outlined above, for full floristic survey to determine native plant species richness.

The minimum number of plots/transects per vegetation zone was determined using Table 3 of the FBA (OEH 2014a). A total of 23 plots/transects were completed across the broader project area, with 21 of the plots/transects located within the disturbance footprint (Figure 4.1). Plot data entered into the FBA calculator, along with original datasheets, are provided in Appendix B.

Surveys for flora and vegetation communities were completed under the authority of Scientific License (SL100409). A list of flora species was compiled for each plot and PCT. Records of all flora species will be submitted to BCD for incorporation into the Atlas of NSW Wildlife.

4.3 Results

4.3.1 Flora and plant community types

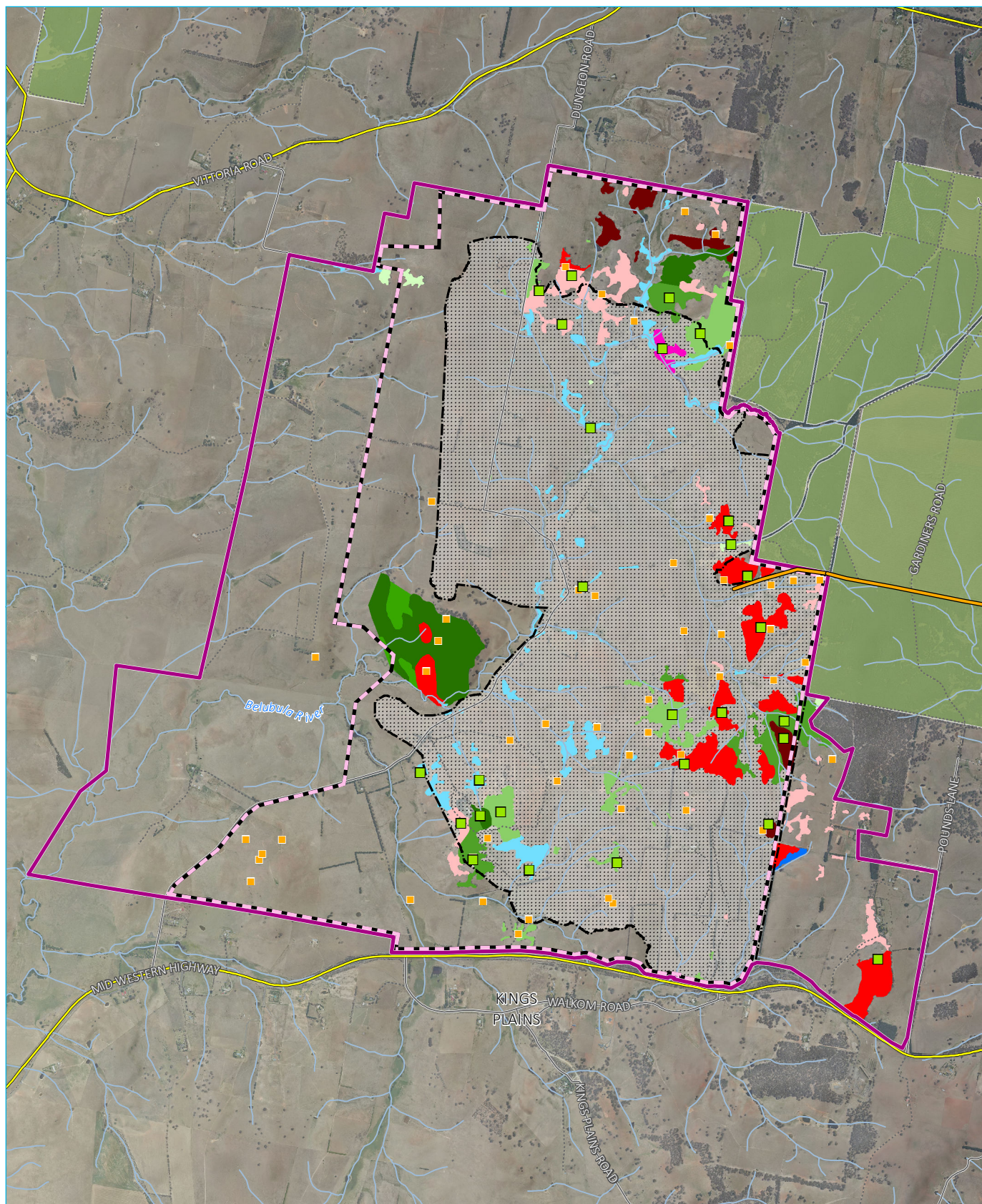
Four PCTs and seven vegetation zones were initially identified across the project area (Section 4.1). Vegetation zones were delineated by the presence/absence of canopy and condition of derived grasslands. During the background review (Section 4.1), PCT 1375 – Wet tussock grasslands of cold air drainage areas of the tablelands (LA213) was revised to PCT 766 – Carex sedgeland of the slopes and tablelands (LA130) as PCT 1375 was not available in the BioBanking Calculator. PCT 654 – Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands Bioregion (LA103) was also revised to PCT 1330 – Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion (LA276) as vegetation across the project area shared more floristic similarities with PCT 1330 than with PCT 654 and the Statewide Mapping (OEH 2018) has the site as supporting PCT 1330 (with no PCT 654 mapped nearby). Four PCTs were identified across the disturbance footprint (Figure 4.1). Depending on the condition of these PCTs, they were allocated to a condition class of either Moderate-Good (Mod-Good) or Low. Within each condition class, an ancillary code of High, Medium, Other or Poor was attributed depending on the condition of vegetation.

The majority of the project area is dominated by open grasslands of varying condition and quality. Most of these areas have been heavily impacted by pastoral activities, particularly grazing, and are dominated by exotic plant species. In some areas, a simplified native cover of species such as Kangaroo Grass, Red-anthered Wallaby Grass and Weeping Grass occurs. However, these areas are usually small, and rapidly change over tens of metres to exotic dominated pasture, making discrete mapping problematic. To account for this, all plot data collected from open grasslands was inputted into the calculator using three vegetation zones of the same size (1,002.38 ha) across the three identified PCTs.

A list of vegetation zones occurring across the disturbance footprint, including the area of direct impact, is provided in Table 4.2.

Table 4.2 **Vegetation zone identified along with broad condition state and ancillary as identified by EMM**

PCT ID	PCT name	Condition	Ancillary	Extent in disturbance footprint (ha)
727	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion (LA124)	Mod-Good	High	4.75
			Medium	34.55
			Poor	14.25
951	Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion (LA164)	Mod-Good	Poor	31.55
766	Carex sedgeland of the slopes and tablelands (LA130)	Mod-Good	Poor	3.04
1330	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion (LA276)	Mod-Good	High	1.47
			Medium	17.03
			Other	0.76
			Poor	24.96
Unknown	Open grasslands	Low	–	1002.38



Source: EMM (2019); Regis Resources (2019); Survey Graphics (2019); EnviroKey (2017/2018); DFSI (2017); ELVIS (2014)

KEY

Project application area
 Mine development project area (2,513.47 ha)
 Mining lease application area (1,812.99 ha) (Note: boundary offset for clarity)
 Pipeline corridor
 Disturbance footprint
 Existing environment
 Main road
 Local road
 Vehicular track
 Watercourse/drainage line
 Vittoria State Forest

Plot location (EMM, 2019)
 Plot location (EnviroKey, 2017/2018)
 Vegetation with a site value score < 17 (1,002.38 ha)
 Plant community types
 727 - Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion
 Moderate/Good (High)
 Moderate/Good (Medium)
 Moderate/Good (Poor)
 766 - Carex sedgeland of the slopes and tablelands
 Moderate/Good (Poor)

951 - Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion
 Moderate/Good (Medium)
 Moderate/Good (Poor)
 1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
 Moderate/Good (High)
 Moderate/Good (Medium)
 Moderate/Good (Poor)
 Moderate/Good (Other)

Plant community types in the project area and plot/transect locations

McPhillamys Gold Project
 Biodiversity assessment report
 Figure 4.1

i Flora species richness

A total of 123 species (72 native and 51 exotic) were recorded across the 44 EnviroKey plots and transects and the 11 additional plots EMM carried out. Mostly canopy and groundcover species were recorded as a result of cattle and sheep continuing to graze on the property.

ii Plant community types

To identify PCTs within the project area, data collected during the preliminary site visit to map vegetation was assessed. Floristic data collected during plot surveys were used to confirm the vegetation mapping. A total of four PCTs were identified within the project area, as described in the following sections. Within each PCT further stratification into differing vegetation zones was also required to meet the requirements of the FBA (OEH 2014a) and better define Threatened Ecological Communities (TECs).

a PCT 1330 – Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion (LA276)

PCT 1330 is best described as dry grassy woodland. PCT 1330 has been heavily grazed across the project area. Areas of high to poor quality are distinguished largely by presence or absence of woody debris, and by the species composition. Table 4.3 provides a description of the vegetation zones attributed to this PCT.

Table 4.3 Vegetation zones 1-4 description

Vegetation Zones 1-4 – Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion (PCT 1330)	
PCT ID	1330
Common name	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion (LA276)
Condition class	Vegetation zone 1 – moderate/good_high Vegetation zone 2 – moderate/good_medium Vegetation zone 3 – moderate/good_other Vegetation zone 4 – moderate/good_poor
Extent within disturbance footprint	44.22 ha 1.47 ha (moderate/good_high) 17.03 ha (moderate/good_medium) 24.96 ha (moderate/good_poor) 0.76 ha (moderate/good_other)
Description	The canopy is co-dominated by Yellow Box (<i>Eucalyptus melliodora</i>) with occasional stands of Apple Box (<i>Eucalyptus bridgesiana</i>). The midstorey is largely absent. A single native shrub occurs, being Silver Wattle (<i>Acacia dealbata</i> subsp. <i>dealbata</i>). Two exotic shrub species occur rarely within the PCT, being Blackberry complex (<i>Rubus fruticosus</i> aggregate) and Briar Rose (<i>Rosa rubiginosa</i>). The groundlayer is co-dominated by native and exotic grass species. Dominant native grasses are Purplish Wallaby Grass (<i>Rytidosperma tenuius</i>), Short Wallaby Grass (<i>Rytidosperma carphoides</i>), Snow Grass (<i>Poa sieberiana</i>), Common Wheatgrass (<i>Anthosachne scaber</i>) and Weeping Grass (<i>Microlaena stipoides</i>). Dominant exotic grass species recorded include Harding Grass (<i>Phalaris aquatica</i>) and Creeping Bentgrass (<i>Agrostis stolonifera</i>).

Table 4.3 **Vegetation zones 1-4 description**

Vegetation Zones 1-4 – Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion (PCT 1330)	
Survey effort	<p>Nine plots/transects within the disturbance footprint:</p> <ul style="list-style-type: none"> • Vegetation zone 1 – moderate/good_high: 1 • Vegetation zone 2 – moderate/good_medium: 3 • Vegetation zone 3 – moderate/good_other: 1 • Vegetation zone 4 – moderate/good_poor: 4
Condition description	<p>The community is largely in medium to poor condition with a high cover of introduced plant species due to past and current cattle grazing activities. An area of higher condition occurs in the northern part of the mine development project area, but this has largely been avoided during detailed design.</p> <p>The midstorey (shrub layer) is largely absent. An exotic forb and grass species occur within the PCT, being Flatweed (<i>Hypochaeris radicata</i>) and Rhodes grass (<i>Chloris gayana</i>) respectively. Surrounding land use (mostly grazing and forestry) and associated edge impacts contribute even further to the existing condition of this PCT.</p>
Characteristic species used for identification of PCT	<p>According to the NSW VIS Classification Version 2.1, the canopy layer species recorded within this community that align with the dominant species listed as characteristic of this PCT include Yellow Box and Apple Box, although Blakely's Red Gum (<i>Eucalyptus blakelyi</i>) was absent in the mine development project area but was found to occur immediately adjacent to the east where it was co-dominant. The midstorey of the community on site contains Silver Wattle. However, the midstorey species listed for PCT 1330 under the NSW VIS Classification Version 2.1 are <i>Lissanthe strigosa</i> and <i>Melichrus urceolatus</i>. These two species were not present at McPhillamys, even in ungrazed areas adjacent to the site.</p> <p>Aligning ground layer species include Snow Grass. The description under the NSW VIS Classification Version 2.1 for PCT 1330 is brief and has few identifying ground layer species. This said, analysing the plot data against the key species in the PCT descriptions gives a match of 57% for PCT 1330.</p>
Justification of evidence used to identify the PCT	<p>Revision of vegetation mapping by EnviroKey (2017) considered several closely related PCTs (277, 654 and 1330). This PCT was mapped as PCT 1330 (over PCT 277 or 654). Although the upper stratum species of Yellow Box and Apple Box closely match PCT 654 (as mapped in the preliminary mapping by Envirokey):</p> <ul style="list-style-type: none"> • as the three PCTs under consideration have similar overstorey species, the overstorey composition cannot be used to identify the PCT conclusively on site; • in the midstorey, no species are listed for PCT 654, while PCT 277 has Silver Wattle in the shrub storey (which is present on site). The midstorey species listed for PCT 1330 are <i>Lissanthe strigosa</i> and <i>Melichrus urceolatus</i>. These two species were not present at McPhillamys, even in ungrazed areas adjacent to the site; • the description of ground layer species for PCT 1330 is brief, and has few identifying ground layer species. This said, analysing the plot data against the key species in the PCT descriptions gives a match of 57% for PCT 1330 versus 37% for PCT 277; and • the Statewide Vegetation Map (OEH 2018) maps PCT 1330 across the project area. PCT 654 is mapped adjacent, while PCT 277 is not mapped in the vicinity of the site (further than 20 km distance). <p>As the PCT on site shares greater alignment with key species (in the ground layer) and the description of landscape and soils could fit any PCT, PCT 1330 was found to be a better fit based on alignment with regional mapping and initial advice of BCD.</p>

Table 4.3 **Vegetation zones 1-4 description**

Vegetation Zones 1-4 – Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion (PCT 1330)	
Status	<p>PCT 1330 Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion represents White Box Yellow Box Blakely's Red Gum Woodland listed under the BC Act as it:</p> <ul style="list-style-type: none"> • occurs on fertile soils in the western slopes of NSW; • is dominated by Yellow Box, a representative canopy species; • has an understorey comprising grasses and herbs; and • has a sparse shrub layer. <p>The National Recovery Plan for White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland (DECCW 2010) describes the listed community (under the EPBC Act) as a woodland or derived native grassland, characterised by a species-rich understorey of native tussock grasses, herbs and scattered shrubs, that is dominated by White Box, Yellow Box and/or Blakely's Red Gum. To be considered part of the listed community, remnants must also:</p> <ul style="list-style-type: none"> • have a predominantly native understorey (i.e. more than 50% of the perennial ground layer must comprise native species); and • be 0.1 ha or greater in size and contain 12 or more native understorey species (excluding grasses), including one or more identified important species; or • be 2 ha or greater in size and have either natural regeneration of the overstorey species or an average of 20 or more mature trees per ha. <p>Using the above criteria, polygons of PCT 1330 in moderate/good (high) and moderate/good (medium) meet the criteria for White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland as listed under the EPBC Act, while polygons in moderate/good (poor) and moderate/good (other) do not.</p> <p>It should be noted that when entered into the BioBanking Calculator, the PCT does not show as having an EEC multiplier (though the community is listed under the BC Act). This issue is addressed further in Section 7.5.</p>
Estimate of percent cleared value of PCT across its distribution	95%



Photograph 4.1 **Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands Bioregion within the project area (moderate/good high - plot ID EMM8Zone1).**

b **PCT 727 – Broad-leaved Peppermint – Brittle Gum – Red Stringybark dry open forest of the South Eastern Highlands Bioregion (LA124)**

PCT 727 is best described as dry open forest with a grassy understorey. A total of 53.55 ha of Broad-leaved Peppermint – Brittle Gum – Red Stringybark dry open forest of the South Eastern Highlands Bioregion occurs in the disturbance footprint as shown on Figure 4.1. This PCT has been heavily grazed across the project area. Areas of high quality are distinguished largely by presence or absence of woody debris, and by the species composition. Table 4.4 provides a description of the vegetation zones attributed to this PCT.

Table 4.4 **Vegetation zones 5-7 description**

Vegetation Zones 5-7 – Broad-leaved Peppermint – Brittle Gum – Red Stringybark dry open forest of the South Eastern Highlands Bioregion (PCT 727)	
PCT ID	727
Common name	Broad-leaved Peppermint – Brittle Gum – Red Stringybark dry open forest of the South Eastern Highlands Bioregion (LA124)
Condition class	Vegetation zone 5 – moderate/good_high Vegetation zone 6 – moderate/good_medium Vegetation zone 7 – moderate/good_poor
Extent within disturbance footprint	53.55 ha 4.75 ha (moderate/good_high) 34.55 ha (moderate/good_medium) 14.25 ha (moderate/good_poor)
Description	<p>The canopy is co-dominated by Broad-leaved Peppermint (<i>Eucalyptus dives</i>) and Long-leaved box (<i>Eucalyptus goniocalyx</i>), with occasional stands of Brittle Gum (<i>Eucalyptus mannifera</i>), Yellow Box, and Apple Box (<i>Eucalyptus bridgesiana</i>). The native midstorey comprises a sparse cover of Hoary Guinea Flower (<i>Hibbertia obtusifolia</i>).</p> <p>About half of the ground layer cover consists of bare ground. The remaining area is dominated by native grasses, comprising of Snow Grass (<i>Poa sieberiana</i>), Purplish Wallaby Grass (<i>Rytidosperma tenuius</i>), Common Wheatgrass (<i>Anthosachne scaber</i>), Weeping Grass (<i>Microlaena stipoides</i>), Red-anthered Wallaby Grass (<i>Rytidosperma pallidum</i>) and Kangaroo Grass (<i>Themeda triandra</i>). All other species recorded occur at covers of less than 1% within the PCT.</p>
Survey effort	<p>Thirteen plots/transects within the disturbance footprint.</p> <ul style="list-style-type: none"> • Vegetation zone 5 – moderate/good_high: 3 • Vegetation zone 6 – moderate/good_medium: 6 • Vegetation zone 7 – moderate/good_poor: 4
Condition description	<p>The community is largely in moderate to poor condition with a high cover of introduced plant species due to past and current cattle grazing activities. Areas of higher condition occur along the eastern boundary of the mine development project area and to the east.</p> <p>The midstorey (shrub layer) is largely absent, with a sparse cover of Hoary Guinea Flower present. Half the ground cover consists of bare ground, with the remaining area dominated by native grasses. The community has not been subject to pasture improvement, however numerous exotic grasses and herbs have invaded. Most stands are subject to heavy grazing impacts and native species richness is low.</p>
Characteristic species used for identification of PCT	According to the NSW VIS Classification Version 2.1, the canopy layer species recorded within this community that align with the dominant species listed as characteristic of this PCT include Broad-leaved Peppermint and Brittle Gum. Aligning ground layer species include Snow Grass and Hoary Guinea Flower.
Justification of evidence used to identify the PCT	The canopy species of Broad-leaved Peppermint and Brittle Gum closely match PCT 727, and the community shares three groundcover species with the NSW VIS Classification Version 2.1. The community occurs on undulating exposed and sheltered footslopes which matches the relief of the site.
Status	<p>Commonwealth EPBC Act: not listed</p> <p>NSW BC Act: not listed</p>

Table 4.4 Vegetation zones 5-7 description

Vegetation Zones 5-7 – Broad-leaved Peppermint – Brittle Gum – Red Stringybark dry open forest of the South Eastern Highlands Bioregion (PCT 727)

Estimate of percent cleared value of PCT 50%
across its distribution



Photograph 4.2 Broad-leaved Peppermint – Brittle Gum – Red Stringybark dry open forest of the South Eastern Highlands Bioregion (moderate/good_high - plot ID EMM3Zone5).

c PCT 951 – Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion (LA164)

PCT 951 is characterised by open forest and comprises of 31.55 ha within the disturbance footprint (Figure 4.1). Vegetation in this PCT is highly fragmented, occurring as small, isolated patches. The midstorey and groundcover have been heavily impacted by grazing. Table 4.5 provides a description of the vegetation zone attributed to this PCT.

Table 4.5 **Vegetation zone 8 description**

Vegetation Zone 8 – Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion (PCT 951)	
PCT ID	951
Common name	Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion (LA164)
Condition class	Vegetation zone 8 – moderate/good_poor
Extent within disturbance footprint	31.55 ha
Description	<p>The canopy is dominated by Manna Gum (<i>Eucalyptus viminalis</i>). The midstorey is largely absent. Two native shrubs, Silver Wattle and White Dogwood (<i>Ozothamnus diosmifolius</i>) occur rarely. One high-threat-exotic species, Blackberry complex (<i>Rubus fruticosus</i> sp. aggregate) occurs rarely.</p> <p>The groundlayer is co-dominated by native and exotic grass, grass-like and forb species. Dominant native grasses include Wallaby Grass, Weeping Grass, Snow Grass and Kangaroo Grass (<i>Themeda triandra</i>). Dominant native grass-like plants are Tall Sedge (<i>Carex appressa</i>) and Common Rush (<i>Juncus usitatus</i>). One native forb species is co-dominant, being Slender Knot Weed (<i>Persicaria decipiens</i>).</p> <p>Dominant exotic grasses comprise of Harding Grass (<i>Phalaris aquatica</i>), Rye Grass (<i>Lolium perenne</i>), Prairie Grass (<i>Bromus catharticus</i>), Tall Fescue (<i>Festuca arundinacea</i>), Soft Brome (<i>Bromus hordeaceus</i>), Windmill Grass and Couch Grass (<i>Cynodon dactylon</i>). Dominant exotic forbs are Burr clover (<i>Medicago</i> spp.), Flatweed (<i>Hypochaeris radicata</i>) and White Clover (<i>Trifolium repens</i>).</p>
Survey effort	<p>Five plots/transects within the disturbance footprint:</p> <ul style="list-style-type: none"> Vegetation zone 8 – moderate/good_poor: 5
Condition description	<p>The community is in poor condition with a high cover of introduced plant species due to past and current cattle grazing activities. The midstorey (shrub layer) is largely absent, with two native shrubs occurring rarely. The exotic species Blackberry also occurs rarely in the shrub layer.</p> <p>Due to pasture improvement in the vicinity, the grassy understorey is generally dominated by exotic pasture grasses. A number of typical herbaceous weeds found in grazing areas also occur. Many of the canopy trees show signs of stress (e.g. dead/defoliated branches and a large amount of fallen woody debris). This is typical in grazing land due to soil compaction and excessive nutrients from stock manure.</p>
Characteristic species used for identification of PCT	<p>According to the NSW VIS Classification Version 2.1, the canopy layer species recorded within this community that aligns with the dominant species listed as characteristic of this PCT is Manna Gum, which dominates the canopy.</p> <p>The shrub layer is sparse, but Silver Wattle occurs which is listed in the NSW VIS Classification Version 2.1 for the PCT. Aligning ground layer species include Snow Grass, Weeping Grass and Tall Sedge.</p>

Table 4.5 **Vegetation zone 8 description**

Vegetation Zone 8 – Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion (PCT 951)	
Justification of evidence used to identify the PCT	<p>PCT 1101 Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands Bioregion, is better aligned for this community, being mapped on the site in the regional mapping by OEH (2018) and being closely aligned in terms of dominant canopy species (Ribbon Gum – also known as Manna Gum) and mid stratum species (Silver Wattle). However, the Biobanking Calculator does not include this as an option for selection on the site.</p> <p>The best available fit is Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion (PCT 951). Although not within the relevant IBRA subregion, according to the NSW VIS Classification Version 2.1, the canopy layer species recorded within this community that aligns with the dominant species listed as characteristic of this PCT is Manna Gum, which dominates the canopy. The shrub layer is sparse, but Silver Wattle occurs which is listed in the NSW VIS Classification Version 2.1 for the PCT. Aligning ground layer species include Snow Grass, Weeping Grass and Tall Sedge.</p>
Status	<p>Commonwealth EPBC Act: not listed</p> <p>NSW BC Act: not listed</p>
Estimate of percent cleared value of PCT across its distribution	80%



Photograph 4.3 Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion (moderate/good_poor - plot ID 103_WL_2_E).

d PCT 766 – Carex sedgeland of the slopes and tablelands (LA130)

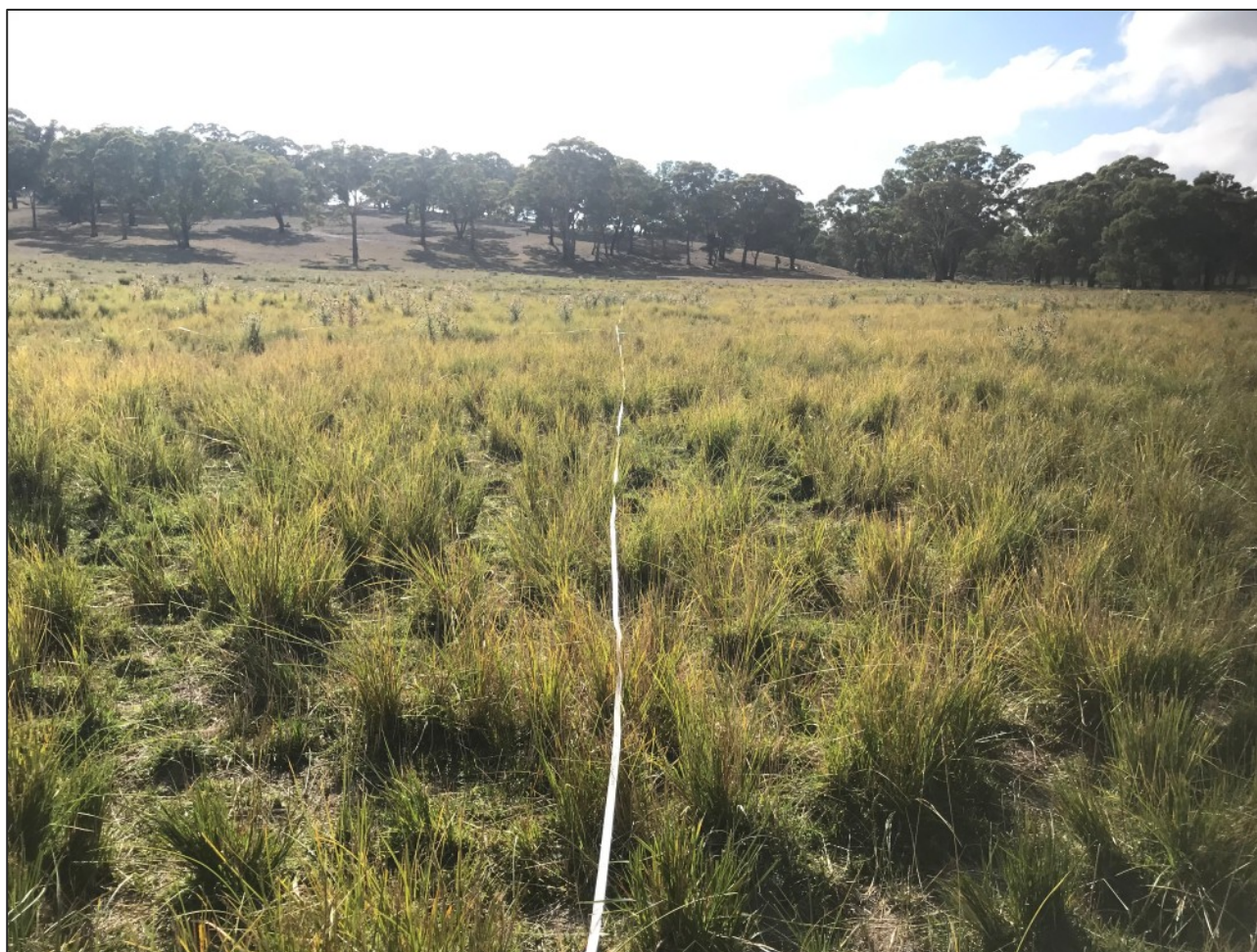
PCT 766 is characterised by wet tussock grassland, dominated by sedges, growing in low lying and infrequently inundated drainage lines. This PCT occurs as a single 3.04 ha patch of grassland within both the project area and the proposed disturbance footprint (Figure 4.1). Table 4.6 provides a description of the vegetation zone attributed to this PCT.

Table 4.6 Vegetation zone 9 description

Vegetation Zone 9 – Carex sedgeland of the slopes and tablelands (PCT 766)	
PCT ID	766
Common name	Carex sedgeland of the slopes and tablelands (LA130)
Condition class	Vegetation zone 9 – moderate/good_poor
Extent within disturbance footprint	3.04 ha

Table 4.6 **Vegetation zone 9 description**

Vegetation Zone 9 – Carex sedgeland of the slopes and tablelands (PCT 766)	
Description	The canopy and midstorey are absent, as is typical for this PCT. Over three-quarters of the groundlayer is co-dominated by three species: one native grass-like species, Tall Sedge (<i>Carex appressa</i>), one exotic grass, Tall Fescue (<i>Festuca arundinacea</i>), and one exotic forb, White Clover (<i>Trifolium repens</i>). The next most common species is an unidentified grass within the Poaceae family. The remaining area (around 10% of the PCT) is dominated by exotic grasses and forbs, being Spear Thistle (<i>Cirsium vulgare</i>), Harding Grass (<i>Phalaris aquatica</i>), Flatweed (<i>Hypochaeris radicata</i>), Prickly Lettuce (<i>Lactuca serriola</i>) and Common Dandelion (<i>Taraxicum officinale</i>). Two native forbs are also common within this remaining area, being Swamp Dock (<i>Rumex brownii</i>) and Common Rush (<i>Juncus usitatus</i>).
Survey effort	Vegetation zone 9 – moderate/good_poor: 2
Condition description	The community is in poor condition with a high cover of exotic pasture grasses and weeds. While Tall Sedge provides significant cover, grazing of these low lying areas by cattle has resulted in significant trampling and grazing of vegetation and consequent introduction of exotic species.
Characteristic species used for identification of PCT	The canopy and shrub layers are not present, consistent with the NSW VIS Classification Version 2.1 (although the VIS gives <i>Leptospermum</i> spp as species within the shrub layer, the shrub layer is absent consistent with vegetation across the site). The ground layer is dominated by Tall Sedge, consistent with the NSW VIS Classification Version 2.1.
Justification of evidence used to identify the PCT	The community is described in the NSW VIS Classification Version 2.1 as occurring on valley floors and drainage lines with poor drainage, consistent with its distribution in the project area, upstream of a farm dam across a watercourse.
Status	Commonwealth EPBC Act: not listed NSW BC Act: not listed
Estimate of percent cleared value of PCT across its distribution	75%



Photograph 4.4 Wet tussock grasslands of cold air drainage areas of the tablelands (moderate/good_poor - plot ID EMM5Zone9)

e Open grasslands

Open grasslands occur as a single 1,002.38 ha patch of grassland within the disturbance footprint (Figure 4.1). Open grasslands were in a highly disturbed site, meaning that they could not be reliably assigned to a PCT. Accordingly, a conservative approach was taken and the open grasslands were assigned to each potential PCT (ie 727, 951 and 1330), to determine if their site value score exceeded the offset threshold, or otherwise. Table 4.7 provides a description of open grassland, and the three vegetation zones used to determine whether offsets were required for this area.

Table 4.7 Vegetation zone 10-12 description

Vegetation Zone 10-12 – Open grasslands	
PCT ID	Assigned to 727, 951 and 1330
Common name	Open grassland
Condition class	Vegetation zone 10 – PCT 1330 low Vegetation zone 11 – PCT 727 low Vegetation zone 12 – PCT 951 low

Table 4.7 **Vegetation zone 10-12 description**

Vegetation Zone 10-12 – Open grasslands	
Extent within disturbance footprint	1002.38 ha 1002.38 (PCT 1330 low) 1002.38 (PCT 727 low) 1002.38 (PCT 951 low)
Description	The overstorey and midstorey in these areas is absent, except for scattered paddock trees. Areas of open grassland are dominated by exotic grasses such as Harding Grass, Creeping Bentgrass, Rye Grass, Prairie Grass, Tall Fescue, Soft Brome, Windmill Grass as well as exotic forbs such as Burr clover, Flatweed and White Clover. In some areas native grasses such as Kangaroo Grass, Red-anthered Wallaby Grass and Weeping Grass and can be dominant over small areas; however, these areas are highly simplified through past grazing.
Survey effort	Vegetation zone 10 – PCT 1330 low: 15 Vegetation zone 11 – PCT 727 low: 15 Vegetation zone 12 – PCT 951 low: 15
Condition description	The community is in very poor to poor condition with a high cover of exotic pasture grasses and weeds. While native grass species can provide over 50% cover in some areas, this transitions rapidly (over tens of metres) to low native cover. Exotic plant species make up to 40-92% cover.
Characteristic species used for identification of PCT	As it was problematic to delineate the boundaries of open grassland PCTs, the plot data collected from open grassland areas was inputted against all three PCTs mapped in the project area.
Justification of evidence used to identify the PCT	Open grasslands were mapped as a single vegetation zone as condition and cover of native versus exotic species rapidly changed over tens of metres, making mapping of derived grasslands problematic, if not impossible.
Status	Commonwealth EPBC Act: not listed NSW BC Act: not listed
Estimate of percent cleared value of PCT across its distribution	Not determined



Photograph 4.5 **Open grassland areas**

iii **Site value scores**

Four PCTs occur in the disturbance footprint, with 12 vegetation zones mapped and/or entered into the credit calculator to determine site value score. A summary of the site value score for each vegetation zone is provided in Table 4.8. The site value score is based on the transect data which is compared with benchmark values for each vegetation type.

Table 4.8 **Vegetation zone summary**

PCT ID	PCT name	Condition	Ancillary	Extent in disturbance footprint (ha)	Site value
727	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion (LA124)	Mod-Good	High	4.75	71.88
			Medium	34.55	61.98
			Poor	14.25	52.08
951	Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion (LA164)	Mod-Good	Poor	31.55	46

Table 4.8 **Vegetation zone summary**

PCT ID	PCT name	Condition	Ancillary	Extent in disturbance footprint (ha)	Site value
766	Carex sedgeland of the slopes and tablelands (LA130)	Mod-Good	Poor	3.04	31.16
1330	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion (LA276)	Mod-Good	High	1.47	16.67
			Medium	17.03	58.85
			Other	0.76	44.27
			Poor	24.96	58.85
727	Open grassland	Low	–	1002.38	7.81
951		Low	–	1002.38	12.00
1330		Low	–	1002.38	9.38

Site value scores for wooded vegetation varied between 16.67 and 71.88. Interestingly, plot data from PCT 1330 in moderate/good – high condition derived a very low site value score of 16.67, below the benchmark for offsetting and below that expected. The site value score for PCT 766 was 31.16, reflective of the level of past disturbance to this PCT.

Areas of open grassland derived a site value score of 7.81 to 12.00, indicating the level of past disturbance to these areas, and confirming that regardless of the PCT selected these areas are below the threshold for requiring offsets.

5 Threatened species

5.1 Habitat assessment

The project area has an extensive history of use for agricultural purposes, particularly for grazing. As a result, the disturbance footprint provides limited refuge or habitat for fauna. Fauna habitat features were limited to areas of remnant vegetation, particularly those in higher quality, scattered trees and waterways.

Areas of remnant vegetation in moderate/good – high and moderate/good-medium condition contained a moderate level of fallen timber and a sparse to moderate litter cover; some hollow-bearing logs are present but most have been cleared through underscrubbing. The groundcover consists of a sparse to moderate cover of native grasses, including tussock grasses, and forbs. The midstorey is largely absent due to grazing. Hollows varied from largely absent in areas of regrowth and younger vegetation to abundant in some vegetation zones.

Waterways within the project area are highly degraded due to stock access. During periods of low flow, the Belubula River consists of a series of disconnected pools with a gravel to muddy base and little aquatic vegetation. There is a large sediment load due to stock access. Riparian vegetation is largely absent and restricted to patches of retained trees and Willows (*Salix* sp.). There are several farm dams, which generally lack vegetation cover.

5.2 Candidate species assessment

5.2.1 Geographic habitat features

An assessment of the occurrence of geographic habitat features, in accordance with Section 6.3 of the FBA (OEH 2014a) was undertaken, along with a determination of whether impacts to these habitat features will result from project. The results of this assessment, along with the species generated by the calculator associated with the FBA, are outlined in Table 5.1.

Table 5.1 Assessment of geographic habitat features within the disturbance footprint

Feature	Common name	Scientific name	Feature present in disturbance footprint?	Justification and discussion of potential for species impacts
Land within 250m of termite mounds or rock outcrops	Rosenberg's Goanna	<i>Varanus rosenbergi</i>	No	The project area does not support termite mounds or areas of outcropping rock suitable for Rosenberg's Goanna.
Land containing a forb-rich grassy ground layer	Small Purple-pea	<i>Swainsonia recta</i>	Yes	Areas of PCTs 727 and 1330 in moderate/good-high and moderate/good – medium conditions tended to support a groundcover dominated by native grasses and some forbs.
Land within 100m of stream or creek banks	Booroolong Frog	<i>Litoria booroolongensis</i>	Yes	The project area supports land within 100 m of streams and creeks, including the Belubula River and associated tributaries.

Suitable geographic features for the Small Purple-pea and Booroolong Frog were recorded in the project area. These two species have been included in the species credit species assessment in Section 5.2.3.

5.2.2 Ecosystem credit species assessment

A list of ecosystem credit species predicted to occur within the disturbance footprint, based on the PCTs present and generated by the calculator associated with the FBA (OEI 2014a), is provided in Table 5.2, along with a list of associated PCTs.

Table 5.2 Ecosystem credit species predicted on site and associated vegetation types

Species name	Associated vegetation type	Threatened species offset multiplier
Black-chinned Honeyeater (eastern subspecies) <i>Melithreptus gularis subsp. gularis</i>	PCT1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion (LA276)	1.3
Brown Treecreeper (eastern subspecies) <i>Climacteris picumnus subsp. victoriae</i>	PCT 727 - Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion (LA124)	2.0
	PCT1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion (LA276)	-
Diamond Firetail <i>Stagonopleura guttata</i>	PCT 727 - Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion (LA124)	1.3
	PCT1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion (LA276)	-
Flame Robin <i>Petroica phoenicea</i>	PCT 727 - Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion (LA124)	1.3
	PCT 951 - Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion (LA164)	-
	PCT1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion (LA276)	-
Gang-gang Cockatoo <i>Callocephalon fimbriatum</i>	PCT 727 - Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion (LA124)	2.0
	PCT 951 - Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion (LA164)	-
	PCT1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion (LA276)	-
Hooded Robin (south-eastern form) <i>Melanodryas cucullata subsp. cucullata</i>	PCT1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion (LA276)	1.7
Little Eagle <i>Hieraaetus morphnoides</i>	PCT 727 - Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion (LA124)	1.4
	PCT 766 - Carex sedgeland of the slopes and tablelands (LA130)	-
	PCT 951 - Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion (LA164)	-

Table 5.2 Ecosystem credit species predicted on site and associated vegetation types

Species name	Associated vegetation type	Threatened species offset multiplier
	PCT1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion (LA276)	-
Little Lorikeet <i>Glossopsitta pusilla</i>	PCT1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion (LA276)	1.8
Painted Honeyeater <i>Grantiella picta</i>	PCT 727 - Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion (LA124)	1.3
	PCT1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion (LA276)	-
Scarlet Robin <i>Petroica boodang</i>	PCT 727 - Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion (LA124)	1.3
	PCT 766 - Carex sedgeland of the slopes and tablelands (LA130)	-
	PCT 951 - Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion (LA164)	-
	PCT1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion (LA276)	-
Speckled Warbler <i>Chthonicola sagittata</i>	PCT 727 - Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion (LA124)	2.6
	PCT1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion (LA276)	-
Spotted Harrier <i>Circus assimilis</i>	PCT 766 - Carex sedgeland of the slopes and tablelands (LA130)	1.4
	PCT1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion (LA276)	-
Spotted-tailed Quoll <i>Dasyurus maculatus</i>	PCT 727 - Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion (LA124)	2.6
	PCT 951 - Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion (LA164)	-
	PCT1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion (LA276)	-
Square-tailed Kite <i>Lophoictinia isura</i>	PCT1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion (LA276)	1.4
Swift Parrot <i>Lathamus discolor</i>	PCT1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion (LA276)	1.3
Varied Sittella <i>Daphoenositta chrysoptera</i>	PCT 727 - Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion (LA124)	1.3

Table 5.2 Ecosystem credit species predicted on site and associated vegetation types

Species name	Associated vegetation type	Threatened species offset multiplier
	PCT 951 - Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion (LA164)	-
	PCT1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion (LA276)	-
White-fronted Chat <i>Epthianura albifrons</i>	PCT 766 - Carex sedgeland of the slopes and tablelands (LA130)	0.8
Yellow-bellied Glider <i>Petarus australis</i>	PCT 951 - Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion (LA164)	2.3

Notes: Where no value is assigned to the threatened species offset multiplier for a particular species (ie Varied Sittella for PCT 951), it is not a predicted ecosystem credit species associated with that PCT. The presence of these species could not be discounted using the methodology outlined in Section 6.3 of the FBA (OEH 2014a). It was therefore assumed that these species may occur within the project area.

The Spotted-tailed Quoll and Speckled Warbler have the lowest Tg values and therefore the highest threatened species offset multipliers.

To account for PCT 1330 not being able to be aligned with White Box Yellow Box Blakely's Red Gum Woodland EEC in the BioBanking Calculator, and therefore deriving an EEC multiplier of 3.0, the threatened species offset multiplier for the Black-chinned Honeyeater was manually increased to 3.0.

5.2.3 Species credit species assessment

To develop a list of threatened fauna species credit species requiring assessment, the PCTs listed in Section 4 were entered into the credit calculator associated with the FBA (OEH 2014a). An initial assessment was undertaken, in accordance with Section 6.5 of the FBA (OEH 2014a) to develop a list of candidate species requiring further assessment and survey. This assessment is provided in Table 5.3.

Table 5.3 Candidate threatened species assessment

Scientific name	Common Name	Candidate species	Rationale
Flora			
<i>Eucalyptus aggregata</i>	Black Gum	No	Known to occur in the region, this species occurs on alluvial soils in low lying areas, including in association with Manna Gum. Initially considered to have potential to occur in association with PCT 951. However, all patches of this PCT were visited during vegetation mapping by EnviroKey and EMM and the species was not recorded.
<i>Eucalyptus canobolensis</i>	Silver-Leaf Candlebark	No	Known only from Mt Canobolas near Orange. Project area is outside species range.
<i>Eucalyptus saxicola</i>	Mt Canobolas Box	No	This taxon is no longer considered by the Scientific Committee to represent a taxon separate from <i>Eucalyptus bridgesiana</i> , and as a consequence it has been delisted from the BC Act. Further, this species was restricted to a few scattered stands over approximately 1 km at Mt Canobolas near Orange.
<i>Leucochrysum albicans</i> subsp. <i>tricolor</i>	Hoary Sunray	Yes	Species occurs in a wide variety of grassland, woodland and forest habitats, generally on relatively heavy soils. There are records of this species north and south of project area. Presence cannot be discounted. Potential to occur in all vegetation zones not in low condition.
<i>Swainsona recta</i>	Small Purple-pea	Yes	Species occurs in a variety of woodlands, including Box Gum Woodland, generally with an understorey dominated by Kangaroo Grass (<i>Themeda triandra</i>), Poa

Table 5.3 **Candidate threatened species assessment**

Scientific name	Common Name	Candidate species	Rationale
			tussocks (<i>Poa</i> spp.) and Spear-grasses (<i>Austrostipa</i> spp.). There are records south of the disturbance footprint, near Carcoar. Presence cannot be discounted. Potential to occur in all vegetation zones with a groundcover dominated by native grasses listed above.
Fauna			
<i>Anthochaera phrygia</i>	Regent Honeyeater	Yes - vagrant	The Regent Honeyeater mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia, where it feeds on the nectar from a wide range of eucalypts and mistletoes, including species present in the project area. There are records from near Bathurst; however, the project area does not present breeding habitat or habitat critical to the survival of the species. The species may forage in the project area as a vagrant species. The species is considered vagrant within the project area. Targeted surveys were undertaken for this species as a precaution.
<i>Cercartetus nanus</i>	Eastern Pygmy-possum	Yes	Found in a broad range of habitats, usually with a complex midstorey. The habitat in the project area is considered marginal and the project area is outside of the species range, with no recent records within proximity to the project area. However, a precautionary assessment has been undertaken and the species has been included as a candidate species. Potential to occur in PCTs 727 and 951, excluding areas lacking tree or shrub cover.
<i>Litoria booroolongensis</i>	Booroolong Frog	No	The project area does not support permanent streams, with all waterways declining to disconnected ponds during low flow. Further, waterways within the project area do not support cobble banks or other rock substrate along stream margins that would provide breeding habitat for this species. The project area does not provide suitable habitat for this species.
<i>Petaurus norfolcensis</i>	Squirrel Glider	Yes	The project area supports forests and woodlands dominated by Box species, although a shrubby or <i>Acacia</i> spp. dominated midstorey is largely absent. The species has been recorded during previous surveys and is known to occur on-site. Species was considered likely to occur in all PCTs excluding areas lacking tree cover.
<i>Phascolarctos cinereus</i>	Koala	Yes	The Koala occurs in a wide variety of forests and woodlands. PCT 951 represents primary koala feeding habitat as it contains Manna Gum, a primary koala food tree in the central and southern tablelands koala management area (KMA), in which the project is located. PCT 1330 represents secondary habitat for the species, as it contains secondary food tree species, Apple Box and Yellow Box. Although the NSW VIS Classification Version 2.1 lists PCT 727 as containing Brittle Gum which is a secondary koala food tree in the central and southern tablelands KMA, Brittle Gum was not noted as being abundant on site. Brittle Gum occurred as less than 15% of total number of trees present in all vegetation plots (n=4) and all Spot Assessment Technique (SAT) sites (n=9) in PCT 727 (see Table 5.9), with Broad-leaved Peppermint being dominant species. Small numbers of Long-leaved Box occurred particularly in the northeast of the site, but again below the 15% threshold. SEPP 44 classifies areas of potential Koala habitat referring to areas of native vegetation where the trees of the types listed in Schedule 2 of the policy constitute at least 15% of the total number of trees in the upper or lower strata of the tree component. By also including koala food tree species listed in the central and southern tablelands KMA (Brittle Gum and Long-leaved Box) PCT 727 does not contain greater than 15% koala food tree species and does not meet

Table 5.3 **Candidate threatened species assessment**

Scientific name	Common Name	Candidate species	Rationale
			the criteria of koala habitat. This PCT is therefore excluded as habitat for the species in the assessment.
			There are records in proximity to the project area.

This assessment identified the following species as candidate species requiring further assessment:

- Hoary Sunray;
- Small Purple-pea;
- Regent Honeyeater;
- Eastern Pygmy-possum;
- Squirrel Glider; and
- Koala.

Targeted surveys were undertaken, and the presence or absence of these species in the project area determined, in accordance with Section 6.6 of the FBA (OEH 2014a). Survey methods and outcomes are discussed further below.

5.3 Methods

5.3.1 Targeted flora surveys

Initial targeted threatened flora surveys were carried out by EnviroKey in 2013 during peak detection periods (spring). Threatened flora searches were undertaken in the following survey periods:

- 9 - 14 September 2013: targeting Small Purple-pea;
- 23 - 24 October 2013 targeting Small Purple-pea and Hoary Sunray;
- 6 - 7 November 2013 targeting Hoary Sunray; and
- 20 - 26 November 2013 targeting Hoary Sunray.

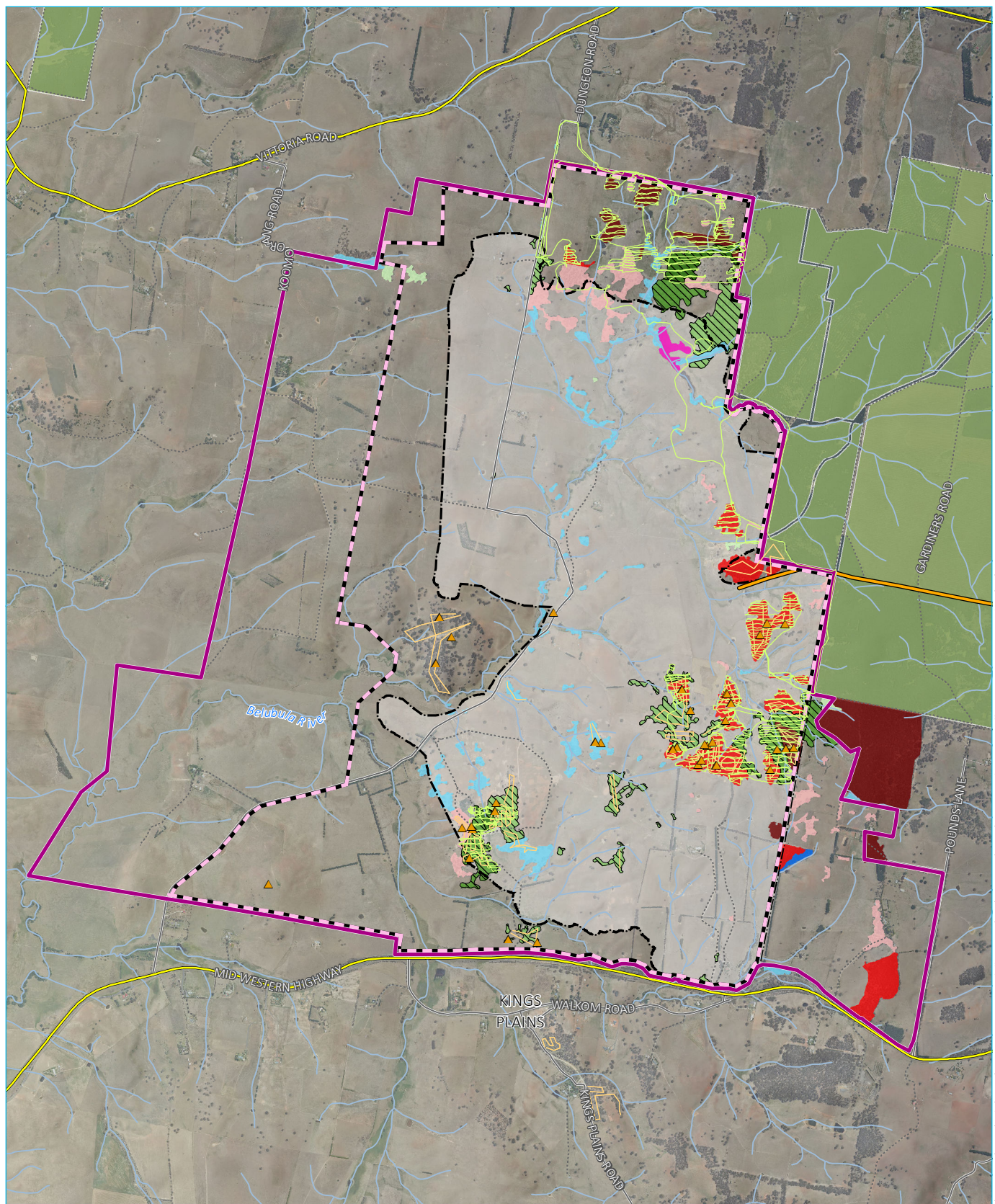
Surveys were undertaken by walking transects (either random meanders or line transects) through patches of potentially suitable vegetation by experienced personnel (EnviroKey 2017, Figure 5.1).

Further targeted flora surveys were conducted in February – March 2019 in accordance with OEH *Guide to surveying threatened plants* (OEH 2016) using transects spaced at 10 m intervals (Figure 5.1). These surveys primarily targeted the Hoary Sunray, as surveys occurred outside the survey period of September to October for the Small Purple-pea. Vegetation communities which were mapped as having a High and Medium ancillary code were targeted as they were considered to have the most potential of the targeted species being present.

EMM sent an email to BCD on 11 February 2019 seeking comment regarding EMM's proposed approach to survey for the Small Purple-Pea. BCD responded on 5 March 2019 stating that targeted surveys had been conducted for Small Purple-pea in the spring of 2013, with adequate coverage of the following PCTs:

- PCT 1330 Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion; and
- PCT 727 Broad-leaved Peppermint – Brittle Gum – Red Stringybark dry open forest on the South Eastern Highlands Bioregion.

BCD stated they were satisfied with the survey effort conducted to date in the above PCTs. However, they noted that no transects were conducted in the northernmost part of the proposed disturbance footprint in PCT 1298 – Wet tussock grasslands of cold air drainage areas of the tablelands (re-classified by EMM to PCT 766 – *Carex* sedgeland of the slopes and tablelands, refer Section 4.1). It was noted this area contains habitat suitable for the Silky Swainson-pea (*Swainsona sericea*). BCD advised that the exclusion of species within this PCT will need to be fully justified in the BAR. The Silky Swainson-pea is not identified as a threatened species requiring consideration by the calculator associated with the FBA (OEH 2014a) for this PCT. Therefore, this species is not considered a candidate species requiring further assessment, in accordance with the method set out in Section 6.5 of the FBA (OEH 2014a).



Source: EMM (2019); Regis Resources (2019); Survey Graphics (2019); DFSI (2017); EnviroKey (2013, 2014, 2018)

KEY

- Project application area
 - Mine development project area (2,513.47 ha)
 - Mining lease application area (1,812.99 ha) (Note: boundary offset for clarity)
 - Disturbance footprint
 - Pipeline corridor
- Existing environment
 - Main road
 - Local road
 - Vehicular track
 - Watercourse/drainage line
 - Vittoria State Forest

- Flora survey effort
 - Threatened flora transect (EMM, 2019)
 - Threatened flora search (EnviroKey, 2013)
 - Threatened flora transect (EnviroKey, 2013)
 - Box Gum Woodland TEC (EMM, 2019)
- Plant community types
 - 727 - Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion
 - Moderate/Good (High)
 - Moderate/Good (Medium)
 - Moderate/Good (Poor)

- 766 - Carex sedgeland of the slopes and tablelands
- Moderate/Good (Poor)
- 951 - Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion
- Moderate/Good (Medium)
- Moderate/Good (Poor)
- 1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
- Moderate/Good (High)
- Moderate/Good (Medium)
- Moderate/Good (Poor)
- Moderate/Good (Other)

Threatened flora survey methods

McPhillamys Gold Project
Biodiversity assessment report
Figure 5.1

5.3.2 Targeted fauna surveys

Initial targeted fauna surveys were conducted by EnviroKey in 2013 and 2014, over six discrete sessions each five days long:

- 21 – 25 May 2013;
- 9 – 14 September 2013;
- 23 – 24 October 2013;
- 6 – 7 November 2013;
- 20 – 26 November 2013; and
- 24 – 30 March 2014.

Fauna surveys consisted of habitat assessment, bird surveys, funnel trap lines, ground Elliot trapping, arboreal Elliot trapping, echolocation call recording, camera trapping, call playback, spotlighting, reptile searches, frog searches, track and scat searches (EnviroKey 2017).

Further targeted fauna surveys were undertaken by EMM from 18 to 22 February 2019 to ensure surveys had been undertaken in accordance with NSW (DEC 2004, DECC 2009) and Commonwealth (DEWHA 2010a, 2010b, 2010c, 2011a, 2011b) guidelines.

Stratification units, as well as survey methods and effort are outlined for each fauna group below. Fauna survey locations are illustrated in Figure 5.2.

i Diurnal birds

Bird surveys were undertaken for the Regent Honeyeater. Stratification units and area of each survey unit in the survey area are shown in Table 5.4.

Table 5.4 Stratification units and survey area – diurnal birds

Stratification unit	Area (ha)
PCT 727 moderate/good – high, medium and poor	53.55
PCT 951 moderate/good – poor	31.55
PCT 1330 moderate/good – high, medium, other and poor	44.22

Bird survey methods and survey effort have been developed in accordance with DEC (2004) and DSEWPaC (2010a) guidelines. Diurnal bird surveys were conducted over five survey periods in 2013; in May, September, and October and twice in November. A further survey period was conducted in March 2014 giving a total of six survey periods.

Field surveys were completed at a variety of locations designed to cover as much of the suitable habitat in the project area as possible but with a focus on suitable habitat for threatened species. Surveys were conducted in either the early morning or late afternoon to coincide with peak bird activity. Opportunistic data was also collected across during the field survey whenever traversing the project area and locality.

Table 5.5 **Methods and survey effort – diurnal birds**

Method	Survey description	Survey effort
Area searches	<ul style="list-style-type: none"> Land based areas searches in suitable habitat, conducted preferably in the morning or afternoon, to coincide with peak bird activity. Surveyors conducted surveys within a 1-3 ha area over a 20-minute period. All calls and habitat features were investigated. Birds observed or heard were recorded. 	<p>DEC (2004) has not resolved bird survey requirements. DSEWPaC (2010a) specifies 20 hours of surveys over 10 days for areas of less than 50 ha. No replication of survey effort is specified.</p> <p>A total of 143 bird surveys were undertaken by EnviroKey (2017) equating to an estimated 47.7 hours of bird surveys.</p>

ii Small terrestrial mammals

Small terrestrial mammal surveys were undertaken to target the Eastern Pygmy-possum. Stratification units and area of each survey unit in the survey area is shown in Table 5.6. Areas in lower condition were not considered suitable for this species due to a lack of suitable cover in the midstorey and groundcover as a result of grazing. Areas in high and medium condition were considered suboptimal but were surveyed as a precaution.

Table 5.6 **Stratification units and survey area – small terrestrial mammals**

Target species	Vegetation class	Area (ha)
Eastern Pygmy Possum	PCT 727 moderate/good – high and medium	39.30
	PCT 1330 moderate/good – high and medium	18.50

Methods and survey effort have been developed in accordance with DEC (2004) and included a mix of terrestrial trapping and remote camera surveys. Methods and survey effort are outlined in Table 5.7.

Table 5.7 **Methods and survey effort – small terrestrial mammals**

Method	Survey description	Survey effort
Trapping	<p>20 Elliot A traps placed 10 m apart in two parallel lines separated by 25 m (access roads) or 25 Elliot A traps placed 10 m apart in a 5 x 5 grid (other areas):</p> <ul style="list-style-type: none"> Traps baited with a mixture of peanut butter, rolled oats and honey. Traps checked early in the morning and closed for the day. Traps opened and rebaited in the late afternoon. Animals to be temporarily marked to allow mark-recapture data to be collected. Surveys to be undertaken anytime except between May and August. 	<p>DEC (2004) specifies one site per 50 ha stratification unit with replication of effort for every additional 100 ha.</p> <p>Based on the areas above this would require two survey sites (one in PCT 727 and one in PCT 1330) equating to 200 trap nights.</p> <p>EnviroKey completed three trap sites in PCT 727 and one trap site in PCT 1330, equating to 400 trap nights.</p>
Remote cameras	<p>Remote camera surveys were undertaken in accordance with the following guidelines:</p> <ul style="list-style-type: none"> Two cameras placed at least 100 m apart. 	<p>No guidelines are available for the Eastern Pygmy-possum. Survey effort from similar projects has been used, with one site (two cameras) per 20 ha of stratification unit.</p>

Table 5.7 Methods and survey effort – small terrestrial mammals

Method	Survey description	Survey effort
	<ul style="list-style-type: none"> Cameras are attached to tree or stake and positioned approximately 25cm above ground with bait stations placed 1.5m away. Bait stations were baited with a mixture of peanut butter, rolled oats and honey. Cameras are left in place for a minimum of 14 nights. 	<p>Based on the areas above this would require three survey sites (two sites in PCT 727 and one site in PCT 1330) equating to 84 camera nights.</p> <p>EnviroKey has completed four sites, consisting of a single camera per site, in the target habitats, with two sites in PCT 727 and two sites in PCT 1330. EMM completed an additional four sites in PCT 727.</p>

iii Arboreal mammals

Arboreal mammal surveys were undertaken to target the Squirrel Glider and Koala. Stratification units and area of each survey unit in the survey area is shown in Table 5.8.

Table 5.8 Stratification units and survey area – arboreal mammals

Stratification unit	Area (ha)
PCT 727 moderate/good – high, medium and poor	53.55
PCT 951 moderate/good – poor	31.55
PCT 1330 moderate/good – high, medium, other and poor	44.22

Methods and survey effort have been developed in accordance with Phillips and Callaghan (2011) (2011) and Commonwealth of Australia (2014). Methods and survey effort are outlined in Table 5.9

Table 5.9 Methods and survey effort – arboreal mammals

Method	Survey description	Survey effort
Arboreal trapping (Squirrel Glider)	<p>Ten Elliot B or cage traps were placed at 2-4 m above the ground, 50 m apart in two parallel lines separated by 50 m:</p> <ul style="list-style-type: none"> Traps were baited with a mixture of peanut butter, rolled oats and honey. A mixture of water and honey was sprayed on tree trunk. Traps were checked early in the morning and closed for the day. Traps were re-opened and rebaited in the late afternoon. Animals to be temporarily marked to allow mark-recapture data to be collected. Trapping was undertaken in conjunction with terrestrial mammal trapping where suitable habitat occurs. 	<p>DEC (2004) requires a minimum of 24 trap nights over 3-4 consecutive days per 50 ha of stratification unit, with replication for every additional 100 ha (or part thereof).</p> <p>Based on the above stratification units, this would equate to 4 survey sites (one in PCTs 951 and 1330 and two in PCT 727).</p> <p>EnviroKey has undertaken five arboreal trapping surveys, three sites in PCT 727 and two in PCT 1330. EMM has undertaken two additional surveys; one site in PCT 951 and one in PCT 1330.</p>
Spotlighting (Squirrel Glider and Koala)	DEC (2004) recommends two parallel 2 x 1km transects, conducted on two separate nights (4 transects total) per 200 ha stratification unit. No survey effort for larger sites is specified.	DEC (2004) recommends 2 transects, completed on separate nights, per 200 ha of stratification unit. This would equate to three 1 km transects (one per PCT)

Table 5.9 Methods and survey effort – arboreal mammals

Method	Survey description	Survey effort
	<ul style="list-style-type: none"> 1km transects should be undertaken by an observer, or two 500 m transects by two observers with 25 m between transects. Observers move at a speed of 1km/h (ie one hour to complete the survey). All animals observed are recorded, including the distance of the animals from the observer. 	<p>completed on two nights (6 transects total).</p> <p>EnviroKey has undertaken seven spotlighting surveys; two transects were completed in PCT 727, one in PCT 951 and three in PCT 1330. One is outside an identified PCT, and covered paddock trees and areas of PCT 951. A further five transects were completed by EMM; two in PCT 727 and three in PCT 1330.</p>
Spot Assessment Technique (SAT) (Koala)	<p>The SAT method involves a radial assessment of Koala “activity” within the immediate area surrounding a tree of any species that is known to have been utilised by the species, or otherwise considered to be of some importance</p> <ul style="list-style-type: none"> Centre tree is located and marked with flagging tape. The 29 nearest trees to the centre tree were also identified and marked. Koala faecal pellets were searched for beneath each of the 30 trees within a distance of 100 cm. Initial inspections were checked in undisturbed ground surface, followed by a more thorough inspection involving disturbance of leaf litter and ground cover (if no faecal pellets were initially detected). An average of approximately two person minutes per tree should be dedicated to the faecal pellet search. Activity levels can be interpreted using Table 2 from Phillips and Callaghan (2011). 	<p>The Regularised Grid Based (RGB) SAT method was used to define survey locations. A 350 m grid was placed over the disturbance area and any points intersecting wooded areas was included for survey. This generated 24 survey locations.</p> <p>Twenty-four SAT surveys were completed across the project area.</p>

iv Other fauna surveys

A number of additional surveys were completed within the project area during the biodiversity assessment conducted by EnviroKey. Although not strictly required under the FBA (OEH 2014a), these surveys have helped define the impact footprint, ensuring impacts to all identified biodiversity values have been considered during detailed mine planning. For completeness, these surveys are outlined below (where not described above).

a Funnel trap lines

Small terrestrial fauna species such as reptiles, frogs and mammals were targeted using funnel trap lines across various locations within the project area. These trap lines comprised of three pairs of funnel traps set along a 20 m long x 0.23 m tall PVC fence. Funnel traps rather than the more traditional pitfall buckets were chosen given their appropriateness for the target fauna.

b Echolocation call recording

Microchiropteran bats were targeted by using a ‘Titley’ Anabat SD1 Echolocation Call Recording Unit coupled to a PDA for active or mobile monitoring. Surveys were conducted across the project area and the locality with an emphasis on derelict mine shafts and water sources such as dams and creeks. Further surveys were undertaken however these were static surveys, where the recorder was set up adjacent to a water source and left in place for the duration of the site surveys with recording times set up for approximately 8 hours over a night.

c Call playback

Call playback was conducted across the project area to detect threatened nocturnal fauna. The target species for this assessment were Masked Owl, Barking Owl, Squirrel Glider, Bush Stone Curlew and Koala. Call playback was undertaken across the project area in potentially suitable habitat on numerous occasions and across a range of seasonal variation. At each site, the call playback survey commenced with an initial listening period of 10 minutes. The call of a target species was then transmitted intermittently over a period of five minutes, followed by a five minute listening period. This was then repeated for each target species for a total of approximately one hour per survey.

d Spotlighting

Spotlighting was undertaken at the conclusion of each call playback survey by two persons for one-person hour. Spotlighting involved walking through areas of potential habitat (i.e. native woodland or forest) with powerful spotlights and shining them into the canopy to try and identify eye-shine of active avian, mammal or reptile species. The spotlights were also periodically shone onto the ground to identify reptiles or amphibians that may be foraging on the ground surface.

e Reptile searches

Herpetofauna searches were conducted across the project area and locality. Each site was systematically searched by an experienced herpetologist for a period of 30 minutes for active and inactive animals. Fallen timber, loose bark, tree and ground hollows, and loose soil were extensively searched. Rock rolling was also utilised as a search method at various locations where potential habitat was present. Each site was systematically searched for active and inactive animals by lifting loose surface rocks, signs of the presence (i.e. scats and sloughs) or ant activity underneath.

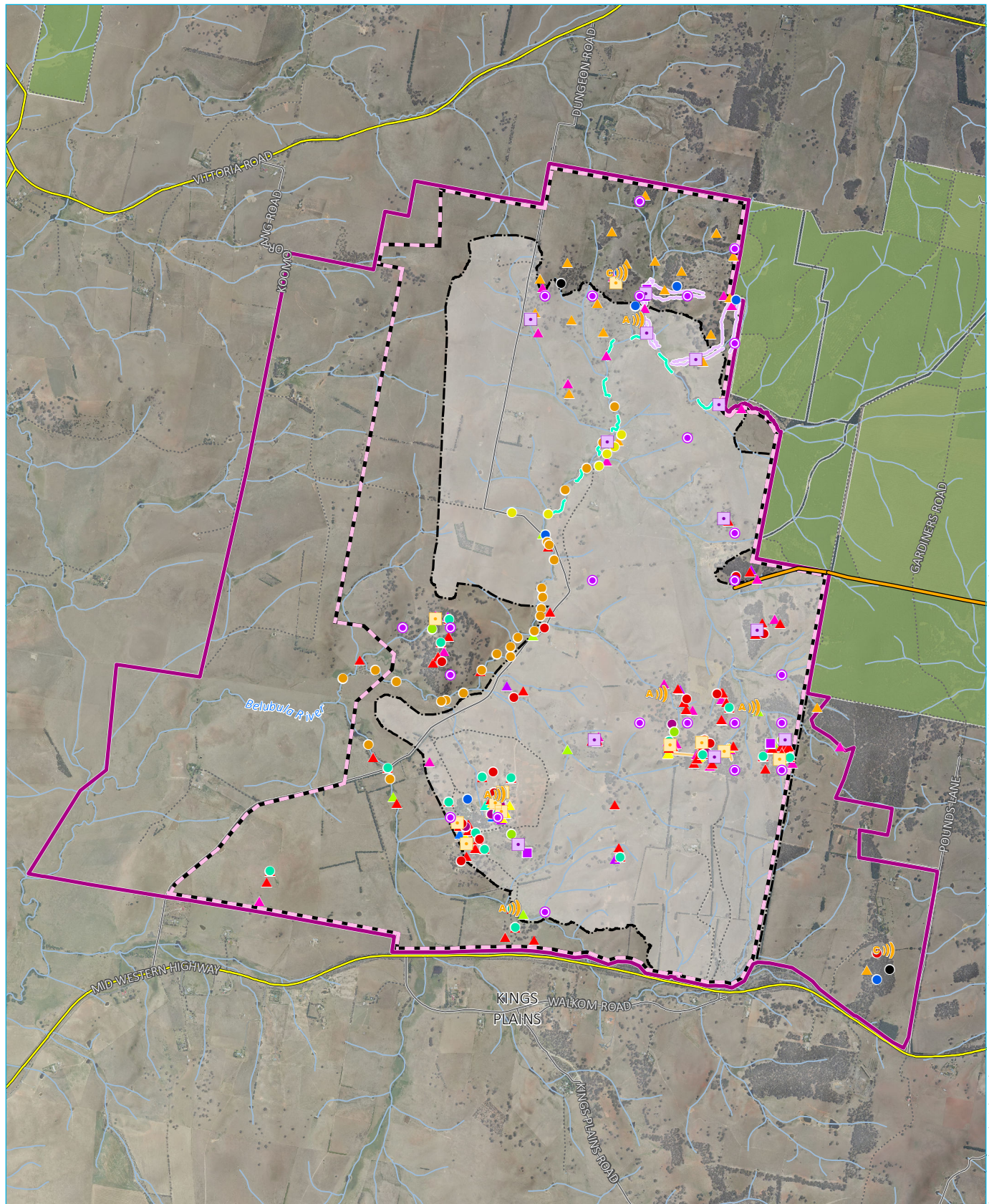
Further reptile searches were undertaken utilising roof tiles specifically targeting Little Whip Snake (*Parasuta flagellum*), but roof tiles are also known to detect the presence of Pink-tailed Worm-lizard. The tiles were set out in a 25 metre × 25 metre grid with a tile located every five metres and a total of 25 tiles for each grid (giving a total of 125 roof tiles). A resting period of six weeks was applied to allow for a sufficient period for animals to seek shelter and commence utilisation of the roof tiles.

f Frog searches

Frog searches were conducted at four locations during the late November survey to coincide with warmer weather and conditions suitable for species detection. Each site was systematically searched by an experienced herpetologist for a period of 30 minutes listening for calling frogs, undertaking sweeps for tadpoles, and searching for active animals. Call playback was also employed to elicit a response from non-calling frogs.

g Track and scat search

Track and Scat searches were conducted in May 2013 and November 2013 coinciding with diurnal bird surveys. In addition, any track and scat of interest observed during the field survey while undertaking other survey methods, were inspected.



Source: EMM (2019); Regis Resources (2019); Survey Graphics (2019); DFSI (2017); EnviroKey (2013, 2014, 2017); ELVIS (2014)

0 1 2 km
GDA 1994 MGA Zone 55

KEY

- Project application area
- Mine development project area (2,513.47 ha)
- Mining lease application area (1,812.99 ha) (Note: boundary offset for clarity)
- Pipeline corridor
- Disturbance footprint
- Existing environment
- Main road
- Local road
- Vehicular track
- Watercourse/drainage line
- Vittoria State Forest

- Fauna survey (EMM, 2019)
 - Camera (12)
 - Elliott trap (4)
 - Koala SAT survey (24)
 - Nocturnal transect (EMM, 2019)
- Fauna survey (EnviroKey, 2013/2014)
 - Anabat (5)
 - Call-playback (2)
 - Camera (11)
 - Bird survey (81)
 - Diurnal bird survey (22)
 - Elliott trap (21)

- Frog survey (8)
- Funnel line (2)
- Funnel trap (3)
- Habitat assessment (10)
- Herpetological survey (33)
- Nocturnal survey (19)
- Platypus assessment (25)
- RARC (6)
- Reptile survey (4)
- Scat and sign (19)
- Spotlight survey (7)
- Tile grid survey (10)
- Trapline (2)

- Elliott trap (EnviroKey, 2013)
- RARC (EnviroKey, 2017)

Fauna survey effort

McPhillamys Gold Project
Biodiversity assessment report
Figure 5.2

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5.3.3 Limitations

Surveys undertaken by EnviroKey (2017) were completed during Autumn and Spring 2013, Autumn 2014 and Autumn 2017 when field conditions were conducive to detecting many of the flora and fauna species known to occur in the area. Surveys have been undertaken in accordance with relevant NSW and Commonwealth survey guidelines for threatened species and the requirements of the FBA (OEH 2014a). Some flora species may be missed in surveys for a variety of reasons, for example: biannual flowering, poor flowering conditions, herbivory, heavy grazing pressures and drought conditions. Therefore, it may be impossible to state that a species is absent from a site based on the field surveys completed.

EMM couldn't undertake comprehensive surveys for Silky Swainsona due to field surveys being conducted outside the preferred survey period of September to November (OEH 2019). The BCD has been consulted regarding this species (refer Section 5.3).

5.4 Targeted survey results

5.4.1 Targeted flora surveys

No threatened flora species were recorded during targeted surveys within the project area. All candidate threatened flora species are considered to have a low likelihood of occurrence with the disturbance footprint following targeted surveys.

5.4.2 Targeted fauna surveys

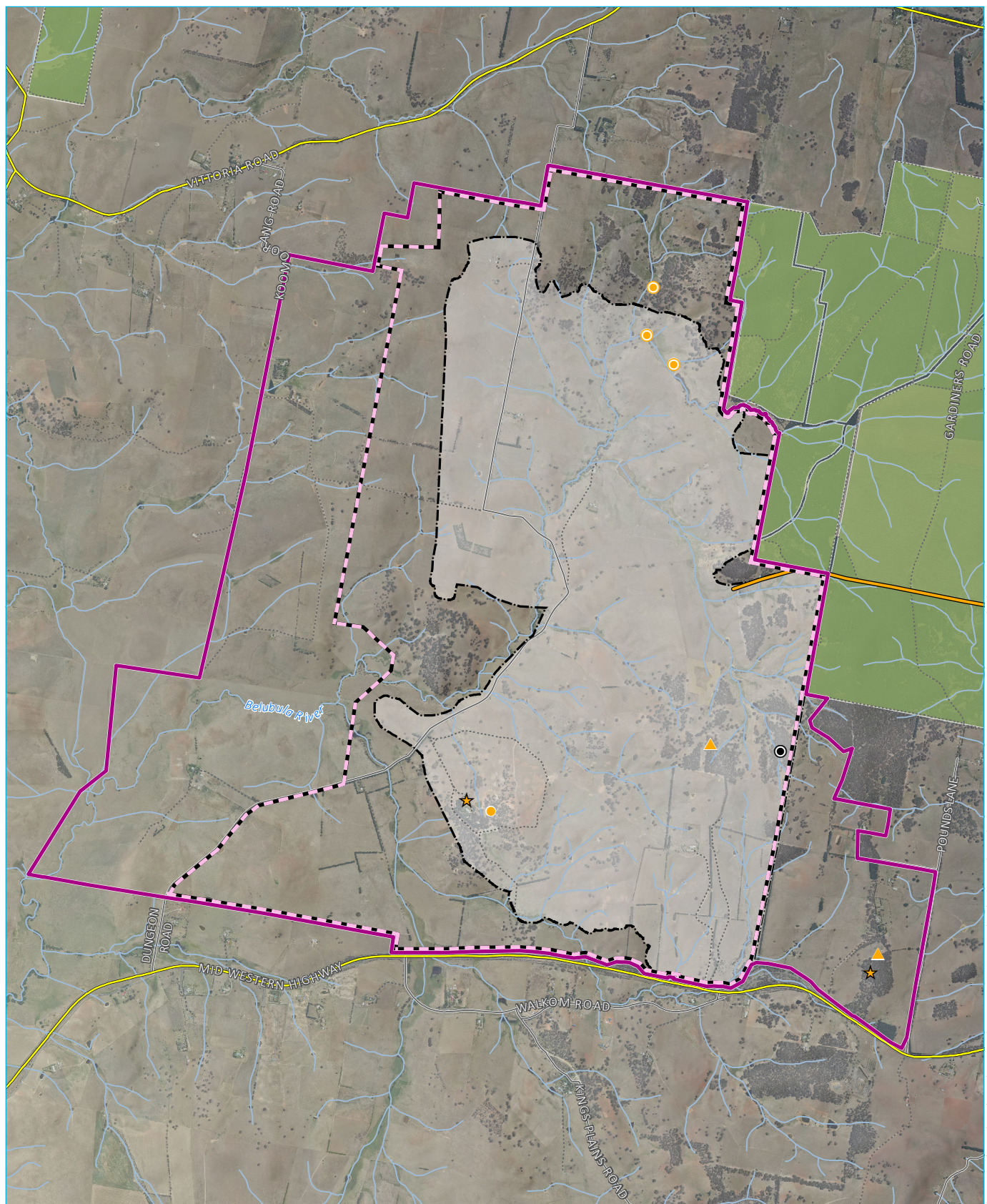
Two threatened fauna species credit species were recorded in the project area (Figure 5.3):

- Squirrel Glider; and
- Koala.

There were eight records of Squirrel Glider within the project area. The species was recorded in PCT 727 (moderate/good – high and moderate/good – medium), PCT 951 (moderate/good – poor) and PCT 1330 (moderate/good- medium and moderate/good – poor). Based on this, the species is predicted to utilise all treed PCTs within the project area, and impacts to these PCTs were used to generate the species polygon.

A single Koala was recorded in the east of the project area in February 2019. The species was not recorded during spotlighting surveys or from SAT surveys, but recorded opportunistically during diurnal surveys. Based on this, it is concluded that the project area supports a low density Koala population. Koalas have been assumed to be associated with two PCTs across the site - PCT 951 and PCT 1330. PCT 951 contains Manna Gum, a primary Koala food tree in the central and southern tablelands KMA. PCT 1330 contains secondary food tree species, Apple Box and Yellow Box. Impacts to these PCTs were used to generate the species polygon.

Other candidate species, including the Eastern Pygmy-possum and Regent Honeyeater, were not recorded in the project area and are considered to have a low likelihood of occurrence with the disturbance footprint following targeted surveys.



Source: EMM (2019); Regis Resources (2019); Survey Graphics (2019); DFSI (2017); EnviroKey (2013, 2014, 2018)

0 1 2 km
GDA 1994 MGA Zone 55
N

KEY

Project application area

Mine development project area (2,513.47 ha)

Mining lease application area (1,812.99 ha) (Note: boundary offset for clarity)

Disturbance footprint

Pipeline corridor

Existing environment

Main road

Local road

Vehicular track

Watercourse/drainage line

Vittoria State Forest

Threatened fauna species (EMM, 2019)

Squirrel Glider (3)

Koala (2)

Threatened fauna species (EnviroKey)

May 2013 sightings

Squirrel Glider (1)

November 2013 sightings

Squirrel Glider (2)

March 2014 sightings

Squirrel Glider (2)

Threatened fauna species credit species recorded in the project area

McPhillamys Gold Project
Biodiversity assessment report
Figure 5.3

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6 Groundwater dependent ecosystems

An assessment was completed, in conjunction with EMM's groundwater specialists, to identify terrestrial ecosystems which potentially utilise and/or are reliant on groundwater in the project area. It included reviewing the Groundwater Dependent Ecosystem Atlas (BOM 2013), groundwater monitoring data and groundwater modelling results against biodiversity values documented in the project area. The groundwater monitoring and modelling methods and results are provided in full in the McPhillamys Gold Project Water Assessment, which forms Appendix K of the EIS.

6.1 Method

The Groundwater Dependent Ecosystems Atlas (BOM 2013) was viewed to identify local terrestrial vegetation types that are potentially groundwater dependent. In addition, ecological characteristics of vegetation communities in the local area were reviewed to identify any features such as landscape position or species composition which may indicate high dependence on groundwater availability.

EMM developed a numerical groundwater model to assess the potential change to the groundwater flow system as a result of the project. A detailed explanation of the model development and predictions is provided in the Groundwater Assessment report (Appendix K of the EIS). The groundwater model includes simulation of the open cut mine development and a conservative simulation of tailings placement. It should be noted at the purpose of the groundwater model does not include assessment of the effectiveness of the TSF seepage management system, as this has been conducted by ATC Williams (2019).

Predicted depth to groundwater data was also modelled for the project area (refer to Appendix K of the EIS) and was reviewed to identify where groundwater could potentially be accessible for terrestrial vegetation. Specifically, the model outputs were used to identify areas where shallow groundwater (0 to 20 m below the ground surface) is available for plants to use. The average depth at which Eucalypts draw on groundwater is 10 m below the ground surface; however, use up to 20 m has been recorded (Serov 2013) and therefore this deeper figure was used as the maximum depth that PCTs would access groundwater. Although accessible, at this maximum depth the level of groundwater uptake is typically lower than where groundwater is shallow, given the larger pressure change required to draw water to the root zone (Eamus 2006). Conversely, the level of groundwater uptake and interaction is higher at shallower depths (ie 0 – 2 mbgl) as groundwater is already within or close to the root zone.

Accordingly, the following categories of groundwater uptake were assigned:

- very high interaction: 0 m (+);
- high interaction: 0 – 0.5 m;
- moderate interaction: 0.5 – 2 m;
- low interaction 2 – 5 m and;
- very low interaction 5 – 20 m.

Recorded PCTs and regional vegetation mapping (OEH 2018) between the edge of the project area and the groundwater model boundary were then overlaid on the shallow groundwater distribution maps in GIS, to determine which patches could potentially access groundwater. Vegetation in the mine development project area was excluded from the assessment as it would be cleared. Areas of overlap; that is where native plant communities coincided with shallow groundwater, were identified as 'potential groundwater dependant ecosystems (GDEs)',

requiring further investigation to understand their groundwater dependence (or otherwise). Ecosystems identified with potential for reliance on groundwater are identified in Section 6.2.

Following the *Risk Assessment Guidelines for Groundwater Dependent Ecosystems* (DPI 2016), potential GDEs were categorised, based on their degree of dependence on groundwater. GDEs are divided into three main categories, comprising:

- non-dependent (ie do not access groundwater);
- facultative (have some degree of dependence on groundwater); and
- entirely dependent/obligate (ie essential to ecosystem functioning).

Non-dependent ecosystems include drier terrestrial vegetation that does not overlie groundwater and rely solely on rainfall for ecosystem functioning. Ecosystems with a facultative dependence would rely on groundwater to support ecosystem functioning, but would also rely on rainfall and surface flows. Entirely dependent/obligate ecosystems are solely dependent on groundwater for functioning (ie karst/cave ecosystems).

Ecosystems with a facultative dependence can be further divided into three sub-categories, including:

- opportunistic: these ecosystems will use groundwater where available, but can exist without the input of groundwater, as long as there is no prolonged drought. Examples of opportunistic ecosystems include coastal mangroves, saltmarshes and Banksia woodlands.
- proportional: these ecosystems take a proportion of their water requirements from groundwater, however there is no absolute threshold for groundwater availability below which ecosystem structure or function is impaired, and can respond to changes in groundwater at any level. Examples of proportional ecosystems include glacial lakes and alpine bogs; and
- highly dependent: these ecosystems take a high proportion of their water requirements from groundwater and can only tolerate small changes in groundwater levels for short periods of time. Examples of highly dependent ecosystems include Paperbark swamps in northern Australia and wetlands of the basalt plains in Victorian.

The categories of groundwater dependency identified in the *Risk Assessment Guidelines for Groundwater Dependent Ecosystems* (DPI 2016) are summarised by the flowchart shown on Plate 6.1.

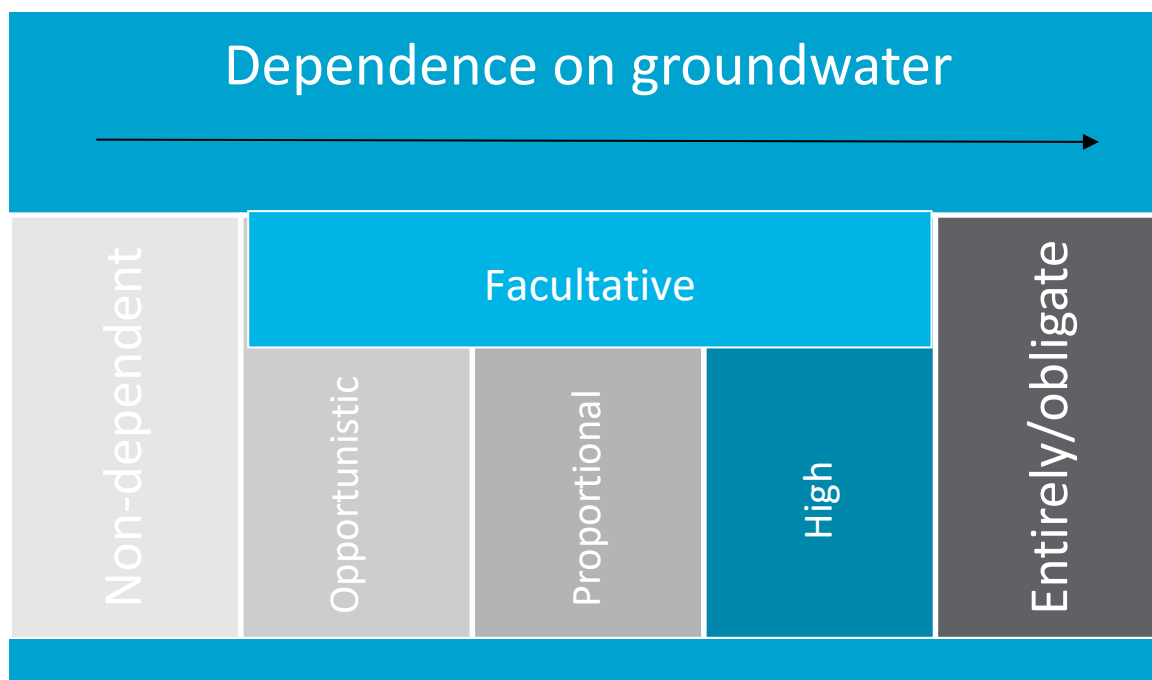


Plate 6.1 GDE categories

6.2 Results

The GDE Atlas (BOM 2013) does not show any terrestrial GDEs as occurring in the project area.

Although terrestrial GDEs are not predicted to occur in the project area, parts of PCT 1330, 727 and 951 overlie shallow groundwater from 0 to 20 mbgl, and would likely range from having a very high ie (0 + m) to very low (5 – 20 mbgl) interaction with groundwater (Figure 6.1). Opportunistic GDEs are mainly located north of the TSF, with smaller patches south-west and south-east of the TSF (Figure 6.1). All other PCTs are considered to be non-dependent as they do not have access to shallow groundwater.

These PCTs represent ecosystems with a facultative and opportunistic dependence on groundwater, in that they would use groundwater where available but can exist without its input, with the exception of times of prolonged drought. The locality is currently in drought. Where soil moisture cannot fulfil the opportunistic GDE's water requirements they would be supplemented by groundwater.

6.2.1 Impact assessment

Plants require water to maintain their structure, to grow, to transport nutrients, to make energy (ie photosynthesis) and for protection against large temperature fluctuations (PSU 2003). The plants comprising the opportunistic GDEs (ie trees, shrubs, grasses and groundcovers) would fulfil most of their water requirements by drawing on soil moisture from shallow roots. However, the more mature roots of trees and shrubs can also extend past the soil profile to access groundwater. As mentioned above, during times of low rainfall and soil moisture, trees and shrubs supplement their water requirements with groundwater. Reductions in groundwater availability during times of drought can lead to water stress in dependent ecosystems, which affects growth, transport of nutrients, photosynthesis and reduce protection against large temperature fluctuations.

This section discusses potential impacts on groundwater availability and quality for opportunistic groundwater users, PCTs 1330, 727 and 951, retained outside the disturbance footprint.

i Groundwater accessibility

The extent of groundwater drawdown associated with open-cut mining is predicted to be steep and localised around the void and limited in extent to the mine development project area (refer Groundwater Assessment, Appendix K of the EIS). As mentioned above, drawdown from the TSF is simulated in the groundwater model using a conservative approach. Under this simulation, seepage from the TSF is predicted to result in the depth to groundwater below and around the TSF to become shallower and rise towards the ground surface. If this predicted change in depth to groundwater occurs, it will allow terrestrial vegetation adjacent to the proposed TSF increased access to groundwater (ie increase in the extent (ha) of the three PCTs that can access groundwater). Figure 6.1 presents the predicted depth to groundwater prior to and at the end of mining.

Table 6.1 shows the predicted changes in the extent of groundwater accessibility between the existing and end of mine conditions, for PCTs 1330, 727 and 951, which are deemed to have a facultative and opportunistic dependence on groundwater).

The project is predicted to result in no change to a minor increase in the extent of groundwater access for PCTs with a higher level of dependence on groundwater (ie moderate to very high groundwater interaction, or 0+ to 2 mbgl) by the end of mining (Table 6.1). This is likely to range from no impact on opportunistic GDEs in areas where no change is predicted, to a minor beneficial impact through an increase to the extent of groundwater access during drought conditions (eg an additional 0.97 ha of PCT 1330 with a moderate groundwater interaction will have access to groundwater at the end of mining, assisting with meeting the ecosystem's water requirements during times of low rainfall and soil moisture).

A minor reduction in the extent of groundwater access is predicted for PCT 951 (0.67 ha, or 13.8% reduction in the extent of groundwater access) and PCT 1330 (0.82 ha, or 0.04% reduction in the extent of groundwater access). Given these minor reductions in the extent of groundwater access and their low to very low interaction and dependence on groundwater (ie between 2 – 20 mbgl), water stress is not predicted to occur. Similarly, a large increase in access to groundwater of 4.13 ha is expected for PCT 727 at the end of mining at 5-20 mbgl. However, as these areas have a low interaction with groundwater, additional groundwater in these areas is not expected to have negative impacts.

Table 6.1 Changes in access to shallow groundwater

Depth to groundwater (mbgl)	PCT 1330 (ha)			PCT 727 (ha)			PCT 951 (ha)		
	Existing	End of mine	Change	Existing	End of mine	Change	Existing	End of mine	Change
0+ (very high interaction)	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.24	0.22
0 - 0.5 (high interaction)	0.00	0.01	0.01	0.00	0.00	0.00	0.95	1.10	0.15
0.5 - 2 (moderate interaction)	0.11	1.08	0.97	0.00	0.00	0.00	2.03	2.07	0.04
2 - 5 (low interaction)	2.78	4.02	1.24	0.06	0.09	0.04	0.99	0.72	-0.27
5 - 20 (very low interaction)	18.68	17.87	-0.82	10.07	14.19	4.13	3.85	3.45	-0.40

ii Groundwater quality

The groundwater model simulations and review of the project activities identified the potential for groundwater quality changes as a result of:

- seepage from the TSF to the water table and the Belubula River;
- seepage from stockpiles to the water table;

- seepage from water storage ponds to the water table; and
- introduction of varying water quality via the pipeline.

The Soils Assessment (Sustainable Soils Management 2019) assessed the potential for Acid Sulphate Soils (ASS) as a risk for the project. The NSW ASS Risk Map indicates that the nearest site with a high probability of occurrence of ASS is further than 100 km from the mine development and is 900 m lower in elevation. As such, there is little risk of ASS in the mine development area, and negative impacts on opportunistic groundwater users PCT 1330, 727 and 951.

The TSF is designed to operate effectively and efficiently, and in consideration of the requirements of the NSW Government. The TSF is designed specifically to avoid adverse impacts to the surrounding environment, including being designed to contain all water during large rainfall events (no spill risk) (refer Surface Water Assessment (HEC 2019)).

The design of the TSF includes additional safeguards for seepage management which are described in the TSF design report (ATC Williams 2019) and include:

- the embankment foundations will be cleared, stripped and excavated to remove weak, compressible or over-saturated soils;
- the in situ material (surface geology) has a low hydraulic conductivity and will therefore minimise the vertical movement of seepage from the TSF;
- prior to tailings placement, a low permeability liner will be placed in areas of potentially higher hydraulic conductivity (such as creek lines) to reduce the potential for seepage from the TSF;
- a seepage interception drain will be constructed towards the toe of the main embankment, which will capture seepage from the TSF and will then be recirculated back to the TSF decant area;
- a low permeability core zone will be included as part of construction of the embankment;
- groundwater monitoring bores will be installed around the TSF to monitor for early warning of potential seepage from the TSF; and
- downstream of the monitoring network, seepage interception bores will be in place to operate as backup seepage collection points to intercept any potential seepage before it progresses further into the catchment (ie downstream towards the Belubula River).

Evidence of seepage from the TSF is likely to be observed as expression of seepage at the ground surface directly downstream from the embankment, some seepage areas may appear in depressions/hollows or discharge to the Belubula River downstream of the embankment.

As stated above, the TSF is simulated in the groundwater using a conservative approach. The model predicts mounding of the watertable during and post -mining operations. The conservative simulation suggests that without effective seepage interception, seepage from the TSF may flow south-west and south of the TSF. Seepage from the TSF is expected to be contained to the saprolite rock zone and the flow direction will mainly be horizontal. Some seepage that flows south from the TSF and that is not intercepted by the seepage interception system, is expected to flow to the pit due to the large hydraulic gradient between the TSF and the void. Some seepage is predicted to flow towards the Belubula River, however the distance that the seepage will move over 100 years is approximately 50 m and is contained within the disturbance footprint.

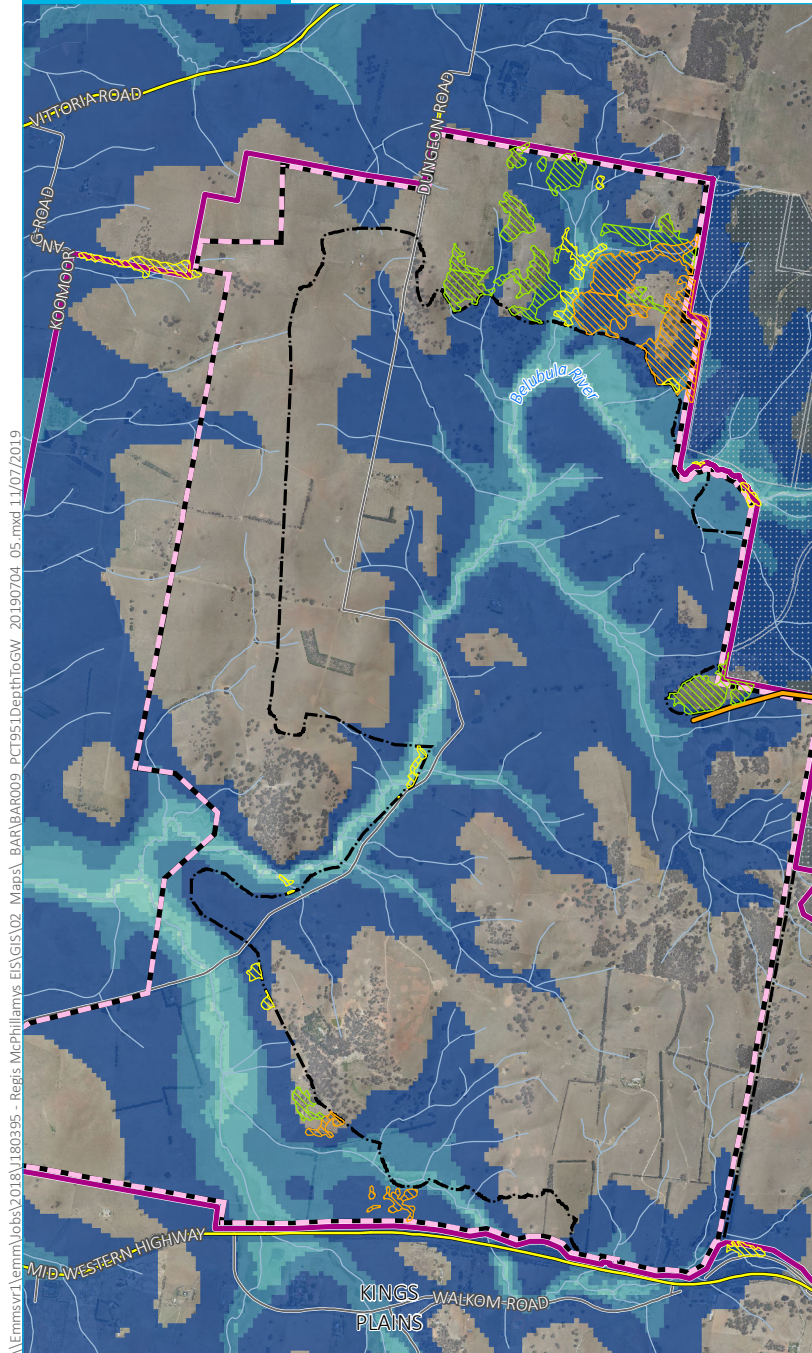
By the time TSF seepage migrates through the ground and reaches the Belubula River, the seepage water chemistry will mix with groundwater, become diluted along the flow path and will undergo other hydrogeochemical reactions. Dilution calculations (Table 6.2) were conducted to provide a conservative estimate of the concentration of SO₄, Se, CN-Total, CN-WAD and Al within the saturated saprock, based on the predicted peak seepage rate (refer Section 6.3.3 in the Groundwater Assessment report, Appendix K o the EIS).

Table 6.2 **Concentrations in groundwater following mixing with TSF seepage (dilution calculation results)**

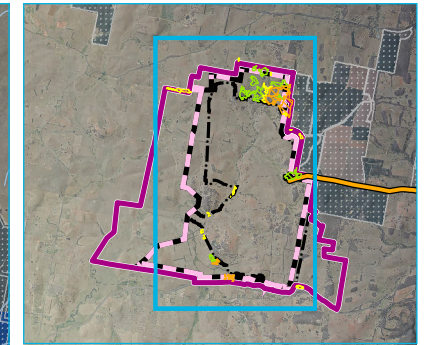
Analyte	Calculated concentration
Sulphate, SO ₄	213 mg/L
Selenium, Se	0.01 mg/L
Total Cyanide, CN-Total	0.06 mg/L
Weak Acid Dissociable Cyanide, CN-WAD	0.04 mg/L
Aluminium, Al	0.03 mg/L

The opportunistic groundwater users (PCT 1330, 727 and 951) are mainly located north of the TSF, with smaller patches to the south and south-west along the Belubula River, and directly south-east of the TSF. The main direction of seepage predicted (without interception measures) is to the south-west and south of the TSF, toward opportunistic groundwater users along the Belubula River, south and south-west of the TSF (Figure 6.1). Although to a lesser extent, there will also be some seepage north of the TSF, toward opportunistic groundwater users in this area. However, the quality of groundwater that these patches would access is not expected to change significantly from current baseline conditions due to dilution.

MODELLED EXISTING CONDITIONS



MODELLED END OF MINING

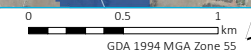


- KEY**
- Project application area
 - Mine development project area (2,513.47 ha)
 - Mining lease application area (1,812.99 ha) (Note: boundary offset for clarity)
 - Pipeline corridor
 - Disturbance footprint
 - Existing environment
 - Main road
 - Local road
 - Watercourse/drainage line
 - Vittoria State Forest
 - Depth to groundwater
 - 0 m
 - 0 - 0.5 m
 - 0.5 - 2 m
 - 2 - 5 m
 - 5 - 20 m
 - Plant community type (EMM, 2019)
 - 1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
 - 727 - Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion
 - 951 - Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion

Potential impacts on groundwater availability for terrestrial vegetation

McPhillamys Gold Project
Biodiversity assessment report
Figure 6.1

Source: EMM (2019); Regis Resources (2019); Survey Graphics (2019); DFSI (2017); ELVIS (2014)



Stage 2 - Impact Assessment (biodiversity values)

7 Impact assessment

7.1 Impact summary

7.1.1 Direct and indirect impacts

Without any measures to avoid, minimise or mitigate impacts, the mine development would result in the following impacts on biodiversity:

- direct impacts:
 - loss of native vegetation; and
 - loss and degradation of native fauna habitats;
- indirect impacts:
 - alteration to hydrology for groundwater dependent ecosystems;
 - erosion and sedimentation;
 - weed introduction and spread;
 - feral animal invasion into retained habitats;
 - potential inadvertent disturbance of retained habitats;
 - removal of habitat resources for threatened fauna; and
 - removal of hollow-bearing trees.

Direct impacts have been avoided and/or minimised through the detailed design of the mine layout wherever possible. Impacts will be further managed and mitigated through the development of a biodiversity management plan, using the measures recommended in Section 7.3. Any residual impacts will be compensated through implementation of the biodiversity offset strategy (Section 7.6).

7.2 Measures implemented to avoid, minimise and mitigate impacts

The project includes the mining of a gold resource. Thus, location and design of the pit area is highly restricted. The project's associated surface infrastructure has been designed, where possible, to avoid sensitive biodiversity areas.

Regis has carried out annual biodiversity surveys within the project area since acquiring Exploration Licence (EL) 5760 in 2013. These surveys have been carried out in parallel with, and have informed the evolution of, the mine development design. This process has ensured the avoidance of environmental constraints, including impacts on Box Gum Woodland and threatened species habitat, as far as practicable. As shown in Figure 1.2, the mining lease application area is relatively constrained within the project area. The mining lease application area (in which all key components of the mine will be) was reduced to avoid potential biophysical strategic agricultural land (BSAL) in the western portion of the project area.

Iterative project planning, informed by the baseline studies outlined above, has allowed a range of impacts to be avoided and others to be minimised throughout the life of the project. To compensate for unavoidable disturbance, biodiversity offsets will be provided.

Key avoidance measures that have been implemented by Regis comprise:

- avoidance of all areas of PCT 1330 Moderate/Good (High) condition apart from a small area in the direct footprint of the open cut mine;
- minimisation of impacts to PCT 1330 Moderate/Good (Medium) condition wherever feasible;
- development of a tailings storage facility which avoids almost all White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grasslands CEEC (EPBC Act) identified within the TSF investigation area identified in the Preliminary Environmental Assessment (PEA), resulting in a clearing reduction of 5.1 ha; and
- purchase of additional land to the north-west of the PEA project area to accommodate a recirculation water storage (the secondary water management facility). The storage is required to ensure the mine development will operate as a no discharge operation and was originally planned to be located to the north of the TSF within the TSF investigation area shown in Figure 7.1. However, to avoid impact on identified White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grasslands in this area, Regis has relocated this storage partially into the recently acquired properties. Due to the prevailing topography, it has not been possible to shift this water storage to completely avoid native vegetation however all impact to White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grasslands has been avoided in this portion of the project area.

The anticipated impact of the mine development on a listed ecological community, namely White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grasslands (Box Gum Woodland) CEEC (EPBC Act) at the time of the pre-referral meeting with DoEE was approximately 33.5 ha. This was a conservative figure based on the preliminary biodiversity assessment results. Since the pre-referral meeting, additional field work has been completed to refine the area of Box Gum Woodland in the project area. Further to this, the tailings storage facility location and mine development project boundary were modified to minimise impacts on Box Gum Woodland. The optimised design will minimise impacts on Box Gum Woodland, with a residual impact of approximately 18.5 ha. Box Gum Woodland (PCT 1330) also provides habitat to the Koala (listed as a vulnerable species under the EPBC Act). Accordingly, the reduction in impact on Box Gum Woodland also reduces the impact on Koala habitat.

Figure 7.1 shows the previous and current mine development and demonstrates how the design has evolved to avoid and or minimise impacts on threatened biodiversity.

In addition to the avoidance and minimisation measures already incorporated into the mine development's design, the proponent would implement the following management and mitigation measures to minimise the potential for unacceptable mine development-related impacts on biodiversity:

- identify the limit of approved disturbance areas on the ground through the use of permanent markers and ensure that all ground disturbing activities are only undertaken within approved areas;
- carefully remove vegetation in such a way that avoids damage to surrounding vegetation;
- undertake a pre-clearing inspection to identify and, where practicable, remove nesting or roosting fauna;
- develop specific procedures for Koala pre-clearing inspections and safe relocation outside the clearing area;
- undertake a revegetation project to increase the connectivity of fragmented patches of Koala habitat within the project area, and outside the disturbance footprint;

- undertake a staged clearing of native vegetation and fauna habitat to minimise impacts to native fauna species;
- stockpile vegetation onsite for use during rehabilitation operations, where practicable. Larger vegetation may be retained whole for use in rehabilitation operations on site;
- implement a weed and pathogen monitoring program to monitor impacts to retained vegetation outside the disturbance footprint, but within the project area (Figure 6.1);
- undertake weed management and pest control programs in consultation with surrounding landholders, based on the results of the weed and pathogen monitoring program; and
- undertake progressive rehabilitation.

Such measures would be documented and fully detailed in a biodiversity management plan, to be prepared following project approval.

The above avoidance, minimisation and mitigation measures were developed with consideration of recovery strategies and actions for Box Gum Woodland and the Koala. The National Recovery Plan for White Box Yellow Box Blakely's Red Gum Woodland (DECCW 2010) identifies the protection of key sites as a recovery strategy. The patches of PCT 1330 in moderate to good (High) condition and moderate to good (Medium) condition represent key sites for the community. Accordingly, the avoidance and minimisation of clearing these areas for the project aligns with the recovery strategy to protect key sites.

The Commonwealth's Approved Conservation Advice for Koala (TSSC 2012) identifies a priority management action applicable to the Project: develop and implement options of vegetation recovery and re-connection in regions containing fragmented koala populations, including inland regions in which koala populations were diminished by drought and coastal regions where development pressures have isolated koala populations. The proposed Koala revegetation project in areas of retained Koala habitat directly addresses this priority management action.

7.3 Residual impacts

Following the implementation of design measures to avoid and minimise biodiversity impacts, the project will result in the residual impact of 132.36 ha of native vegetation clearing (129.3 ha of which comprises habitat for the species credit species, Squirrel Glider, and 75.77 ha of which comprises habitat for the species credit species, Koala). Table 7.1 provides the breakdown of clearing impacts on each PCT and its associated ecosystem credit species, and species credit species.

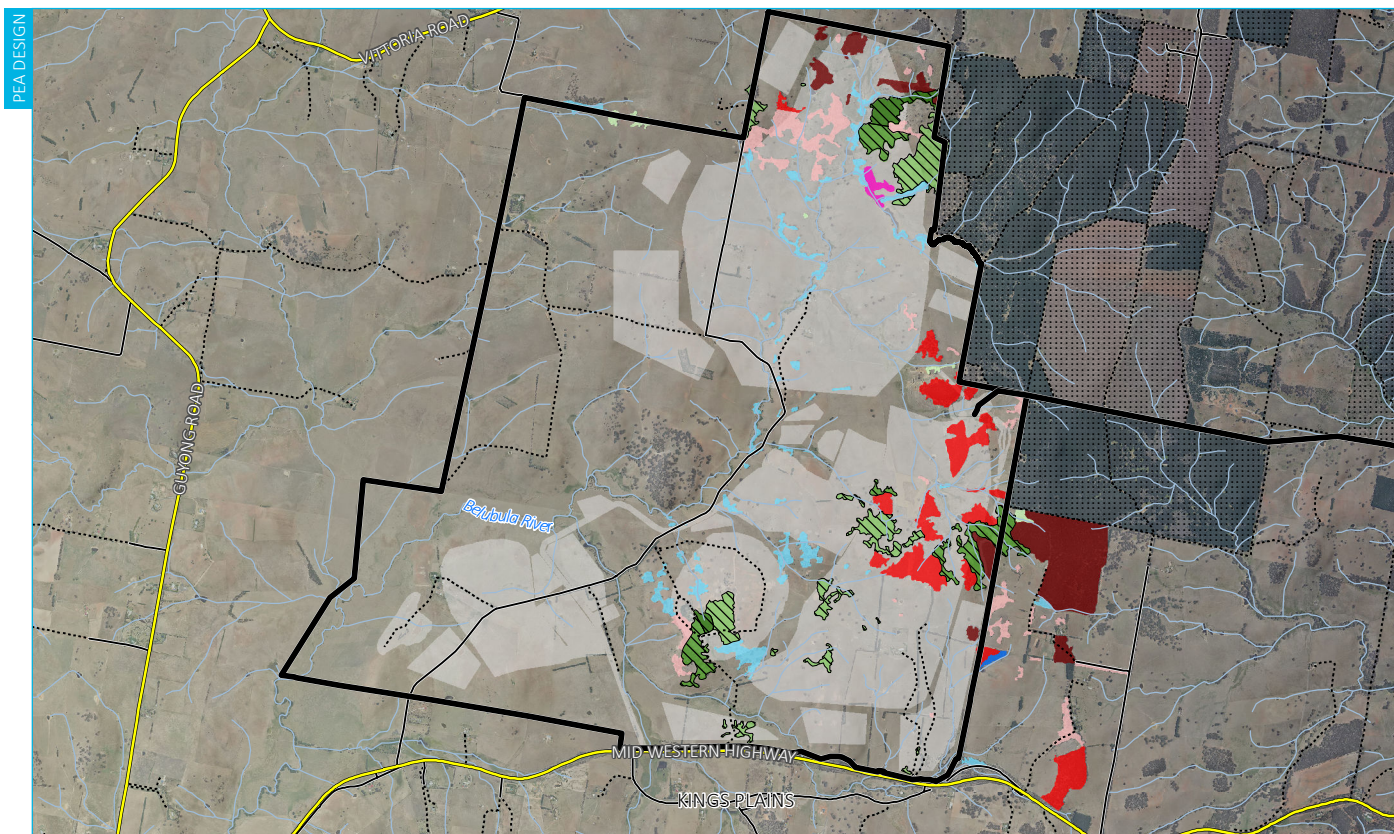
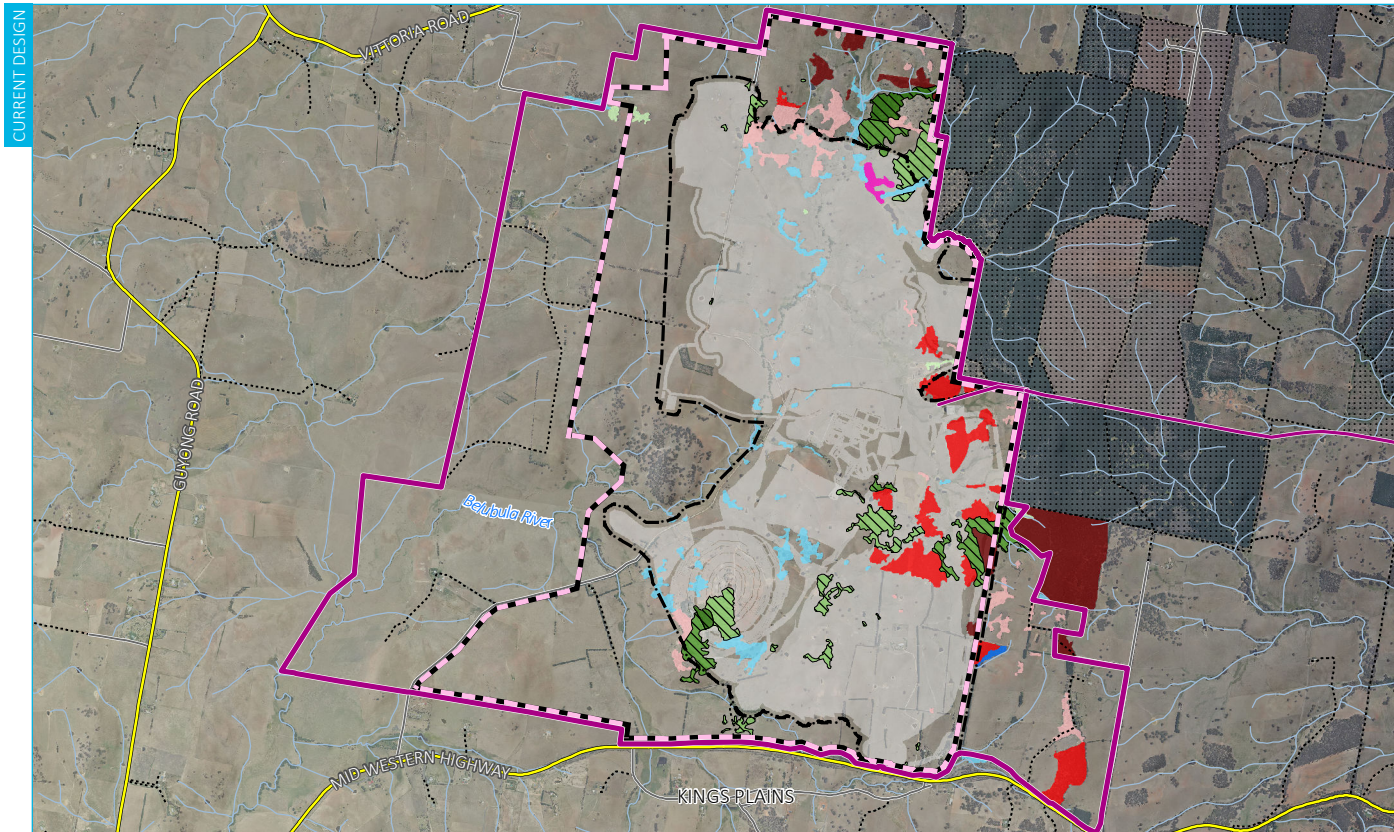
Table 7.1 Residual project impacts

Plant community type/species credit species	Associated ecosystem credit species (species with highest credit requirement italicised)	Residual impact (ha)
727 - Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion – Moderate/Good (High)	Ecosystem credit species: Brown Treecreeper, Diamond Firetail, Flame Robin, Gang-gang Cockatoo, Little Eagle, Painted Honeyeater, Scarlet Robin, <i>Speckled Warbler</i> , Spotted-tailed Quoll, Varied Sittella Species credit species: Squirrel Glider	4.75
727 - Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion – Moderate/Good (Medium)		34.55

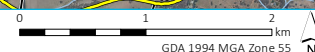
Table 7.1 Residual project impacts

Plant community type/species credit species	Associated ecosystem credit species (species with highest credit requirement italicised)	Residual impact (ha)
727 - Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion – Moderate/Good (Poor)		14.25
951 - Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion – Moderate/Good (Poor)	Ecosystem credit species: Flame Robin, Gang-gang Cockatoo, Little Eagle, Scarlet Robin, <i>Spotted-tailed Quoll</i> , Varied Sittella, Yellow-bellied Glider Species credit species: Koala and Squirrel Glider	31.55
766 - Carex sedgeland of the slopes and tablelands – Moderate/Good (Poor)	Ecosystem credit species: <i>Little Eagle</i> , Scarlet Robin, Spotted Harrier, White-fronted Chat	3.04
1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion– Moderate/Good (High)	Ecosystem credit species: Black-chinned Honeyeater, Brown Treecreeper, Diamond Firetail, Flame Robin, Gang-gang Cockatoo, Hooded Robin, Little Eagle, Little Lorikeet, Painted Honeyeater, Scarlet Robin, <i>Speckled Warbler</i> , Spotted Harrier, Spotted-tailed Quoll, Square-tailed Kite, Swift Parrot, Varied Sittella Species credit species: Koala and Squirrel Glider	1.47
1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion – Moderate/Good (Medium)		17.03
1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion – Moderate/Good (Other)		0.76
1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion – Moderate/Good (Poor)		24.96
Total		132.36¹

Notes: 1. (129.3 ha of this total comprises habitat for Squirrel Glider and 75.77 ha of which comprises habitat for Koala)



Source: EMM (2019); Regis Resources (2019); Survey Graphics (2019); DFSI (2017); GA (2011)



KEY

Project general arrangement

Design lines

Design polygons

Project application area

Mine development project area (2,513.47 ha)

Mining lease application area (1,812.99 ha) (Note: boundary offset for clarity)

Pipeline corridor

Disturbance footprint

PEA design

PEA site boundary (2,266.60 ha)

Pipeline optioneering

Existing environment

Main road

Local road

Vehicular track

Watercourse/drainage line

Vittoria State

Box Gum Woodland TEC (EMM, 2019)

Plant community types

727 - Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion

Moderate/Good (High)

Moderate/Good (Medium)

Moderate/Good (Poor)

766 - Carex sedgeland of the slopes and tablelands

Moderate/Good (Poor)

951 - Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion

Moderate/Good (Medium)

Moderate/Good (Poor)

1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

Moderate/Good (High)

Moderate/Good (Medium)

Moderate/Good (Other)

Evolution of the mine development

McPhillamys Gold Project
Biodiversity assessment report
Figure 7.1

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7.4 Thresholds for assessment and offsetting

7.4.1 Impacts requiring further consideration

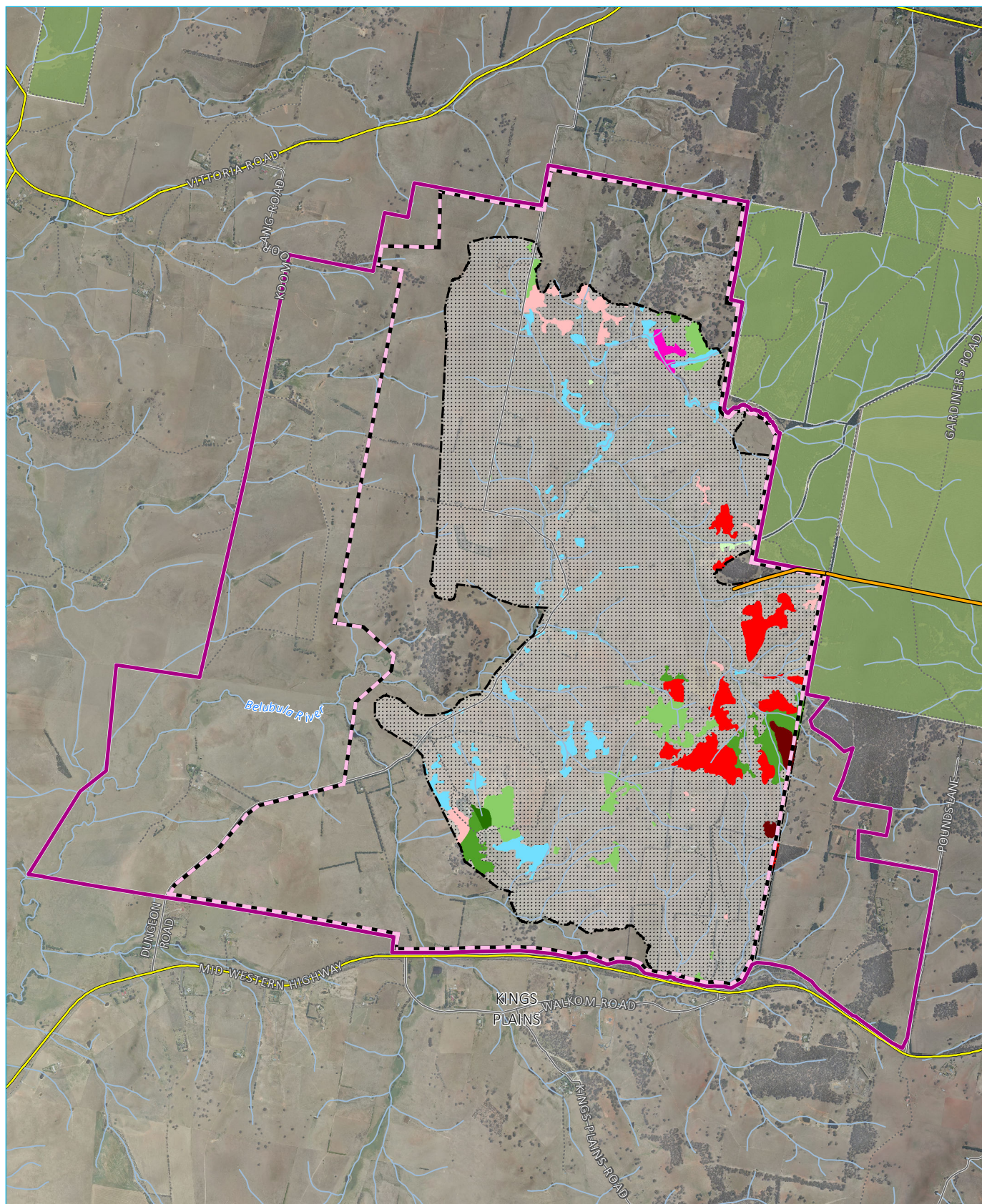
No impacts requiring further consideration were identified in the SEARs. This section provides an assessment of impacts requiring further consideration in accordance with Section 9.2 of the FBA.

Table 7.2 Impacts requiring further consideration

Feature	Description
Landscape features	<p>The project area does not support any estuarine areas, important wetlands, or state biodiversity links. The project area does not support any important wetlands.</p> <p>The project will impact on a regional biodiversity link, being the buffer either side of a 5th order stream (eg. the Belubula River). The project will impact on a 1,382 m length of the 5th order section of the Belubula River, and a 3,273 m length of the 4th order section of the Belubula River and an associated tributary, equating to 18.62 ha.</p> <p>Vegetation along these 4th and 5th order sections of the Belubula River and the associated tributary consists of PCT 951 - Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion (LA164). This vegetation occurs as scattered patches of vegetation isolated through clearing for agriculture. Vegetation is in poor condition, with the midstorey absent and groundcover heavily impacted by grazing with 2-40% native cover and 36-94% exotic plant cover. This PCT derives a vegetation integrity score of 46, demonstrating this poor condition.</p> <p>Indirect impacts on downstream environments are considered unlikely, and are discussed in the aquatic assessment, which has been provided as Appendix O to the EIS. These sections of the Belubula will be diverted and offset for impacts to key fish habitat may include rehabilitation of downstream sections of this waterway or within the broader catchment (to be confirmed).</p>
Native vegetation	<p>PCT 1330 represents White Box Yellow Box Blakely's Red Gum Woodland listed as an EEC under the BC Act. It was not identified in the SEARs and therefore does not require further consideration.</p>
Species and populations	<p>Critically endangered species will not be impacted by the project. No threatened species or populations were nominated in the SEARS and as such do not require further consideration.</p>

7.4.2 Impacts requiring offsets

The impacts requiring offsets are outlined in Section 7.3 and are the basis for calculations in the BioBanking Credit Calculator. The areas of native vegetation requiring offset and species credit polygons are shown in Figure 7.2 and Figure 7.3, respectively.



Source: EMM (2019); Regis Resources (2019); Survey Graphics (2019); EnviroKey (2017/2018); DFSI (2017); ELVIS (2014)

KEY

Project application area
 Mine development project area (2,513.47 ha)
 Mining lease application area (1,812.99 ha) (Note: boundary offset for clarity)
 Disturbance footprint
 Pipeline corridor
 Existing environment
 Main road
 Local road
 Vehicular track
 Watercourse/drainage line
 Vittoria State Forest

Vegetation with a site value score < 17 (1,002.38 ha)
 Vegetation to be cleared (132.35 ha)
 727 - Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion
 Moderate/Good (High)
 Moderate/Good (Medium)
 Moderate/Good (Poor)
 766 - Carex sedgeland of the slopes and tablelands
 Moderate/Good (Poor)

951 - Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion
 Moderate/Good (Medium)
 Moderate/Good (Poor)
 1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
 Moderate/Good (High)
 Moderate/Good (Medium)
 Moderate/Good (Poor)
 Moderate/Good (Other)

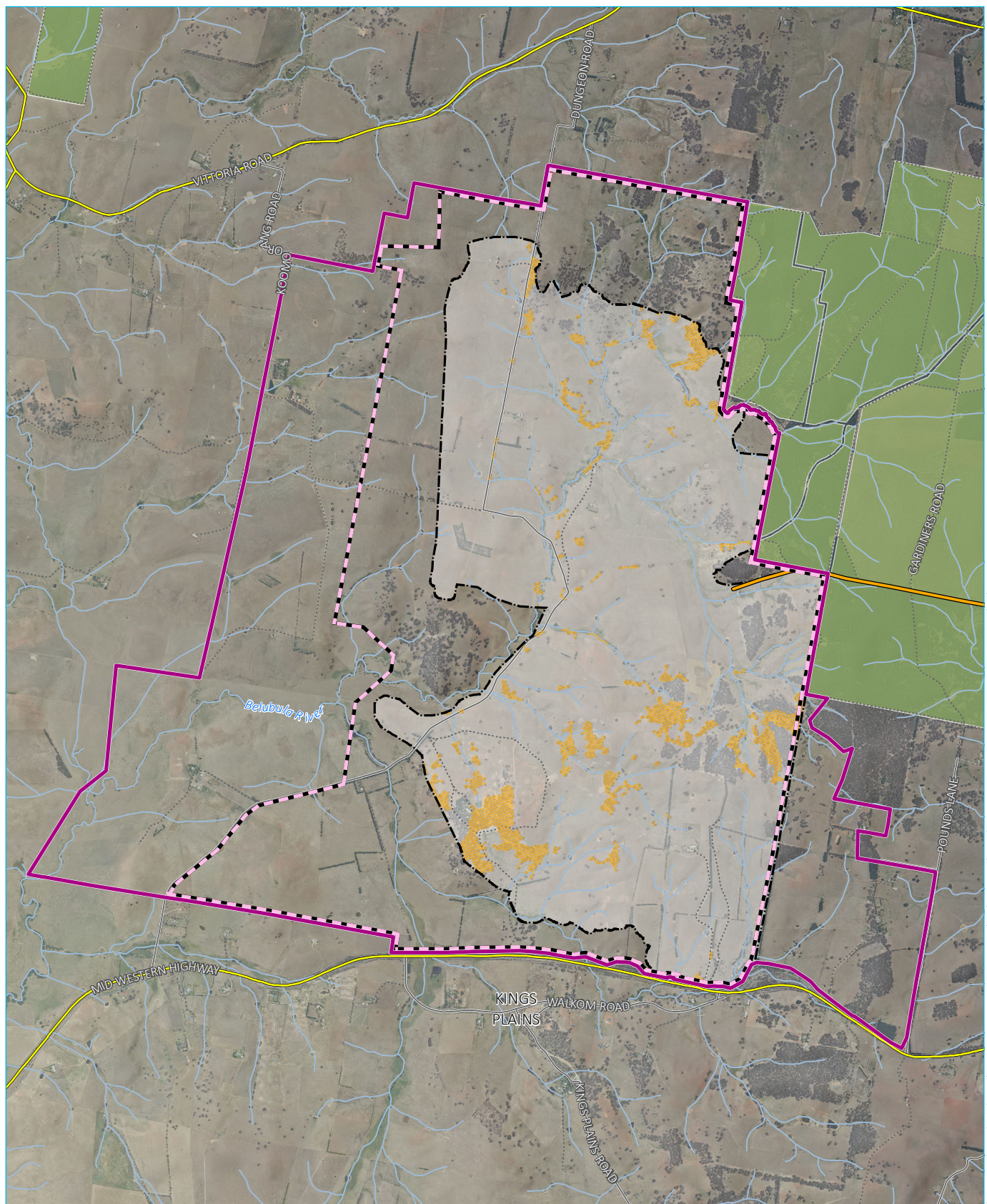
Areas of vegetation requiring offset

McPhillamys Gold Project
 Biodiversity assessment report
 Figure 7.2

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\\Emmsv1\emms\Jobs\2018\180395 - Regis McPhillamys EIS\GIS\02_Maps\BAR\BAR006_AreasRequiringOffset_20190704_09.mxd 10/07/2019



Source: EMM (2019); Regis Resources (2019); Survey Graphics (2019); DFSI (2017); ELVIS (2014)

0 1 2 km
GDA 1994 MGA Zone 55

KEY

- | | |
|---|---------------------------|
| Species credit polygon for Koala and Squirrel Glider (75.76 ha) | Existing environment |
| Project application area | Main road |
| Mine development project area (2,513.47 ha) | Local road |
| Mining lease application area (1,812.99 ha) (Note: boundary offset for clarity) | Vehicular track |
| Disturbance footprint | Watercourse/drainage line |
| Pipeline corridor | Vittoria State Forest |

Species credit polygons

McPhillamys Gold Project EIS
Biodiversity assessment report
Figure 7.3

7.4.3 Impacts not requiring offsets or not requiring further assessment

Areas comprising exotic grassland are shown on Figure 7.2 as having a site value score less than 17. These areas total 1002.38 ha. As few characteristic species were present, they could not be reliably typed to a PCT. A conservative approach was taken and a zone was created in the calculator associated with the FBA to represent each PCT found on site, to determine if the site value score was greater than 17 and offsets were required. The site value score for each entered zone was less than 17. Accordingly, these areas do not require further assessment or offsets.

7.5 Biodiversity credit report

The ecosystem credits required by the project are provided in Table 7.3 and species credits required are provided in Table 7.4.

Table 7.3 Ecosystem credits required

PCT ID	PCT name	Condition	Ancillary	Area (ha)	Loss in site value	EEC offset multiplier	TS offset multiplier	Credits required
1330	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion (LA276)	Mod-Good	High	1.47	16.67	1 ¹	3.0 ¹	0
			Medium	17.03	58.85			879
			Other	0.76	44.27			31
			Poor	24.96	58.85			1288
727	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion (LA124)	Mod-Good	High	4.75	71.88	1	2.6	257
			Medium	34.55	61.98			1649
			Poor	14.25	52.08			589
951	Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion (LA164)	Mod-Good	Poor	31.55	46	1	2.6	1178
785	Carex sedgeland of the slopes and tablelands (LA130)	Mod-Good	Poor	3.04	31.16	1	1.4	56
1330	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion (LA276)	Low	-	1002.38	9.38	0	0	0
727	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion (LA124)	Low	-	1002.38	7.81	0	0	0
951	Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion (LA164)	Low	-	1002.38	12	0	0	0

Notes: 1. As PCT 1330 could not be aligned with an EEC and thus did not show as having an EEC multiplier when entered into the BioBanking Calculator (when it should have a multiplier of 3), the Species multiplier for Black-chinned Honeyeater was manually edited to 3 in the calculator to reflect the correct number of credits required for this PCT (as Black-chinned Honeyeater was only associated with that PCT)

Table 7.4 **Species credits required**

Common name	Scientific name	TS offset multiplier	Credits required
Koala	<i>Phascolarctos cinereus</i>	2.6	1,970
Squirrel Glider	<i>Petaurus norfolcensis</i>	2.2	2,845

7.6 Biodiversity Offset Strategy

The proponent intends to meet the project's ecosystem and species credit requirements (Section 7.5) through one, or a combination of, the following:

- establishment of a biodiversity stewardship site, managed under a stewardship agreement;
- purchase and retire credits available on the biodiversity credit register; and
- payment into the Biodiversity Conservation Fund.

The aim of the offset strategy is to provide no-net loss for the PCTs and threatened species impacted by the project.

The biodiversity credit register was searched on 15 May 2019 to determine if suitable ecosystem and species credits were available. Table 7.5 provides an assessment of available credits against the project's ecosystem and species credit requirements.

Table 7.5 **Assessment of available credits against the project's credit requirements**

Ecosystem or species credit	Credits available
PCT 727 - Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion (LA124)	0
PCT 785 - Carex sedgeland of the slopes and tablelands (LA130)	0
PCT 951 - Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion (LA164)	1,866
PCT 1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion (LA276)	0
Koala	18,018
Squirrel Glider	7,899

Suitable ecosystem credits are only available for PCT 951 on the biodiversity credit register, as at 15 May 2019. Ecosystem credits for other PCTs were available, but not within any IBRA subregion that adjoins the IBRA subregion in which the development occurs as required in Table 5 of the FBA (OEH 2014a). Suitable species credits are available for the Koala and Squirrel Glider.

The proponent is conducting a preliminary assessment of a potential stewardship site in the locality to determine its ability to partially meet the project's ecosystem and species credit requirements. Only a preliminary site visit has been completed to date, and further detailed field assessment is required to determine the site's suitability, and ability to meet the project's credit requirements.

The potential stewardship site is located approximately 3 km southwest of Blayney. One PCT was observed during the site assessment; PCT 277 Blakely's Red Gum Yellow Box grassy tall woodland of the NSW South Western Slopes

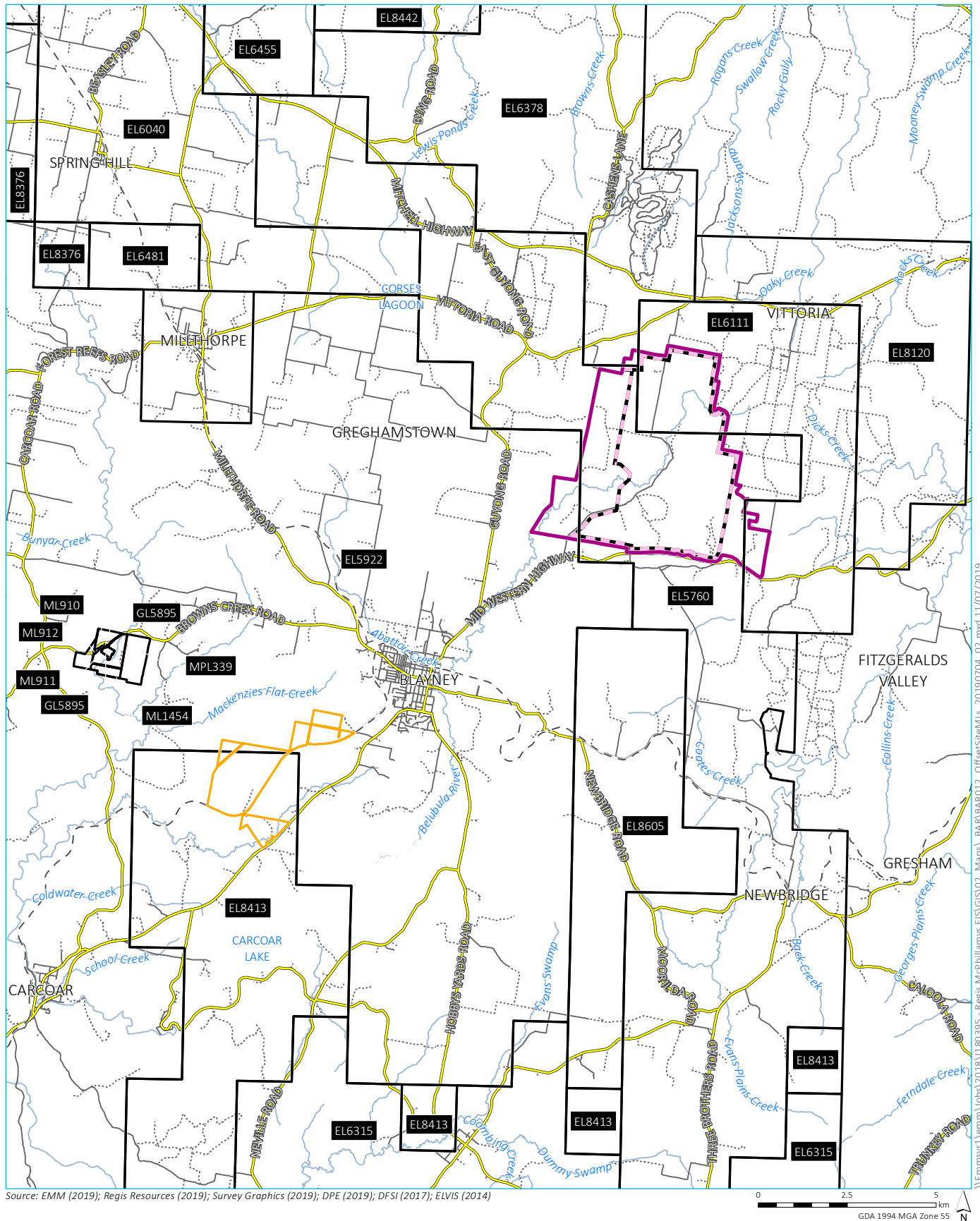
Bioregion. This PCT was determined to be present onsite due to the dominant canopy species and grasses observed. A review of the PCT summary, its location and existing vegetation mapping for the locality was taken into consideration. The PCT was found to be in variable conditions across the site, with three ancillary condition classes of this PCT mapped. The site provides good value as a potential stewardship site, with large areas supporting Box Gum Woodland that meet the condition criteria in the Commonwealth listing advice for the community (PCT condition code high). This would provide a suitable offset for the project and satisfy the requirements for a direct offset in accordance with the EPBC Act Environmental Offsets Policy (DSEWPaC 2012).

The following exploration licences interact with the site as shown on Figure 7.4.

Table 7.6 Exploration licences relevant to the potential stewardship site

Exploration license	EL 8413 (1992 Act)	EL5922 (1992 Act)
License holder	Gold and Copper Resources Pty Ltd	LFB Resources NL
Grant date	2 December 2015	15 February 2002
Expiry date	2 December 2024	15 February 2024
Last renewal date	23 April 2019	4 May 2018

If the project’s credit requirements cannot be fully met by purchasing credits from the biodiversity credit register and/or establishment of a biodiversity stewardship site, the proponent intends to meet their remaining credit requirements through payment into the Biodiversity Conservation Fund (BCF). However, credits for significantly impacted species and communities listed under the EPBC Act would only be sourced through purchase of PCTs that represent Box Gum Woodland and appropriate species credits on the biodiversity credit register, or establishment of a stewardship site providing direct like-for-like credits and other compensatory measures, in accordance with the EPBC Act Environmental Offsets Policy (DSEWPaC 2012).



KEY

- | | |
|-----------------------|---|
| Existing environment | ▭ Mining/exploration titles |
| — Rail line | ▭ Potential stewardship site |
| — Main road | Project application area |
| — Local road | ▭ Mine development project area (2,513.47 ha) |
| Vehicular track | ▭ Mining lease application area (1,812.99 ha) |
| — Named watercourse | (Note: boundary offset for clarity) |
| ▭ Named waterbody | |
| ▭ State forest | |

Current exploration licenses at potential stewardship site

McPhillamys Gold Project
Biodiversity assessment report
Figure 7.4

8 Assessment against relevant biodiversity legislation

8.1 Environment Protection and Biodiversity Conservation Act 1999

This section provides an assessment of the project's impacts specific to species and communities listed under the EPBC Act.

8.1.1 Threatened ecological communities

Recorded PCTs were compared to listed ecological communities predicted to occur in the region by the PMST, namely White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grasslands and Natural Temperate Grasslands of the South Eastern Highlands Bioregion.

i White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grassland

The Commonwealth Listing Advice for the critically endangered White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland (TSSC 2006) provides a general description of the community and describes its current status. White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland occurs on the western slopes and tablelands of the Great Dividing Range, from southern Queensland, though NSW and central Victoria. Much of the community's original distribution has been cleared for agriculture, and remaining areas are subject to grazing and pasture improvement impacts. Consequently, remaining patches of the community have a disturbed understorey with mature trees, or occur as areas with a highly diverse understorey, sometimes without a canopy (i.e. derived native grasslands) (TSSC 2006).

The community is characterised by the dominance (or prior dominance) of White Box (*Eucalyptus albens*), Yellow Box (*E. melliodora*) and/or Blakely's Red Gum (*E. blakelyi*) trees. Tree cover in the community is generally discontinuous, consisting of widely-spaced trees of moderate height. In optimum condition, the community contains a sparse shrub layer and a diverse understorey of native grasses and forbs (TSSC 2006). In order for an area to be included in the listed ecological community, a patch must have a predominantly native understorey (TSSC 2006).

There is no approved Conservation Advice for this ecological community. The recovery plan for the community (DoE 2010) lists clearing for agricultural development, urban/rural residential and urban development, and the development, maintenance and upgrade of public infrastructure as an ongoing threat, as well as conflicting management practices (grazing regimes and pasture management, changed fire regimes and increased soil nutrients) and weed invasion (particularly from pasture grasses).

EPBC Act Policy Statement 3.5 White Box Yellow Box Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands (DEH 2006) provides a flowchart to assist in determining if patches are included in the listed community (Plate 8.1).

The structure and diversity of the native plant community types (PCTs) in the project area have been compared with the flowchart (Plate 8.1) to determine if they represent the listed community.

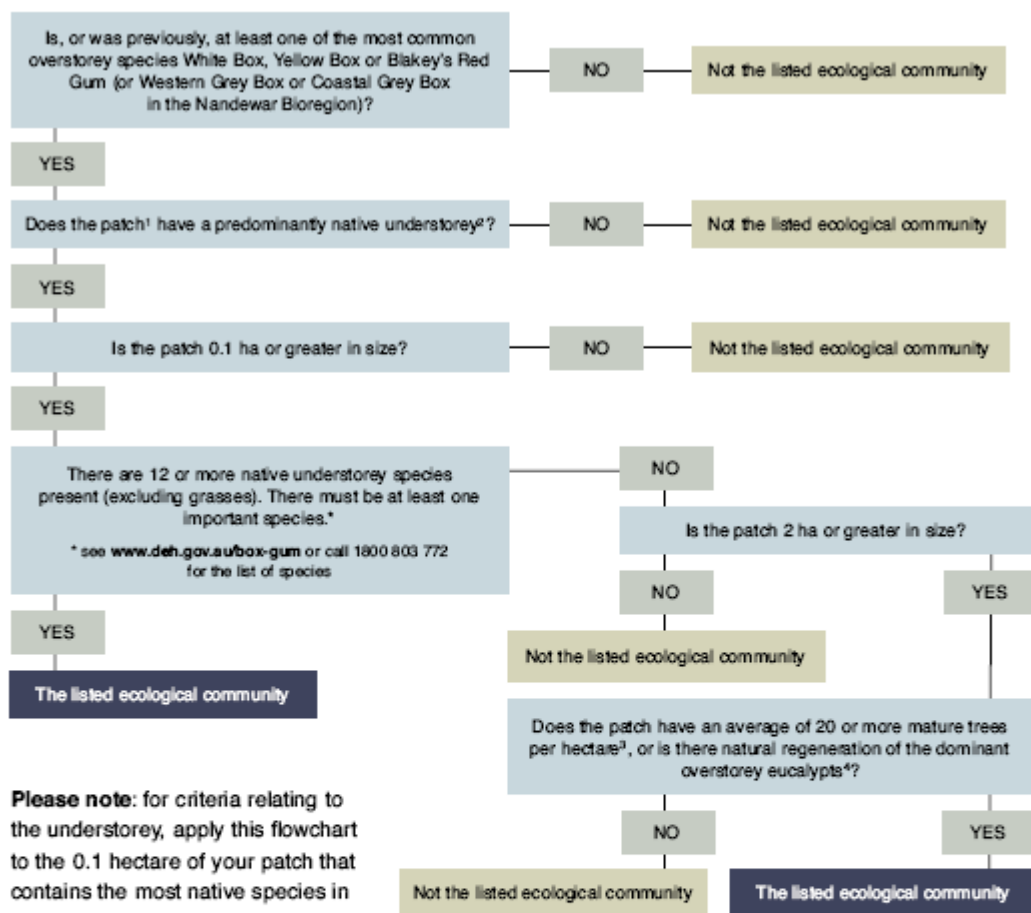


Plate 8.1 Flowchart to determine presence of the listed community (or otherwise)

PCT 1330 – Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion in Moderate/Good (High) and Moderate/Good (Medium) (Figure 4.1) represent the listed community as:

- some patches had a predominantly native understorey with 12 understorey species and one important species; and
- other patches that had less than 12 understorey species and one important species either had:
 - patch size greater than 2 ha; or

- more than 20 representative canopy trees per ha.

Using the above criteria, polygons of PCT 1330 in moderate/good (high) and moderate/good (medium) meet the criteria for White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland as listed under the EPBC Act, while polygons in moderate/good (poor) and moderate/good (other) do not.

Approximately 18.5 ha of the EPBC Act listed community will be impacted by the project. Table 8.1 provides an assessment of significance for the removal of 18.5 ha of White Box-Yellow Box – Blakely's Red Gum Woodland and Derived Native Grassland for the project, in accordance with the assessment criteria for critically endangered ecological communities (DoE 2013).

Table 8.1 Assessment of significance for White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland

Criteria	Discussion
1. Reduce the extent of an ecological community	<p>Approximately 18.5 ha of the listed community will be removed as a result of the project. The listed community has also been mapped within the immediate vicinity of the project area, using plant community type mapping for the central tablelands (OEH 2018). Within a 5 km buffer of the project area, approximately 1,129 ha of White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland is mapped. This comprises 1,096.66 ha of PCT 1330 (including areas mapped on site), 25.67 ha of PCT 654 (Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands Bioregion) and 6.68 ha of PCT 278 (Riparian Blakelys Red Gum - box - shrub - sedge - grass tall open forest of the central NSW South Western Slopes Bioregion). Note that this does not account for the condition of vegetation mapped, and areas of these PCTs in poor condition would likely not meet the criteria for the EPBC Act listed community.</p> <p>PCT 1330 has been identified as representing Box Gum Woodland in the project area. Accordingly, the project would result in a reduction of 1.68% in extent of the CEEC within a 5 km radius of the project (based on all areas of the PCTs above meeting the EPBC Act condition requirement, excluding areas ground-truthed on site as being in poor or other condition).</p> <p>The Commonwealth listing advice (TSSC 2006) estimates that 250,729 ha of the community is extant in NSW and 416,325 ha on a national scale. Accordingly, the project will result in a reduction of 0.007% in the community's NSW extent and 0.004% on a national scale, respectively. The Commonwealth listing advice states that the above estimates are conservative as they include areas in poor condition that do not represent the EPBC Act-listed community.</p>
2. Fragment or increase fragmentation	<p>The listed community is highly fragmented within and surrounding the project area. Several patches of the community will be removed from the disturbance footprint, fragmenting it from patches east of the project area. Accordingly, the project will increase the degree of fragmentation of the community.</p>
3. Adversely affect critical habitat	<p>A national recovery plan has been developed (DECCW 2010) for this community, which states that all areas of the listed community which meet the minimum condition criteria outlined in Section 3 of the plan, should be considered critical to the survival of this listed ecological community. This is defined as a canopy dominated or co-dominated by White Box, Yellow Box or Blakelys Red Gum, have a predominantly native understorey (i.e. more than 50% of the perennial native groundcover) with a patch size greater than 0.1 ha and must contain 12 or more understorey species, with at least one important species. If the patch does not meet the above criteria, it must be part of a patch greater than 2 ha in size and have an average of 20 or more mature trees per ha or natural regeneration of the canopy eucalypts.</p> <p>Approximately 18.5 ha of vegetation in the disturbance footprint meets the above criteria. According to the PCT mapping (OEH 2018), there is approximately 1,129 ha of PCTs that represent the listed community within a 5 km radius of the project. The project would reduce the extent of critical habitat in the locality by approximately 1.68%.</p>

Table 8.1 Assessment of significance for White Box – Yellow Box – Blakely’s Red Gum Grassy Woodland and Derived Native Grassland

Criteria	Discussion
4. Modify or destroy abiotic factors necessary for survival	Abiotic factors including soil and surface hydrology will be modified in the project area, and therefore represents a permanent impact. The listed community occurs directly north and south-west of the disturbance footprint, within the project area (Figure 6.1). An assessment of changes to groundwater availability and quality that these retained patches would use opportunistically was conducted (Section 6.2.1). The assessment concluded that retained patches of the community would not be adversely affected by the project.
5. Cause a substantial change in species composition	The project will remove 18.5 ha of habitat for the listed community within the disturbance footprint, while 35.6 ha will be retained within the project area. Retained areas of the listed community will be designated as no-go zones (with the exception of entry for environmental management). Weed management measures will also be developed and implemented in retained areas of the community outside the disturbance footprint, but within the project area, shown on Figure 6.1.
6. Cause a substantial reduction in quality or integrity	The project will remove all areas of this community within the disturbance footprint; consequently, there will be no residual risk within the project area. Areas outside of the project area have been subjected to the indirect impacts of agriculture for a long period of time, eg the potential importation of invasive species. This does not appear to have significantly impacted the CEEC to date. The majority of weed species within the CEEC are exotic pasture species associated with previous agricultural land uses. Weed management measures will be developed and implemented in retained areas of the community outside the disturbance footprint, but within the project area, shown on Figure 6.1.
7. Interfere with recovery	<p>A national recovery plan has been developed (DECCW 2010), with the objective to promote the recovery and minimise the risk of extinction of the ecological community through:</p> <ul style="list-style-type: none"> • achieving no net loss in extent and condition of the ecological community throughout its geographic distribution; • increasing protection of sites in good condition; • increasing landscape function of the ecological community through management and restoration of degraded sites; • increasing transitional areas around remnants and linkages between remnants; and • bringing about enduring changes in participating land manager attitudes and behaviours towards environmental protection and sustainable land management practices to increase extent, integrity and function of Box-Gum Grassy Woodland. <p>The clearance of up to 18.5 ha of the CEEC will directly contravene Point 1, by reducing the extent of the listed community. However, these impacts will be offset in accordance with the NSW biodiversity offsets policy for major projects (OEH 2014b). Section 7.2 details avoidance measures implemented by Regis Resources into the project design to minimise impacts on this community. The avoidance of all areas of high condition White Box Yellow Box Blakely’s Red Gum Woodland and Derived Native Grasslands within the project area, apart from a small area in the direct footprint of the open cut mine. This area was impossible to avoid due to this being the location of the gold deposit targeted by the project. The location of the TSF was also moved to avoid almost all White Box Yellow Box Blakely’s Red Gum Woodland and Derived Native Grasslands identified within the TSF investigation area.</p> <p>Management of retained areas of the community on the site (see Section 7.2) will assist in protecting areas of good condition habitat to be retained</p> <p>There is no approved Conservation Advice for this ecological community.</p>
Conclusion	The project is likely to result in a significant impact (prior to offsetting) on the listed community as 18.5 ha of habitat critical to its survival will be removed. Impacts to the 18.5 ha of the community removed by the project are known, predictable and irreversible.

ii Natural Temperate Grasslands in the South Eastern Highlands Bioregion

The PMST also identified the potential for Natural Temperate Grasslands in the South Eastern Highlands Bioregion to occur in the project area. The listing and conservation advice for Natural Temperate Grasslands in the South Eastern Highlands Bioregion (TSSC 2016) defines the ecological community as:

- sites confined to the South Eastern Highlands Bioregion;
- sites typically occurring between 350 – 1200 m above sea level;
- dominated by native grasses, with the dominant or co-dominant grass species are: *Themeda triandra* syn. *T. australis* (kangaroo grass), *Poa sieberiana* (snowgrass), *Poa labillardierei* (river tussock grass), *Austrostipa bigeniculata* (kneel speargrass), *Austrostipa scabra* (slender speargrass), *Bothriochloa macra* (red grass), various *Rytidosperma* species syn. *Austrodanthonia* species (wallaby grasses), *Lachnagrostis filiformis* (blowngrass) and *Sorghum leiocladum* (wild sorghum);
- can be dominated or co-dominated by native sedges;
- typically contains a range of native forbs;
- a tree, shrub, or sub-shrub layer may be present with up to 10% projected foliage cover; and
- not a derived or secondary grassland (ie derived from clearing of trees).

Natural Temperate Grasslands in the South Eastern Highlands Bioregion, listed under the EPBC Act, do not occur in the project area. Although the project area is in the South Eastern Highlands Bioregion, and located between 350 – 1200 m above sea level, PCT 766 is dominated by sedges and is a community derived from the prior clearing of trees. This is evidenced by the remnant patches of woodland surrounding these derived communities and the presence of isolated canopy trees. As such this community is not assessed further.

8.1.2 Threatened species

Sixteen species were predicted as having potential to occur within the project area based on database searches undertaken for the project (see Table 8.2).

Table 8.2 Threatened species predicted to be present

Scientific name	Status	Source	Potential presence
Spotted-tailed Quoll <i>Dasyurus maculatus</i>	V (BC Act) E (EPBC Act)	BioBanking Calculator BioNet PMST	Unlikely to occur as the species has not been recorded in the former Lachlan CMA area in which the project is located. The landscape in this area is highly fragmented, with few large patches of vegetation remaining that would provide suitable core habitat for this species.
Swift Parrot <i>Lathamus discolor</i>	E (BC Act) CE (EPBC Act)	BioBanking Calculator PMST	Unlikely to occur. Although Yellow Box, present in PCT 1330 is recognised as a key foraging resource by the National Recovery Plan for the Swift Parrot (Birds Australia 2011) in the former Lachlan CMA area (in which the project occurs), targeted surveys conducted in accordance with Commonwealth guidelines did not record this species.

Table 8.2 **Threatened species predicted to be present**

Scientific name	Status	Source	Potential presence
Superb Parrot <i>Polytelis swainsonii</i>	V (BC Act) V (EPBC Act)	BioNet PMST	Recorded from Last Chance Mine, 1 km south of the project area. According to Figure 1 of the species recovery plan, it is not known to breed in the project area and is likely to be a vagrant. Further assessment of this species is provided below.
Koala <i>Phascolarctos cinereus</i>	V (BC Act) V (EPBC Act)	BioNet PMST	Recorded by EMM in Feb 2019 in Apple Box. PCT 951 contains Manna Gum, a primary food tree species, while PCT 1330 contains Apple Box and Yellow Box, two secondary food tree species in the southern and central tablelands Koala management area, in which the project occurs. Further assessment of this species is provided below.
Regent Honeyeater <i>Anthochaera phrygia</i>	CE (BC Act) CE (EPBC Act)	PMST	Low likelihood. Although the project area represents habitat critical to the survival of the species in accordance with the National Recovery Plan and contains Yellow Box (foraging habitat) in an area where the species is likely to occur, targeted surveys conducted in accordance with Commonwealth guidelines did not record the species.
Curlew Sandpiper <i>Calidris ferruginea</i>	E (BC Act) CE, (EPBC Act)	PMST	Unlikely to occur as suitable foraging habitat (intertidal mudflats, swamps, lakes, lagoons) are absent.
Malleefowl <i>Leipoa ocellata</i>	E (BC Act) V (EPBC Act)	PMST	Unlikely to occur due to the absence of required habitat types.
Eastern Curlew <i>Numenius madagascariensis</i>	CE, (EPBC Act)	PMST	Unlikely to occur given the absence of required foraging habitat types (i.e. mudflats, mangroves, coastal lakes).
Australian Painted Snipe <i>Rostratula australis</i>	E (BC Act) E (EPBC Act)	PMST	Unlikely to occur given the absence of preferred foraging habitats including swamps and marshes
Booroolong Frog <i>Litoria booroolongensis</i>	E (BC Act) E (EPBC Act)	PMST	Unlikely to occur as suitable habitat (i.e. cobble banks/rock structures) are absent.
Yellow-spotted Tree Frog <i>Litoria castanea</i>	CE (BC Act) E (EPBC Act)	PMST	Unlikely to occur as the species is locally extinct.
Large-eared Pied Bat <i>Chalinolobus dwyeri</i>	V (BC Act) V (EPBC Act)	PMST	Unlikely to occur as suitable cave-roosting habitats are absent.
Greater Glider <i>Petauroides volans</i>	V (EPBC Act)	PMST	Unlikely to occur given the absence of tall moist eucalypt forest.
Grey-headed Flying-fox <i>Pteropus poliocephalus</i>	V (EPBC Act)	PMST	Unlikely to occur as there are no roosting camps within 20 km of the project area.
Pink-tailed Worm-lizard	V (BC Act) V (EPBC Act)	PMST	Unlikely as the closest record, and the eastern boundary of the species distribution, is over 50 km west of the project area.

Table 8.2 **Threatened species predicted to be present**

Scientific name	Status	Source	Potential presence
Striped Legless Lizard <i>Delma impar</i>	V (BC Act) V (EPBC Act)	PMST	Unlikely as the species is not known to occur in the former Lachlan CMA, in which the project is located

Two species listed as threatened under the EPBC Act were recorded as being present in the project area and/or are considered likely to occur and utilise habitat on-site – these species are discussed further below.

i Koala

The range of the combined population of Koalas (EPBC Act – vulnerable) in QLD, NSW and ACT extends from approximately the latitude of Cairns to the New South Wales-Victoria border, and includes some island populations. The Koala's distribution is not continuous across this range, with some populations isolated by cleared land or unsuitable habitat (DECC 2008). Koalas inhabit a range of temperate, sub-tropical and tropical forest, woodland and semi-arid communities dominated by species from the genus *Eucalyptus*. The distribution of Koalas is also affected by altitude (generally limited to <800 m asl), temperature, and at the western end of their range, leaf moisture (TSSC 2012).

A single Koala was recorded resting in Apple Box in the project area. In accordance with the Koala Recovery Plan (DECC 2008), PCT 951 represents primary koala feeding habitat as it contains Manna Gum, a primary koala food tree in the central and southern tablelands KMA, in which the project is located. PCT 1330 represents secondary habitat for the species, as it contains secondary food tree species in the central and southern tablelands KMA, Apple Box and Yellow Box (PCT 1330). Approximately 31.55 ha of primary and 44.22 ha of secondary Koala habitat occurs (total of 75.77 ha) in the disturbance footprint.

An assessment has been completed for the project area in accordance with the Koala habitat assessment tool in EPBC Act referral guidelines for the vulnerable Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) (DoE 2014) in Table 8.1.

Table 8.3 **Koala habitat assessment tool (Commonwealth of Australia 2014)**

Attribute	Score	Data source	Habitat assessment
Koala occurrence	+2 (high)	Desktop	The NSW Atlas of Wildlife identifies one recent record (1986), east of the project area. The Protected Matters Search Tool identifies that the species or its habitat is known to occur in the area.
		On ground	Vegetation communities containing Koala feed tree species for the southern and central tablelands KMA were mapped for the project area. Scat searches were completed in the project area using the Spot Assessment Technique (Phillips and Callaghan 2011). No scats were found, however a single Koala was found resting in an Apple Box during the day. Nocturnal spotlighting was also completed, and no Koalas were recorded during this activity.
Vegetation structure and composition	+2 (high)	Desktop	The project is in the central and southern tablelands KMA. Primary food trees for region occurring in the project area comprise Manna Gum. It also contains Apple Box, Yellow Box and Brittle Gum, secondary food tree species.

Table 8.3 Koala habitat assessment tool (Commonwealth of Australia 2014)

Attribute	Score	Data source	Habitat assessment
		On ground	On-ground surveys confirmed that the project area contains Koala habitat, comprising the food tree species listed above. An assessment of habitat structure and composition for the Koala to inform this EPBC Koala habitat assessment tool has followed the assessment of Koala habitat on-site outlined in Table 5.3.
Habitat connectivity	0 (low)	Desktop	Koala habitat in the project area is highly fragmented. In addition, Koala habitat in the project area does not connect to any large patches of habitat outside the project area. The area of connected habitat is less than 500 ha, and therefore habitat connectivity is low.
Key existing threats	+2 (high)	Desktop	No sick, injured or dead Koalas have been recorded during the course of the biodiversity assessment. The status of Chlamydia infection in the region is unknown.
		On ground	The Koalas observed in the project area appeared to be healthy, with no signs of Chlamydia (e.g. dry bottom). A medium value has been assigned due to uncertainty over local threats.
Recovery value	+1 (medium)	Desktop and on ground	Koala habitat is highly fragmented in the project area and region, however contains small, patchy woodland remnants in an agricultural setting, which is recognised by Table 1 of the referral guideline as having recovery value. Therefore, there is uncertainty whether the habitat is important for achieving the interim Koala recovery objectives.

With a total score of seven, vegetation in the project area represents habitat critical to the survival of the Koala, in accordance with the referral guidelines (i.e. score greater than five).

Table 8.4 provides an assessment of significance for the removal of up to 75.77 ha of potential Koala habitat, in accordance with the assessment criteria for vulnerable species (DoE 2013).

Table 8.4 Assessment of significance for the Koala

Criteria	Discussion
1: long-term decrease of an important population	The Koala referral guideline (DoE 2014) does not identify any important populations of the species. A single Koala was opportunistically identified in the project area during surveys, while targeted searches including SAT assessments and spotlighting did not. There is only one NSW Atlas of Wildlife record (1986) of the species, east of the project area. Koala habitat is highly fragmented in the project area and region but contains small, patchy woodland remnants in an agricultural setting. The altitude of the site (up to 1,000 m AMSL) is another potential limiting factor to the species presence, and it may be that Koalas only occur on a sporadic, transient basis. Considering the above, Koalas are likely to occur in low densities in the project area and therefore would not represent an important population.
2: reduce area of occupancy of an important population	An important population of the Koala does not occur in the project area.
3: fragment an important population	An important population of the Koala does not occur in the project area.
4: adversely affect critical habitat	Following the precautionary principle, all wooded parts of the project area was identified in the EPBC referral as representing habitat critical to the survival of the Koala. This habitat would be

Table 8.4 Assessment of significance for the Koala

Criteria	Discussion
	<p>permanently removed from the disturbance footprint, and therefore critical habitat would be adversely affected.</p> <p>Further refinement in the EIS has excluded PCT 727 as being critical habitat for the Koala. Although the NSW VIS Classification Version 2.1 lists PCT 727 as containing Brittle Gum which is a secondary koala food tree in the central and southern tablelands KMA, Brittle Gum was not noted as being abundant on site. Brittle Gum occurred as less than 15% of total number of trees present in all vegetation plots (n=4) and all Spot Assessment Technique (SAT) sites (n=9) in PCT 727 (see Table 5.9), with Broad-leaved Peppermint being dominant species. Small numbers of Long-leaved Box occurred particularly in the northeast of the site, but again below the 15% threshold.</p> <p>SEPP 44 classifies areas of potential Koala habitat referring to areas of native vegetation where the trees of the types listed in Schedule 2 of the policy constitute at least 15% of the total number of trees in the upper or lower strata of the tree component. By also including koala food tree species listed in the central and southern tablelands KMA (Brittle Gum and Long-leaved Box) PCT 727 does not contain greater than 15% koala food tree species and does not meet the criteria of koala habitat. This PCT is therefore excluded as habitat for the species in the assessment.</p> <p>Section 7.2 details avoidance measures implemented by Regis Resources into the project design to minimise impacts on habitat for this species. Management of retained areas of species habitat on the site (see Section 7.2) will assist in protecting areas of habitat to be retained.</p>
5: disrupt the breeding cycle of an important population	An important population of the Koala does not occur in the project area.
6: decrease availability or quality of habitat	<p>The project would decrease habitat availability in the project area by approximately 75.77 ha. Approximately 148.6 ha of Koala habitat would be retained in the project area. A project would be undertaken in retained habitat areas to reconnect fragmented patches and increase connectivity for Koalas to mitigate the removal of Koala habitat.</p> <p>Approximately 1,516.3 ha of Koala habitat occurs within a 5 km radius of the project. This habitat comprises PCTs with key feed tree species in the Central and Southern Tablelands Koala Management Area, in which the project occurs, and is a conservative estimate as the composition of key feed species within these PCTs is unknown. Accordingly, the project would result in a 5% (approximate) reduction in Koala habitat within a 5 km radius of the project.</p> <p>The species national distribution extends along much of the NSW east coast, extending from Adelaide to the east coast, and northern QLD to the coast (excluding Cape York). The project will contribute to a small reduction in Koala habitat on a national scale, however this will be mitigated by the revegetation project that will aim to reduce the fragmentation of Koala habitat in retained patches of Koala habitat in the project area.</p>
7: result in invasive species	Domestic dogs (<i>Canis familiaris</i>) are known to prey on Koalas. As the project will not introduce domestic dogs to the area, the project will not result in invasive species that would adversely affect the Koala.
8: introduce disease	<p>Koalas are susceptible to Chlamydia, a sexually transmitted disease. The single Koala observed in the project area during surveys appeared to be in good health and free of the signs of Chlamydia.</p> <p>In general, disease outbreaks occur when animals are stressed. As Koala density in the project area is low, the potential for a disease outbreak is also considered to be low.</p>
9:interfere with recovery	The overall objective of the Recovery plan for the Koala (DECC 2008) is to reverse the decline of the Koala in NSW, to adequately protect, manage and restore Koala habitat and to maintain healthy breeding populations of Koalas throughout their current range. As the project will remove habitat critical to the survival of the species, it interferes with recovery of the Koala. The proposed Koala habitat revegetation in retained native vegetation in the project area will address a priority management measure for the Koala outlined in the species conservation advice (TSSC 2012).

Table 8.4 Assessment of significance for the Koala

Criteria	Discussion
Conclusion	The project may result in a significant impact on the Koala as an area of habitat critical to the survival of the Koala would be removed. Impacts to the 75.77 ha of critical habitat removed by the project are known, predictable and irreversible.

ii Superb Parrot

The Commonwealth Conservation Advice for the Superb Parrot (EPBC Act – vulnerable) (TSSC 2016b) describes the conservation status, distribution, biology/ecology and threats to the survival of the Superb Parrot. The Superb Parrot occurs west of the Great Dividing Range, in Canberra, Goulburn and west to Nyngan and Swan Hill. The Superb Parrot nests in large, living or dead trees with many hollow branches, typically near watercourses. Following breeding, Superb Parrots disperse and forage on a variety woodland and other habitat types. Threats to the survival of the species comprise the loss and degradation of habitat, competition for nest hollows, road kill, illegal collection of wild birds, Psittacine beak and feather disease and climate change.

The National Recovery Plan for the Superb Parrot (Baker-Gabb 2011) details the species biology, ecology, distribution, populations, habitat and threats. The recovery plan describes the species as nomadic, resident, dispersive and migratory, making regular seasonal movements between breeding and non-breeding areas, in response to changes in food availability. When making local foraging movements, the species usually moves through wooded corridors, rarely crossing large areas of open ground.

The breeding range of the Superb Parrot is concentrated on the NSW South Western Slopes and Riverina bioregions.

The three main breeding areas comprise:

- the area bounded by Molong, Rye Park, Yass, Coolac, Cootamundra and Young;
- along the Murrumbidgee River between Wagga Wagga and Toganmain Station to Goolgowi; and
- along the Murray and Edward Rivers, east of Barmah and Millewa State Forest to south of Taylors Bridge.

The species has also recently been recorded breeding in urban areas of Canberra (Rayner et al. 2016).

The total population of the Superb Parrot has been estimated at 5,000 to 8,000 birds, 6,500 of which comprise adults.

The recovery plan (Baker-Gabb 2011) defines habitat critical to the survival of the Superb Parrot as breeding habitat that comprises riverine forests in the Riverina and Box-Gum Woodlands on the tablelands and slopes. Tree species typically selected for nesting on the slopes and tablelands comprise River Red Gum (*E. camaldulensis*), Blakely's Red Gum, Apple Box (*E. bridgesiana*), Grey Box (*E. microcarpa*), White Box and Red Box (*E. polyanthemus*). Of the species described above, Blakely's Red Gum and Apple Box occur in the project area and surrounds. However, the project area does not occur within the three main breeding areas for the species, so local records of the species are considered to be vagrant individuals.

Foraging habitat critical to the survival of the species is defined by the recovery plan (Baker-Gabb 2011) as Boree Woodlands between the Murrumbidgee and Murray Rivers, River Red Gum Forest, Box-Pine Woodland and White Cypress Pine Woodland. These vegetation types do not occur in the project area, and therefore it does not comprise foraging habitat critical to the survival of the species.

One Superb Parrot was recorded directly south of the mine development (EnviroKey 2018). Habitat within the project area has been mapped as areas of PCT 1330 in moderate/good (high) and moderate/good (medium), which

meet the criteria for White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland as listed under the EPBC Act.

Table 8.5 provides an assessment of significance for the removal of up to 18.5 ha of potential Superb Parrot habitat, in accordance with the assessment criteria for vulnerable species (DoE 2013).

Table 8.5 Assessment of significance for the Superb Parrot

Criteria	Discussion
1. Long-term decrease of an important population	Important populations have not been defined in the recovery plan for the Swift Parrot (Baker-Gabb 2011). A single population of the species exists, and therefore the project cannot lead to the decrease of an important population.
2. Reduce occupancy area for important population	As above.
3. Fragment an important population	As above.
4. Adversely affect habitat critical to survival	<p>Habitat critical to the survival of the species has been defined by the recovery plan (Baker-Gabb 2011) as breeding habitat that comprises riverine forests in the Riverina and Box Gum Woodlands on the tablelands and slopes and foraging habitat comprising Boree Woodlands between the Murrumbidgee and Murray Rivers, River Red Gum Forest, Box-Pine Woodland and White Cypress Pine Woodland.</p> <p>As the project area does not fall within the species breeding range, it does not represent habitat critical to the survival of the species.</p> <p>Section 7.2 details avoidance measures implemented by Regis Resources into the project design to minimise impacts on habitat for this species. Management of retained areas of species habitat on the site (see Section 7.2) will assist in protecting areas of habitat to be retained.</p>
5. Disrupt breeding cycle	The project area is outside the species breeding range. Therefore, the project will not disrupt the species breeding cycle.
6. Modify, destroy, remove, isolate or degrade habitat	The project will remove 18.5 ha of potential foraging habitat for the Superb Parrot. The project area is outside the species breeding range, and therefore the species is considered to be a vagrant in the region. At a national scale, the species occurs in Tasmania and between Bendigo, Victoria and north-western NSW. The removal of 18.5 ha of potential foraging habitat in which the species is vagrant will not substantially reduce the national extent.
7. Result in invasive species	Soil disturbance for the project has potential to result in the spread of invasive weeds to retained areas of vegetation and potential habitat. Weed control procedures will be developed during the EIS to minimise the impact on potential foraging habitat for the Superb Parrot.
8. Introduce disease	Superb Parrots may be susceptible to beak and feather disease. Disease outbreaks usually occur in wild animal populations where significant stresses arise. The clearance of potential foraging habitat is unlikely to cause significant stress such that a disease outbreak would occur.
9. Interfere with recovery	Recovery actions for the Superb Parrot aim to determine population trends, increase knowledge of the species ecological requirements, develop and implement threat abatement strategies and increase community involvement and awareness of the recovery program (Baker-Gabb 2011). As recovery actions are focused on increasing knowledge of the species, the project will not interfere with recovery.
Conclusion	The clearance of 18.5 ha of potential Superb Parrot foraging habitat will not result in a significant impact on the species, important populations will not be adversely affected, the area to be removed does not represent habitat critical to the survival of the species and the project will not interfere with recovery of the species. Impacts are known, predictable and irreversible.

8.1.3 Migratory species

Eleven species listed as migratory under the EPBC Act were predicted to occur in the project area based on database searches undertaken. Table 8.6 provides an assessment of the likelihood of these species utilising habitat within the project area.

Table 8.6 Migratory species predicted to be present

Scientific name	Status	Source	Potential presence
Curlew Sandpiper <i>Calidris ferruginea</i>	E (BC Act) CE, Mig (EPBC Act)	PMST	Unlikely to occur as suitable foraging habitat (intertidal mudflats, swamps, lakes, lagoons) are absent.
Eastern Curlew <i>Numenius madagascariensis</i>	CE, Mig (EPBC Act)	PMST	Unlikely to occur given the absence of required foraging habitat types (i.e. mudflats, mangroves, coastal lakes).
Fork-tailed Swift <i>Apus pacificus</i>	Mig (EPBC Act)	PMST	Recorded by EMM in Feb 2019. Unlikely to use habitats onsite as the species is almost exclusively aerial.
White-throated Needletail <i>Hirundapus caudacutus</i>	Mig (EPBC Act)	PMST	May occur overhead only. Unlikely to use habitats onsite as native vegetation is heavily fragmented
Yellow Wagtail <i>Motacilla flava</i>	Mig (EPBC Act)	PMST	Unlikely as well watered open grasslands and wetlands are absent from the project area.
Satin Flycatcher <i>Myiagra cyanoleuca</i>	Mig (EPBC Act)	PMST	Unlikely to occur as tall wet sclerophyll forests and rainforests are absent from the project area.
Rufous Fantail <i>Rhipidura rufifrons</i>	Mig (EPBC Act)	PMST	Unlikely to occur as moist, dense forests are absent from the project area.
Common Sandpiper <i>Actitis hypoleucos</i>	Mig (EPBC Act)	PMST	Unlikely to occur as wetlands are absent from the project area.
Sharp-tailed Sandpiper <i>Calidris acuminata</i>	Mig (EPBC Act)	PMST	Unlikely to occur as wetlands are absent from the project area.
Pectoral Sandpiper	Mig (EPBC Act)	PMST	Unlikely to occur as wetlands are absent from the project area.
Latham's Snipe <i>Gallinago hardwickii</i>	Mig (EPBC Act)	PMST	Recorded in the project area by EnviroKey (one record). Further assessment of this migratory species is provided below.

One species listed as migratory under the EPBC Act was recorded as being present in the project area and/or is considered likely to occur and utilise habitat on-site – this species is discussed further below.

i Latham's Snipe

Latham's Snipe was recorded directly adjacent to the project area by EnviroKey in November 2013. It breeds in Japan and in far eastern Russia during the northern summer and then migrates to Australia, where it remains for the duration of the northern winter.

Latham's Snipe is a non-breeding visitor to south-eastern Australia, migrates through northern Australia to reach non-breeding areas located further south. The species has been recorded along the east coast of Australia from Cape York Peninsula through to south-eastern South Australia. The range extends inland over the eastern tablelands in south-eastern Queensland to west of the Great Dividing Range in New South Wales. The species is widespread in

Tasmania and is found in all regions of Victoria except for the north-west. Most birds spend the non-breeding period at sites located south of the Richmond River in NSW.

The size of the Latham's Snipe population that visits Australia is estimated at 25,000 to 100,000 birds. Previous population estimates have ranged from 15,000 breeding birds to 37,000 breeding birds. The actual population size is difficult to estimate, and is poorly known. In Australia, Latham's Snipe occurs in a single, dispersed non-breeding population.

Latham's Snipe occurs in permanent and ephemeral wetlands up to 2,000 m above sea-level. They usually inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies). However, they can also occur in habitats with saline or brackish water, in modified or artificial habitats, and in habitats located close to humans or human activity, such as where they were recorded in the project area.

The Matters of National Environmental Significance Significant Impact Guidelines 1.1 (DoE 2013) defines important habitat for migratory species as areas periodically occupied by an ecologically significant proportion of the population, habitat critical to the species life cycle, habitat at the edge of their range or within an area where they are declining. The Industry Guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species (DoE 2015) defines important habitat for Latham's Snipe as areas that have previously been identified as internationally important for the species, or areas that support at least 18 individuals of the species.

Only one site in Australia, Seaford Swamp in Victoria is recognised as an internationally important wetland for the species (Bamford et al 2008). The internationally important habitat occurs outside the project area.

An assessment of significance (Table 8.7) was prepared for Latham's Snipe in relation to the project, in accordance with the assessment criteria for migratory species (DoE 2013).

Table 8.7 **Assessment of significance for Latham's Snipe**

Criteria	Discussion
1. Substantially modify important habitat	The only identified important sites for Latham's Snipe (based on the DoE guidelines), are six sites located in Victoria, Tasmania and South Australia. The <i>Industry Guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species</i> (DoE 2015) defines important habitat for Latham's Snipe as areas that have previously been identified as internationally important for the species, or areas that support at least 18 individuals of the species. Only one individual was recorded adjacent to the area. Therefore, the project area does not contain important habitat for Latham's Snipe, and will not reduce the national extent of important sites.
2. Result in invasive species	Vegetation clearing and topsoil stripping are likely to lead to weed invasion in surrounding habitat, unless adequately mitigated. Measures to control weeds in retained habitats of the project area will be developed during the EIS. As a ground-dwelling bird, Latham's Snipe are vulnerable to predation from the introduced Red Fox (<i>Vulpes vulpes</i>). These species can spread into undisturbed areas when new access roads and tracks are created. As the project will not create new tracks through undisturbed areas, it is unlikely to result in the spread of the Red Fox.
3. Disrupt lifecycle of ecologically significant proportion of population	The project area does not contain an ecologically significant proportion of the species. Therefore, the lifecycle of an ecologically significant proportion of Latham's Snipe will not be disrupted.
Conclusion	The project is unlikely to result in a significant impact on Latham's Snipe as: <ul style="list-style-type: none"> • the area does not contain important habitat for the species; and • an ecologically significant proportion of the population will not be disrupted.

8.2 Environmental Planning and Assessment Act 1979

8.2.1 SEPP No. 44

State Environmental Planning Policy 44 - Koala Habitat Protection (SEPP 44) defines Koala habitat as:

- potential Koala habitat: areas of native vegetation where the trees of the types listed in Schedule 2 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component; and
- core Koala habitat: an area of land with a resident population of Koalas, evidenced by attributes such as breeding females (that is, females with young) and recent sightings of and historical records of a population.

One feed tree species listed in Schedule 2 of SEPP 44, Manna Gum, occurs in PCT 951 within the project area. In areas of PCT 951 this species comprises at least 15% of the trees, and would be considered potential Koala habitat in accordance with SEPP 44. All other PCTs on site would not represent Koala habitat as defined in SEPP 44.

Only one Koala was observed opportunistically in the project area, despite targeted SAT and spotlighting surveys. No breeding or young was observed. Accordingly, the project area is unlikely to represent core Koala habitat.

8.3 Biosecurity Act 2015

One priority weed of the central tablelands was recorded in the project area, namely Blackberry. Blackberry is a priority weed for all of NSW and are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable. The species must not be imported into NSW or sold. In addition, there is a regional recommended measure for land managers in the central tablelands to mitigate the risk of new weeds being introduced to, and spread from, their land. The plant should not be bought, sold, grown, carrier or released into the environment. Conservation areas, natural environments and primary production lands should be protected that are free of Blackberry. The biodiversity management plan for the project would directly address the control of Blackberry.

9 Conclusion

This Biodiversity Assessment Report has been prepared in accordance with the FBA, biodiversity-related SEARs and agency-specific assessment requirements. Regis has carried out annual biodiversity surveys within the mine development project boundary since acquiring EL 5760 in 2012. These surveys have been carried out in parallel with, and have informed the evolution of, the mine development design. This iterative process has resulted in a disturbance footprint that is predominantly comprised of open grassland with a long history of agricultural use, and has avoided biodiversity constraints as far as practicable.

Following all measures to avoid, minimise and mitigate impacts the project will result in residual impacts to 132.36 ha of native vegetation and fauna habitat. The project requires 5,927 ecosystem credits to compensate for residual impacts on PCTs and their associated threatened species. In addition to ecosystem credits, the project also requires 1,970 species credits for the Koala and 2,845 species credits for the Squirrel Glider. The proponent will compensate for these residual impacts through the implementation of their biodiversity offset strategy, developed in accordance with the FBA.

The Biodiversity Assessment Report has also considered impacts on species and ecological communities listed under the EPBC Act. The project is expected to result in significant impacts on White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grasslands by removing 18.5 ha of the listed community, representing a reduction in 1.68% within a 5 km radius of the project. The project may also result in a significant impact on the Koala through the removal of 75.77 ha, representing a 5% reduction in habitat within a 5 km radius of the project.

Drawdown associated with open-cut mining is predicted by the groundwater model to be tight around the void, and limited in extent around the void. Three PCTs outside the disturbance footprint (1330, 727 and 951) are deemed to have a facultative and opportunistic dependence on groundwater, however adverse impacts from drawdown are not expected as there is little to no change in access to groundwater for the patches of vegetation that would have the highest level of dependence (ie overlie groundwater 0 – 2 mbgl). In addition, no changes in groundwater quality are expected in vicinity to these groundwater users.

As the McPhillamys Gold Project is being assessed under the bilateral assessment, impacts on this listed ecological community and species will be compensated through the implementation of the biodiversity offset strategy, developed in accordance with the FBA.

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Appendix A

Protected Matters Search



EPBC Act Protected Matters Report

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.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 14/02/19 15:47:27

[Summary](#)

[Details](#)

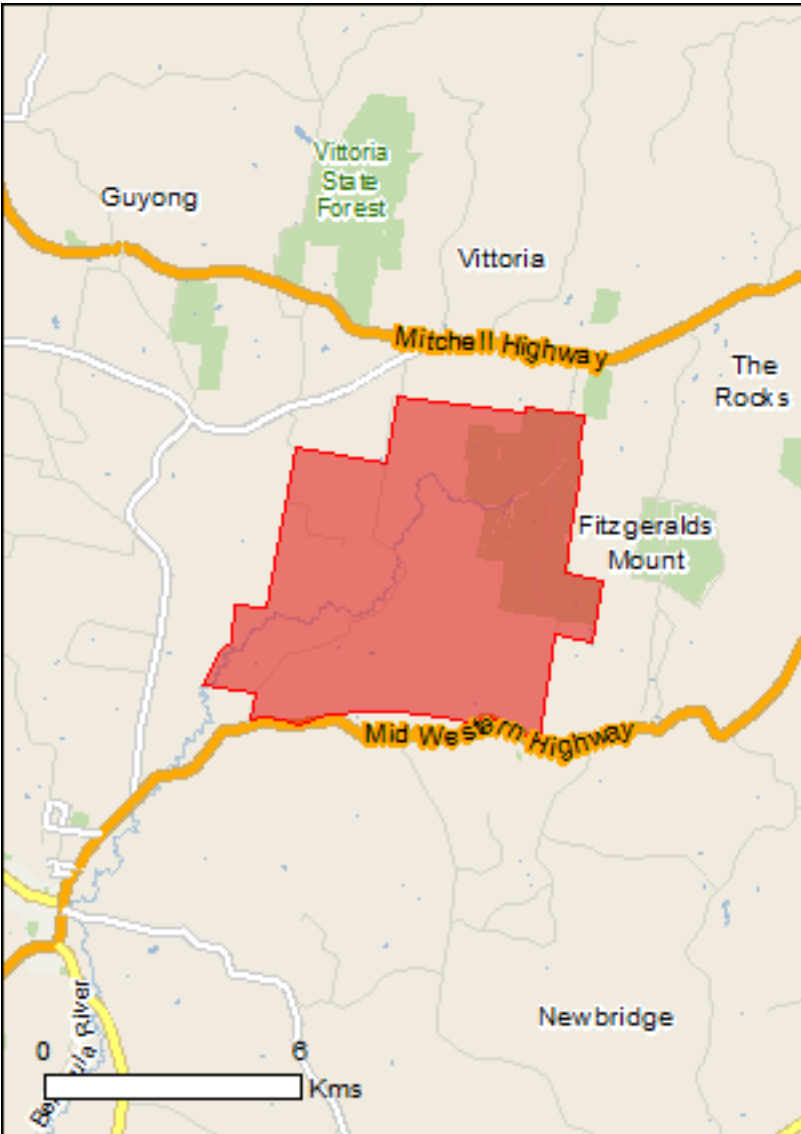
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)



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[Coordinates](#)

[Buffer: 1.0Km](#)



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	5
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	2
Listed Threatened Species:	25
Listed Migratory Species:	11

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	18
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	30
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar)		[Resource Information]
Name	Proximity	
Banrock station wetland complex	800 - 900km upstream	
Hattah-kulkyne lakes	600 - 700km upstream	
Riverland	700 - 800km upstream	
The coorong, and lakes alexandrina and albert wetland	900 - 1000km upstream	
The macquarie marshes	300 - 400km upstream	

Listed Threatened Ecological Communities	[Resource Information]
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For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Natural Temperate Grassland of the South Eastern Highlands	Critically Endangered	Community likely to occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community likely to occur within area

Listed Threatened Species	[Resource Information]
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Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Foraging, feeding or related behaviour may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Polytelis swainsonii Superb Parrot [738]	Vulnerable	Species or species habitat known to occur within area
Rostratula australis Australian Painted-snipe, Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Fish		

Name	Status	Type of Presence
Maccullochella peelii Murray Cod [66633]	Vulnerable	Species or species habitat may occur within area
Macquaria australasica Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area
Frogs		
Litoria booroolongensis Booroolong Frog [1844]	Endangered	Species or species habitat may occur within area
Litoria castanea Yellow-spotted Tree Frog, Yellow-spotted Bell Frog [1848]	Endangered	Species or species habitat likely to occur within area
Mammals		
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat may occur within area
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area
Petauroides volans Greater Glider [254]	Vulnerable	Species or species habitat may occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Plants		
Eucalyptus aggregata Black Gum [20890]	Vulnerable	Species or species habitat likely to occur within area
Eucalyptus pulverulenta Silver-leaved Mountain Gum, Silver-leaved Gum [21537]	Vulnerable	Species or species habitat likely to occur within area
Euphrasia arguta [4325]	Critically Endangered	Species or species habitat may occur within area
Lepidium hyssopifolium Basalt Pepper-cress, Peppercress, Rubble Pepper-cress, Pepperweed [16542]	Endangered	Species or species habitat may occur within area
Leucochrysum albicans var. tricolor Hoary Sunray, Grassland Paper-daisy [56204]	Endangered	Species or species habitat likely to occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Aprasia parapulchella Pink-tailed Worm-lizard, Pink-tailed Legless Lizard [1665]	Vulnerable	Species or species habitat may occur within area
Delma impar Striped Legless Lizard [1649]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Hirundapus caudacutus		
White-throated Needletail [682]		Species or species habitat likely to occur within area
Motacilla flava		
Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca		
Satin Flycatcher [612]		Species or species habitat known to occur within area
Rhipidura rufifrons		
Rufous Fantail [592]		Species or species habitat likely to occur within area
Migratory Wetlands Species		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat likely to occur

Name	Threatened	Type of Presence
Ardea ibis Cattle Egret [59542]	Critically Endangered	within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]		Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Critically Endangered	Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat likely to occur within area
Lathamus discolor Swift Parrot [744]		Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]	Critically Endangered	Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]		Species or species habitat may occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]		Species or species habitat may occur within area

Extra Information

Invasive Species

[Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Cytisus scoparius Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Nassella neesiana Chilean Needle grass [67699]		Species or species habitat likely to occur within area
Nassella trichotoma Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Ulex europaeus Gorse, Furze [7693]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-33.44557 149.365453,-33.445625 149.365376,-33.45164 149.364175,-33.454362 149.364604,-33.466105 149.362372,-33.473193 149.361257,-33.474482 149.369325,-33.485006 149.367265,-33.483789 149.359111,-33.503186 149.355763,-33.49925 149.348554,-33.498319 149.345206,-33.499393 149.341086,-33.498463 149.335679,-33.497246 149.326667,-33.497246 149.319972,-33.497747 149.311389,-33.499178 149.307269,-33.499536 149.305381,-33.498677 149.301948,-33.498319 149.297999,-33.498964 149.29551,-33.494168 149.296369,-33.492591 149.285231,-33.486793 149.28918,-33.485218 149.29124,-33.478704 149.291926,-33.479205 149.298707,-33.450958 149.305058,-33.453751 149.323769,-33.441989 149.326056,-33.444926 149.352921,-33.443851 149.353179,-33.44557 149.365453

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Department of Land and Resource Management, Northern Territory](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- [-Natural history museums of Australia](#)
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence](#)
- [Forestry Corporation, NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- [-Australian Tropical Herbarium, Cairns](#)
- [-eBird Australia](#)
- [-Australian Government – Australian Antarctic Data Centre](#)
- [-Museum and Art Gallery of the Northern Territory](#)
- [-Australian Government National Environmental Science Program](#)
- [-Australian Institute of Marine Science](#)
- [-Reef Life Survey Australia](#)
- [-American Museum of Natural History](#)
- [-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [-Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- [-Other groups and individuals](#)

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.

Appendix B

Plot and transect data

B.1 Plot and transect data

Table B.1 Plot and transect data

Transect / Plot	Native plant species*	Native over-storey cover*	Native mid-storey cover*	Native ground cover (grass)*	Native ground cover (shrubs)*	Native ground cover (other)*	Exotic plant cover*	Number of trees with hollows*	Over-storey regen*	Total length of fallen logs*	Easting	Northing	Zon
103_WL_1	3	25	0	12	0	2	54	2	1	7	715611	6291879	55
103_WL_2_E	4	7	0	0	2	0	94	1	1	32	715226	6292502	55
103_WL_3	3	30	0	36	0	6	32	2	1	60	716678	6291837	55
103_WL_5	25	13	0	56	0	10	24	0	1	20	717082	6292932	55
103_WL_6_E	7	32	0	26	0	4	70	1	0	35	716102	6296068	55
124_For_1_E	7	19	0	50	0	6	34	12	1	120	717502	6294366	55
124_For_2_E	7	25	0	48	0	2	0	7	1	80	717735	6293570	55
124_For_3_E	7	25	1	30	0	0	0	4	1	95	717637	6293966	55
124_For_4	7	33	0	30	0	2	18	8	1	37	715821	6292214	55
124_For_5_E	7	25	0	52	0	0	34	3	1	25	717172	6292569	55
124_For_6_E	9	31	0	44	0	8	2	3	1	100	717446	6292954	55
124_For_8_E	9	18	0	14	0	0	0	6	1	15	718598	6291129	55
164_For_1	7	35	0	30	2	2	36	1	1	15	715654	6292442	55
164_For_2	4	55	0	40	0	0	60	3	1	60	716025	6291781	55
164_For_3_E	3	37	0	2	0	0	88	1	1	40	716393	6293861	55
164_For_5_E	4	26	0	2	0	16	80	3	1	70	716486	6295054	55
EK_103_DG_1	5	0	0	54	0	0	46	0	0	0	716906	6292803	55
EK_103_DG_17	7	0	0	48	0	2	32	0	0	0	716614	6291579	55

Table B.1 **Plot and transect data**

Transect / Plot	Native plant species*	Native over-storey cover*	Native mid-storey cover*	Native ground cover (grass)*	Native ground cover (shrubs)*	Native ground cover (other)*	Exotic plant cover*	Number of trees with hollows*	Over-storey regen*	Total length of fallen logs*	Easting	Northing	Zon
EK_103_DG_18	6	0	0	52	0	2	46	0	0	0	717189	6292229	55
EK_103_DG_2	3	0	0	52	0	0	48	0	0	0	716911	6293048	55
EK_103_DG_4	9	0	0	28	0	6	66	0	0	0	717836	6293190	55
EK_103_DG_5	3	0	0	42	0	0	58	0	0	0	716647	6291540	55
EK_103_DG_8	1	0	0	14	0	0	86	0	0	0	717171	6293556	55
EK_103_DG_9	5	0	0	36	0	0	64	0	0	0	717448	6293531	55
EK_124_DG_6	6	0	0	42	0	1	40	0	0	0	717363	6294388	55
EK_164_DG_1	3	0	0	34	0	0	66	0	0	0	716527	6292844	55
EK_164_DG_2	6	0	0	52	0	2	46	0	0	0	716768	6292639	55
EK_164_DG_3	5	0	0	60	0	0	40	0	0	0	717093	6294057	55
EK_Cultiv3	1	0	0	8	0	0	90	0	0	0	716513	6293817	55
EK_Cultiv6	1	0	0	18	0	0	82	0	0	0	716232	6292446	55
EK_Cultiv7	1	0	0	8	0	0	92	0	0	0	715883	6292746	55
EMM1	10	26	0	38	0	12	0	1	0	71	715480	6292156	55
EMM10Zone3	7	20.2	0	2	0	0	20	1	0	53	717519	6294195	55
EMM11	11	20	0	32	0	0	0	9	0	142	716340	6296182	55
EMM2Zone2	14	27.5	0	44	0	10	36	0	1	39	717912	6292888	55
EMM3	8	30	0	42	0	0	0	1	1	58	717910	6292754	55
EMM4	5	24.5	0	2	0	0	0	0	0	1	716271	6295825	55
EMM5	3	0	0	0	0	72	96	0	0	0	717013	6295643	55
EMM5_9	3	0	0	0	0	72	96	0	0	0	717013	6295643	55

Table B.1 **Plot and transect data**

Transect / Plot	Native plant species*	Native over-storey cover*	Native mid-storey cover*	Native ground cover (grass)*	Native ground cover (shrubs)*	Native ground cover (other)*	Exotic plant cover*	Number of trees with hollows*	Over-storey regen*	Total length of fallen logs*	Easting	Northing	Zon
EMM6Zone2	9	17.9	0	2	0	0	4	1	1	42	717061	6296016	55
EMM7Zone4	4	5	0	38	0	0	2	0	1	4	717326	6295747	55
EMM8Zone1	12	28.5	0	8	0	4	16	0	0	0	715659	6292182	55
EMM9	6	28	0	2	0	2	2	5	1	191	717799	6292125	55
EVKT4	12	40	0	48	0	2	0	2	1	60	718245	6292935	55

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400 m² plot: Sheet 1 of 1

Date 12/3/19

Survey Name McPhillamy's

Plot Identifier 727 (MG/Pool)

Recorders RP & SW

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
T	Eucalyptus dives	N	35	10		
G	Microlaena stipoides	N	5	5000		
G	Rytidosperma tenuis	N	15	>10000		
G	Vulpia bromoides	E	2	>10,000		
G	Anthosachne scaber	N	2	5000		
G	Lomandra filiformis	N	<0.1	30		
G	Carex sp. (no seedhead)	N	<0.1	10		
G	Poa sieberiana	N	5	5000		
G	Themeda triandra	N	1	20		
G	Doctylis glomeratus	E	0.1	8		
F	Einadia nutans	N	<0.1	1		
F	Desmodium illinoense	N	<0.1	1		
	NATIVE RICHNESS	NATIVE COVER				
	TG - 1	35				
	FG - 2	0.2				
	GG - 7	28.3				
	HTE RICHNESS	HTE COVER				
	0	0				

GF Code: see Growth Form definitions in Appendix 1 N: native, E: exotic, HTE: high threat exotic GF - circle code if 'top 3'

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ..., 100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m

Abundance: 1, 2, 3, ..., 10, 20, 30, ..., 100, 200, ..., 1000, ...

PLOT 1

Biobanking Plot Sheet - Transect

Proposal ID: J180395	Proposal Name:	Zone ID:
Veg Type: 722 MG - POOR		

Coordinates: Start Transect Easting/Northing: -33.48845, 149.31964

Coordinates: End Transect Easting/Northing: -33.88335, 149.319294



50 m Transect (every 5 m)	5	10	15	20	25	30	35	40	45	50	Avg (%)
Canopy Cover (% - see Specht)	40	15	20	0	10	60	40	15	5	55	0
Mid Storey Cover (shrubs > 1m)	-	-	-	-	-	-	-	-	-	-	0

50 m Transect (every 1 m)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	%
Ground Cover (shrubs < 1m)																																																		0	
Exotic shrubs (<1m)																																																		0	
Ground Cover (grasses)																																																		0	
Exotic grasses																																																		0	
Ground Cover (other)																																																	0		
Exotic other																																																		0	

Notes

Hollow-bearing trees - 1
 Logs - 71



Ready to enter

Entered into S123

Plot 2

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400 m ² plot: Sheet 1 of 1		Survey Name	Plot Identifier	Recorders		
Date	12/3/19	McPhillanys	654-MG-med-2 RP-SW			
GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	Voucher
TG	<i>Eucalyptus melliodora</i>	N	40	2		
GG	<i>Phalaris aquatica</i>	E	40	40,000		
GG	<i>Rytidosperma tenuius</i>	N	30	30,000		
GG	<i>Bromus</i> sp. (dead)	E	<0.1	50		
FG	<i>Einadia nutans</i>	N	0.3	200		
GG	<i>Bothriochloa macro</i>	II N	0.1	7		
FG	<i>Desmodium varians</i>	N	0.3	800		
FG	<i>Chondrilla juncea</i>	IIII E	0.1	7		
GG	<i>Carex</i> sp. (seed decomposed)	N	0.5	100		
GG	<i>Poa sieberiana</i> var. <i>sieberiana</i>	II N	5	5,000		
FG	<i>Cirsium vulgare</i>	IIII N	0.1	19		
FG	<i>Oxalis perenans</i>	III N	<0.1	3		
GG	<i>Anthoschoenus scaber</i>	N	5	10,000		
FG	<i>Hypochaeris radicata</i>	IIII E	0.1	9		
FG	<i>Convolvulus angustissimus</i> (N	<0.1	2		
GG	<i>Dactylis glomerata</i>	II E	<0.1	2		
FG	<i>Modiola caroliniana</i>	II E	<0.1	2		
FG	<i>Lactuca serriola</i>	I E	<0.1	1		
FG	<i>Rumex</i> sp. - no seed head	I E	<0.1	1		
SG	<i>Rosa rubiginosa</i>	I HTE	<0.1	1		
GG	<i>Microberna stipodes</i> 20 x 6	N	<0.1	40		
FG	<i>Dichondra</i> species 'A'	III N	<0.1	5		
GG	<i>Themeda triandra</i>	II N	<0.1	5		
GG	<i>Cynosurus echinatus</i>	I E	<0.1	9		
GG	<i>Juncus ustitatus</i>	IIII N	<0.1	1		
NATIVE RICHNESS		NATIVE COVER				
TG	1	40				
FG	5	0.9				
GG	9	40.9				
HTE RICHNESS		HTE COVER				
TG	-0	0				
FG	-0	0				
GG	-0	0				
SG	-1	0.1				

GF Code: see Growth Form definitions in Appendix 1 N: native, E: exotic, HTE: high threat exotic GF - circle code if 'top 3'.
 Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ..., 100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
 Abundance: 1, 2, 3, ..., 10, 20, 30, ..., 100, 200, ..., 1000, ...

Plot 2

Biobanking Plot Sheet - Transect

Proposal ID: 5180395	Proposal Name:	Zone ID:
Veg Type: 654 m6 MED		
Coordinates: Start Transect Easting/Northing:		
Coordinates: End Transect Easting/Northing:		

-33.481572
149.345737



50 m Transect (every 5 m)	5	10	15	20	25	30	35	40	45	50	Avg (%)
Canopy Cover (% - see Specs)	20	90	75	45	-	-	-	-	15	30	0
Mid Storey Cover (shrubs > 1m)											0

50 m Transect (every 1 m)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
Ground Cover (shrubs < 1m)																																																		
Exotic shrubs (<1m)																																																		
Ground Cover (grasses)																																																		
Exotic grasses																																																		
Ground Cover (other)																																																		
Exotic other																																																		

Notes

Hollow-bearing trees. ☉
Logs: 39

PCT 727

400 m ² plot: Sheet <u>1</u> of <u>1</u>		Survey Name	Plot Identifier	Recorders
Date	12-03-2019	McPhillamys	727-M62-HIGH 3	SGW + RP

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ... 100% (foliage cover); **Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m

Plot 3

Biobanking Plot Sheet - Transect



Proposal ID: J180395	Proposal Name:	Zone ID:
Veg Type: 727		
Coordinates: Start Transect Easting/Northing: -33.48255, 149.34527		
Coordinates: End Transect Easting/Northing: -33.48294, 149.34544		

50 m Transect (every 5 m)	5	10	15	20	25	30	35	40	45	50	Avg (%)
Canopy Cover (% - see Specht)	40	20	40	5	40	30	5	5	60	55	0
Mid Storey Cover (shrubs > 1m)	-	-	-	-	-	-	-	-	-	-	0

50 m Transect (every 1 m)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
Ground Cover (shrubs < 1m)																																																		
Exotic shrubs (<1m)																																																		
Ground Cover (grasses)																																																		
Exotic grasses																																																		
Ground Cover (other)																																																		
Exotic other																																																		

Notes	Hollow-bearing trees - Logs - 50
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READY TO ENTER
ENTERED INTO 8123

PG 727-M6-R00R

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400 m ² plot: Sheet 1 of 1		Survey Name	Plot Identifier	Recorders			
Date	13-03-2019	J180395	4	SGW + RP			
GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher	
✓ TG	EUCALYPTUS MELHODARA	N	70	7			
✓ TG	EUCALYPTUS BRIDGESIANA	N	5	1			
✓ FG	CIRSIUM VULGARIS	E	2	10			
✓ GG	BROMUS CATHARTICUS	E	3	50			
✓ GG	HORDEUM HYSTRIX	E	3	50			
✓ FG	MALVA PARVIFLORA	E	1	2			
✓ GG	LOLIUM PERENNE	E	1	10			
✓ GG	RYTHIDOSPERMA TENUIS	N	1	10			
✓ GG	ELEUSINE TRISTACHYA	E	1	5			
✓ GG	DACTYLIS GLOMERATUS	E	2	20			
✓ FG	POLYGONUM PLEBEIUM	N	1	2			
✓ FG	ENADIA NUTANS	N	1	2			
✓ FG	SOLANUM NIGRUM	E	1	1			
NATIVE RICHNESS		NATIVE COVER					
TG - 25		- 75					
FG - 2.2		- 0.2					
GG - 1.1		- 0.1					
HTE RICHNESS		HTE COVER					
0		0					

GF Code: see Growth Form definitions in Appendix 1 N: native, E: exotic, HTE: high threat exotic GF - circle code if 'top 3'
Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ..., 100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
Abundance: 1, 2, 3, ..., 10, 20, 30, ..., 100, 200, ..., 1000, ...

Plot 4

13/3/19

Biobanking Plot Sheet - Transect

Proposal ID: J190395	Proposal Name:	Zone ID:
Veg Type: 727 PCT		
Coordinates: Start Transect Easting/Northing:		
Coordinates: End Transect Easting/Northing:		



50 m Transect (every 5 m)	5	10	15	20	25	30	35	40	45	50	Avg (%)
Canopy Cover (% - see Specht)	20	40	40	15	5	20	30	15	20	40	0
Mid Storey Cover (shrubs > 1m)	-	-	-	-	-	-	-	-	-	-	0

50 m Transect (every 1 m)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	%
Ground Cover (shrubs < 1m)																																																		0	
Exotic shrubs (<1m)																																																		0	
Ground Cover (grasses)																																																		0	
Exotic grasses																																																		0	
Ground Cover (other)																																																		0	
Exotic other																																																		0	

Notes

Mostly bare ground / litter
 (1) Hollow bearing trees: 0
 Logs: 1m

READY TO ENTER
ENTERED INTO SURVEY 123

PCT 1293

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400 m ² plot: Sheet 1 of 1		Survey Name	Plot Identifier	Recorders			
Date	13/03/2019	J180395	5	SGW + RP			
GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher	
GG	CAREX APPRESSA	N	70	2000			
FG	CIRSIIUM VULGARE	E	10	29			
GG	FESTUCA ARUNDINACEA	E	70	2000			
FG	TRIFOLIUM REPENS	E	70	40000			
FG	RUMEX BROWNII	N	.1	5			
GG	PHALARIS AQUATICA	E	2	200			
FG	HYPOCHAERIS RADICATA	E	.2	12			
FG	LACTUCA SCARIOLA	E	.1	2			
FG	TARAXIACUM OFFICINALE	E	.1	2			
GG	POACEAE INDETERMINATE	-	40	5000			
GG	JUNCUS USTATUS	N	.1	2			
NATIVE RICHNESS		Sum of COVER					
TG	T - 0	0					
SG	SH - 0	0					
GG	GRASS - 5	182.1					
FG	FORBS - 6	80.5					
	FERNS - 0	0					
OG	OTHER - 0	0					
HTE RICHNESS		HTE COVER					
0		0					

GF Code: see Growth Form definitions in Appendix 1

N: native, E: exotic, HTE: high threat exotic

GF - circle code if 'top 3'

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ..., 100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m

Abundance: 1, 2, 3, ..., 10, 20, 30, ..., 100, 200, ..., 1000, ...

PLOT 5

13/3/19

Biobanking Plot Sheet - Transect

Proposal ID: J180395	Proposal Name:	Zone ID:
Veg Type:		
Coordinates: Start Transect Easting/Northing:		
Coordinates: End Transect Easting/Northing:		



50 m Transect (every 5 m)	5	10	15	20	25	30	35	40	45	50	Avg (%)
Canopy Cover (% - see Specht)											0
Mid Storey Cover (shrubs > 1m)											0

no trees or shrubs

50 m Transect (every 1 m)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	%
Ground Cover (shrubs < 1m)																																																		0	
Exotic shrubs (<1m)																																																		0	
Ground Cover (grasses)																																																		0	
Exotic grasses																																																			0
Ground Cover (other)																																																			0
Exotic other																																																			0

Notes

READY TO ENTER
ENTERED INTO S123 PCT 654

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400 m ² plot: Sheet 1 of 1		Survey Name	Plot Identifier	Recorders			
Date	13/03/19	J180395	6	SGW + RP			
GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher	
TG	EUCALYPTUS MELIODORA	N	25	2			
TG	EUCALYPTUS BRIDGESIANA	N	1	1			
GG	RYTIDOSPERMA TENUIUS	N	0.1	200			
GG	ANTHOSACHNE SCABER	N	0.1	1000			
GG	MICROLAENA STILOIDES	N	0.8	1600			
GG	VULPIA SP	E	0.2	1600			
GG	JUNCUS SP	-	0.1	1			
GG	CAREX SP	-	0.1	30			
FG	CHONDRIELLA JUNCEA	E	0.1	4			
GG	LOMANDRA FILIFORMIS	N	0.1	2			
GG	PHALARIS AQUATICA	E	0.1	3			
FG	POLYGONUM PERIUM	N	0.1	2			
GG	BROMUS CATHARTICUS	E	0.1	400			
NATIVE RICHNESS		SUM NATIVE COVER					
TG = 2		26					
GG = 4		1.1					
FG = 1		0.1					
HTE RICHNESS		HTE COVER					
TG - 0		0					
GG - 0		0					
FG - 0		0					

GF Code: see Growth Form definitions in Appendix 1

N: native, E: exotic, HTE: high threat exotic

GF = circle code if 'top 3'

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ..., 100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

PLOT 6

13/3/19

Biobanking Plot Sheet - Transect

Proposal ID: J180395	Proposal Name:	Zone ID:
Veg Type:		
Coordinates: Start Transect Easting/Northing:		
Coordinates: End Transect Easting/Northing:		



50 m Transect (every 5 m)	5	10	15	20	25	30	35	40	45	50	Avg (%)
Canopy Cover (% - see Specht)	15	25	15	5	28	20	1	20	20	30	0
Mid Storey Cover (shrubs > 1m)	-	-	-	-	-	-	-	-	-	-	0

50 m Transect (every 1 m)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	%
Ground Cover (shrubs < 1m)																																																		0	
Exotic shrubs (<1m)																																																			
Ground Cover (grasses)																																																		0	
Exotic grasses																																																			
Ground Cover (other)																																																		0	
Exotic other																																																			

Notes

mostly litter & bare ground.

Hollows - 1

Logs - 42

READY TO ENTER ENTERED INTO S123
PCT 654

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400 m ² plot: Sheet 1 of 1		Survey Name	Plot Identifier	Recorders			
Date	13-03-2019	J180395	7	RP + SGW			
GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher	
TG	EUCALYPTUS MELIODOORA	N	22	1			
GG	RYTHIDOSPHERMA TENDRUS	N	8	2000			
FG	HYPOCHAERIS RADICATA	E	8	3000			
GG	MICROLAGNA STIPOIDES	N	4	2000			
GG	EUCHITON SPHAGRICUS	N	0.1	10			
GG	GLEUSINE TRISTACHYA	E	0.1	1			
GG	PHALARIS AQUATICA	E	1	60			
FG	RUBUS FRUTICOSA AGGREGATE	HTE	0.1	1			
NATIVE RICHNESS		SUM OF NATIVE COVER					
TG - 1			22				
GG - 3			13				
FG - 0			0				
HTE RICHNESS		SUM OF HTE COVER					
FG - 0.1			0.1				

GF Code: see Growth Form definitions in Appendix 1 N: native, E: exotic, HTE: high threat exotic GF = circle code if 'top 3'
Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ... 100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

13/03/19

PLOT 7

SGW+RP

Biobanking Plot Sheet - Transect

Proposal ID: 21803915	Proposal Name:	Zone ID:
Veg Type:		
Coordinates: Start Transect Easting/Northing:		
Coordinates: End Transect Easting/Northing:		

-33.45569 149.33787

-33.45600 149.33828



50 m Transect (every 5 m)	5	10	15	20	25	30	35	40	45	50	Avg (%)
Canopy Cover (% - see Spect)	0	0	50	0	0	0	0	0	0	0	0
Mid Storey Cover (shrubs > 1m)											0

50 m Transect (every 1 m)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	%
Ground Cover (shrubs < 1m)																																																		0	
Exotic shrubs (<1m)																																																		0	
Ground Cover (grasses)	/					/	/	/					/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	0		
Exotic grasses																																																		0	
Ground Cover (other)																																																		0	
Exotic other																																																		0	

Notes

mostly Bare Ground + Litter.
Hollow Bearing trees — 0
Logs — 4

PLOT 8 PCT 654

EMING STAGE

Ready to entered into S123

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400 m ² plot: Sheet <u>1</u> of <u>1</u>		Survey Name	Plot Identifier	Recorders			
Date							
	14/3/12	McPhillanys	8	RP & SGU			
GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher	
T	Eucalyptus meliodora	N	45	7			
G	Arrostis stolonifera	E	10	>10,000			
G	Microseris stipodes	N	<0.1	15			
G	Drosera aegyptiaca	E	2.5	48			
F	Desmodium illinoense	N	0.1	9			
G	Rytidosperma tenuius	N	<0.1	10			
G	Lomandra filiformis	N	0.8	13			
F	Erigeron nutans	N	0.6	19			
G	Carex bichenoviana	N	0.3	50			
G	Poa sp - no seed head	N	0.1	35			
G	Anthoxanthum odoratum	N	<0.1	8			
S	Rubus fruticosus aggregatus	HTE	<0.1	4			
				10			
G	Rytidosperma orianthum	N	<0.1	3			
F	Oxalis perennans	N	<0.1	1			
S	Acacia dealbata subsp. dealbata	N	<0.1	1			
				5			
F	Chondrilla juncea	E	<0.1	1			
				16			
NATIVE RICHNESS		NATIVE COVER					
T	1	45					
F	2	0.4					
G	7	0.9					
S	1	0.1					
HTE RICHNESS		HTE COVER					
T	0	0					
F	0	0					
G	0	0					
S	1	0.1					

GF Code: see Growth Form definitions in Appendix 1

N: native, E: exotic, HTE: high threat exotic

GF - circle code if 'top 3'

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ... 100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Stew + RP

PLOT 8

Biobanking Plot Sheet - Transect

Proposal ID: J180395	Proposal Name:	Zone ID:
Veg Type:		
Coordinates: Start Transect Easting/Northing:		
Coordinates: End Transect Easting/Northing:		

-33.48816 149.32122
-33.48809 149.32180



50 m Transect (every 5 m)	5	10	15	20	25	30	35	40	45	50	Avg (%)
Canopy Cover (% - see Spect)	55	80	20	80	15	20	-	-	-	15	0
Mid Storey Cover (shrubs > 1m)											0

50 m Transect (every 1 m)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	9
Ground Cover (shrubs < 1m)																																																			
Exotic shrubs (<1m)																																																			
Ground Cover (grasses)																																																			
Exotic grasses																																																			
Ground Cover (other)																																																			
Exotic other																																																			

Notes

Hollow-bearing trees - 0

Logs - 0

~~Eucalyptus meliodora~~

50-plot =
PLOT 9
J130395
READY TO ENTER
ENTERED INTO 5123
PCT 727

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400 m ² plot: Sheet <u>1</u> of <u>1</u>		Survey Name	Plot Identifier	Recorders			
Date	<u>14/3/19</u>	<u>McPharlands</u>	<u>9</u>	<u>RP & SGW</u>			
GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable		N, E or HTE	Cover	Abund	stratum	Voucher
T	<u>Euca. gomicalyx</u>		N	39	13		
T	<u>Euca. dives</u>		N	18	6		
G	<u>Vulpia sp</u>		E	1	200		
G	<u>Pylidaspisma tenuius</u>		N	6.3	1000		
G	<u>Anthosachne scaber</u>		N	<0.1	7		
G	<u>Lolium perenne</u>		E	<0.1	2		
G	<u>Cynodorus echinatus</u>		E	<0.1			
G	<u>Lomarda filiformis</u> (20=0.1)		N	0.4	127		
G	<u>Poa sp</u> - no seedhead		N	<0.1	13		
			N	63.9	1166		
			HTE	0	0		
NATIVE RICHNESS			NATIVE COVER				
T	2		57				
G	4		6.9				
F	0		0				
HTE RICHNESS			HTE COVER				
0			0				

GF Code: see Growth Form definitions in Appendix 1 N: native, E: exotic, HTE: high threat exotic GF = circle code if 'top 3'
Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); Note: 0.1% cover represents an area of approximately 83 x 83 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

PLOT 9

14/3/19

Biobanking Plot Sheet - Transect

Proposal ID: J180395	Proposal Name:	Zone ID:
Veg Type: E. Goniodactylus & E. divers		
Coordinates: Start Transect Easting/Northing:		
Coordinates: End Transect Easting/Northing:		



50 m Transect (every 5 m)	5	10	15	20	25	30	35	40	45	50	Avg (%)
Canopy Cover (% - see Spect)	45	30	25	30	10	45	25	15	25	30	0
Mid Storey Cover (shrubs > 1m)	-	-	-	-	-	-	-	-	-	-	0

50 m Transect (every 1 m)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	%
Ground Cover (shrubs <1m)																																																		0	
Exotic shrubs (<1m)																																																		0	
Ground Cover (grasses)																																																		0	
Exotic grasses																																																		0	
Ground Cover (other)																																																		0	
Exotic other																																																		0	
Notes																																																		0	
No mid stream																																																		0	

Notes

No mid storey

Very little groundlayer

Hollow bearing trees - 5

Logs - 191

PLOT 10

-READY TO ENTER

ENTERED INTO S123

PCT 654

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400 m ² plot: Sheet <u>1</u> of <u>1</u>		Survey Name	Plot Identifier	Recorders			
Date	14/3/19	McPhyllumis	10	RP & SGW			
GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher	
T	<i>Eucalyptus bridgmanii</i>	N	10	2			
G	<i>Chloris gayana</i>	HTE	15	6000			
G	<i>Rytidosperma carphoides</i>	N	5	2000			
G	<i>Stylosanthes perenne</i>	E	0.2	200			
F	<i>Enodia nutans</i>	N	0.1	1			
F	<i>Hypochaeris radicata</i>	E	0.1	2			
G	<i>Eleusine tristachya</i>	E	0.1	20			
G	<i>Anthosachne scabra</i>	N	0.1	1			
F	<i>Polygonum plebun</i>	N	0.1	4			
G	<i>Anthosachne scabra</i>	N	0.1	3			
G	<i>Rytidosperma tenuius</i>	N	5	1900			
G	<i>Phalaris aquatica</i>	E	0.1	20			
G	<i>Juncus ustulatus</i>	E	0.1	3			
NATIVE RICHNESS		NATIVE COVER					
T-1		10					
G-4		10.2					
F-2		0.2					
HTE RICHNESS		HTE COVER					
T-0		0					
G-1		15					
F-0		0					
S-0		0					

GF Code: see Growth Form definitions in Appendix 1

N: native, E: exotic, HTE: high threat exotic

GF - circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ... 100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Biobanking Plot Sheet - Transect

14/03/19

Proposal ID: J180395	Proposal Name: McPherson	Zone ID:
Veg Type:		
Coordinates: Start Transect Easting/Northing:		
Coordinates: End Transect Easting/Northing:		

PLOT 10



50 m Transect (every 5 m)	5	10	15	20	25	30	35	40	45	50	Avg (%)
Canopy Cover (% - see Specht)	30	25	30	10	40	50	15	2	0	0	0
Mid Storey Cover (shrubs > 1m)	-	-	-	-	-	-	-	-	-	-	0

50 m Transect (every 1 m)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	%
Ground Cover (shrubs < 1m)																																																		0	
Exotic shrubs (<1m)																																																		0	
Ground Cover (grasses)																																																		0	
Exotic grasses	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	0			
Ground Cover (other)																																																		0	
Exotic other																																																		0	
Notes																																																		0	

Notes

Hollow-bearing trees - 1
Logs - 53

PCT 727

PLOT 11

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180395

400 m ² plot: Sheet <u>1</u> of <u>1</u>		Survey Name	Plot Identifier	Recorders
Date	15/3/19	McPherson	11	RP ST SW

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
TG	Eucalyptus dives	N	12	3		
TG	Eucalyptus goniorachys	N	10	1		
G	Rytidosperma tenuius	N	7	4000		
G	Anthosachne scalaris	N	1	4000		
G	Microseris stipoides	N	1.5	800		
F	Chondila juncea	E	<0.1	1		
F	Oxalis perennis	N	<0.1	1		
G	Lomandra filiformis	N	<0.1	4		
G	Vilpa sp.	E	<0.1	100		
G	Juncus sp. - no seedhead	E	<0.1	1		
G	Carex sp. - no seedhead	N	<0.1	5		
F	Solanum nigrum	E	<0.1	1		
G	Lomandra - wide leaf, salt - same as L. filiformis	E	<0.1	10		
S	Rubus fruticosus aggregate	HTE	<0.1	1		
F	Eucalyptus nitens	N	<0.1	3		
F	Polygonum persicaria	N	<0.1	1		
NATIVE RICHNESS		NATIVE COVER				
T - 2		22				
F - 3		0.3				
G - 5		8.7				
HTE RICHNESS		HTE COVER				
T - 0		0				
F - 0		0				
G - 0		0				
S - 1		0.1				

GF Code: see Growth Form definitions in Appendix 1

N: native, E: exotic, HTE: high threat exotic

GF - circle code if 'top 3'

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

PLOT 11

J180395

15/3/19

Biobanking Plot Sheet - Transect

Proposal ID:	Proposal Name:	Zone ID:
Veg Type: <i>E. Goniacalyx + 4 drives</i>		
Coordinates: Start Transect Easting/Northing:		
Coordinates: End Transect Easting/Northing:		



50 m Transect (every 5 m)	5	10	15	20	25	30	35	40	45	50	Avg (%)
Canopy Cover (% - see Specht)	15	15	5	5	20	15	10	20	40	40	0
Mid Storey Cover (shrubs > 1m)	—	—	—	—	—	—	—	—	—	—	0

50 m Transect (every 1 m)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	%
Ground Cover (shrubs < 1m)																																																		0	
Exotic shrubs (<1m)																																																		0	
Ground Cover (grasses)	1																																																	0	
Exotic grasses																																																		0	
Ground Cover (other)																																																		0	
Exotic other																																																		0	
Notes	Hollow-bearing trees - 0																																																		

Notes

Hollow-bearing trees - 9
Logs - 142

Appendix C

BioBanking credit report

Biodiversity credit report



This report identifies the number and type of biodiversity credits required for a major project.

Date of report: 22/08/2019

Time: 10:24:21AM

Calculator version: v4.0

Major Project details

Proposal ID: 0103/2018/4941MP

Proposal name: McPhillamy's Gold Project - EIS

Proposal address: 294 Dungeon Road Kings Plain NSW 2799

Proponent name: Regis Resources Ltd

Proponent address: Level 2/516 Hay St Subiaco 6008

Proponent phone: 08 9442 2200

Assessor name: Nathan Garvey

Assessor address: Level 1, Suite 6, 146 Hunter Street NEWCASTLE NSW 2300

Assessor phone: 4907 4800

Assessor accreditation: 0103

Summary of ecosystem credits required

Plant Community type	Area (ha)	Credits created
Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion	1,055.93	2,495.00
Carex sedgeland of the slopes and tablelands	3.04	56.00
Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion	1,033.93	1,178.00
Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	1,046.60	2,198.00
Total	3,139.50	5,927

Credit profiles

1. Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion, (LA164)

Number of ecosystem credits created	0
IBRA sub-region	Orange - Lachlan

Offset options - Plant Community types	Offset options - IBRA sub-regions
<p>Snow Gum - Mountain Gum tussock grass-herb forest of the South Eastern Highlands Bioregion, (LA206)</p> <p>Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion, (LA164)</p> <p>Peppermint - Mountain Gum - Brown Barrel moist open forest of the South Eastern Highlands Bioregion, (LA173)</p> <p>Ribbon Gum - Narrow-leaved Peppermint grassy open forest on basalt plateaux, Sydney Basin Bioregion and South Eastern Highlands Bioregion, (LA261)</p>	<p>Orange - Lachlan</p> <p>and any IBRA subregion that adjoins the IBRA subregion in which the development occurs</p>

2. Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion, (LA164)

Number of ecosystem credits created	1,178
IBRA sub-region	Orange - Lachlan

Offset options - Plant Community types	Offset options - IBRA sub-regions
<p>Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion, (LA164)</p> <p>Snow Gum - Mountain Gum tussock grass-herb forest of the South Eastern Highlands Bioregion, (LA206)</p> <p>Peppermint - Mountain Gum - Brown Barrel moist open forest of the South Eastern Highlands Bioregion, (LA173)</p> <p>Ribbon Gum - Narrow-leaved Peppermint grassy open forest on basalt plateaux, Sydney Basin Bioregion and South Eastern Highlands Bioregion, (LA261)</p>	<p>Orange - Lachlan</p> <p>and any IBRA subregion that adjoins the IBRA subregion in which the development occurs</p>

3. Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion, (LA276)

Number of ecosystem credits created	0
IBRA sub-region	Orange - Lachlan

Offset options - Plant Community types	Offset options - IBRA sub-regions
Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands Bioregion, (LA103) Black Sallee - Tussock Grass open woodland of the South Eastern Highlands Bioregion, (LA113) Blakely's Red Gum moist sedgey woodland on flats and drainage lines of the South Eastern Highlands Bioregion and NSW South Western Slopes Bioregion, (LA121) Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion, (LA276)	Orange - Lachlan and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

4. Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion, (LA276)

Number of ecosystem credits created	2,198
IBRA sub-region	Orange - Lachlan

Offset options - Plant Community types	Offset options - IBRA sub-regions
<p>Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion, (LA276)</p> <p>Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands Bioregion, (LA103)</p> <p>Black Sallee - Tussock Grass open woodland of the South Eastern Highlands Bioregion, (LA113)</p> <p>Blakely's Red Gum moist sedgey woodland on flats and drainage lines of the South Eastern Highlands Bioregion and NSW South Western Slopes Bioregion, (LA121)</p>	<p>Orange - Lachlan</p> <p>and any IBRA subregion that adjoins the IBRA subregion in which the development occurs</p>

5. Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion, (LA124)

Number of ecosystem credits created

0

IBRA sub-region

Orange - Lachlan

Offset options - Plant Community types	Offset options - IBRA sub-regions
<p>Apple Box - Broad-leaved Peppermint dry open forest of the South Eastern Highlands Bioregion, (LA101)</p> <p>Apple Box - Yellow Box - Argyle Apple dry open forest of the South Eastern Highlands Bioregion and NSW South Western Slopes Bioregion, (LA102)</p> <p>Blakely's Red Gum - Red Stringybark open forest on slopes and hills of the western slopes, (LA117)</p> <p>Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion, (LA124)</p> <p>Broad-leaved Peppermint - Mountain Gum dry open forest of the Central Tablelands area of the South Eastern Highlands Bioregion, (LA125)</p> <p>Mugga Ironbark - Red Stringybark - Long-leaved Box dry grass forest of the NSW South Western Slopes Bioregion, (LA167)</p> <p>Red Box - Tumbledown Gum - Red Stringybark - Long-leaved Box dry woodland, upper NSW South Western Slopes Bioregion, (LA251)</p> <p>Inland Scribbly Gum - Red Stringybark open forest on hills composed of siliceous substrates in the mid-Murrumbidgee and upper Lachlan catchments mainly in the western South Eastern Highlands Bioregion, (LA242)</p> <p>Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion, (LA234)</p> <p>Red Stringybark - Blakely's Red Gum hillslope open forest on meta-sediments in the Yass - Boorowa - Crookwell region of the NSW South Western Slopes Bioregion and South Eastern Highlands Bioregion, (LA255)</p>	<p>Orange - Lachlan</p> <p>and any IBRA subregion that adjoins the IBRA subregion in which the development occurs</p>

6. Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion, (LA124)

Number of ecosystem credits created

2,495

IBRA sub-region

Orange - Lachlan

Offset options - Plant Community types	Offset options - IBRA sub-regions
<p>Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion, (LA124)</p> <p>Apple Box - Broad-leaved Peppermint dry open forest of the South Eastern Highlands Bioregion, (LA101)</p> <p>Apple Box - Yellow Box - Argyle Apple dry open forest of the South Eastern Highlands Bioregion and NSW South Western Slopes Bioregion, (LA102)</p> <p>Blakely's Red Gum - Red Stringybark open forest on slopes and hills of the western slopes, (LA117)</p> <p>Broad-leaved Peppermint - Mountain Gum dry open forest of the Central Tablelands area of the South Eastern Highlands Bioregion, (LA125)</p> <p>Mugga Ironbark - Red Stringybark - Long-leaved Box dry grass forest of the NSW South Western Slopes Bioregion, (LA167)</p> <p>Red Box - Tumbledown Gum - Red Stringybark - Long-leaved Box dry woodland, upper NSW South Western Slopes Bioregion, (LA251)</p> <p>Inland Scribbly Gum - Red Stringybark open forest on hills composed of siliceous substrates in the mid-Murrumbidgee and upper Lachlan catchments mainly in the western South Eastern Highlands Bioregion, (LA242)</p> <p>Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion, (LA234)</p> <p>Red Stringybark - Blakely's Red Gum hillslope open forest on meta-sediments in the Yass - Boorowa - Crookwell region of the NSW South Western Slopes Bioregion and South Eastern Highlands Bioregion, (LA255)</p>	<p>Orange - Lachlan</p> <p>and any IBRA subregion that adjoins the IBRA subregion in which the development occurs</p>

7. Carex sedgeland of the slopes and tablelands, (LA130)

Number of ecosystem credits created	56
IBRA sub-region	Orange - Lachlan

Offset options - Plant Community types	Offset options - IBRA sub-regions
Carex sedgeland of the slopes and tablelands, (LA130)	Orange - Lachlan and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

Summary of species credits required

Common name	Scientific name	Extent of impact Ha or individuals	Number of species credits created
Squirrel Glider	Petaurus norfolcensis	129.31	2,845
Koala	Phascolarctos cinereus	75.76	1,970

Appendix D

Regis Resources environmental policy

PO-02 ENVIRONMENTAL POLICY

Regis Resources Ltd understands that its activities will result in a change to the environment in which it operates. Regis recognizes that its obligation is to limit this impact and ensure any potential longer-term legacy issues are appropriately risk managed, as it seeks to achieve continuous improvement in environmental performance.

Through the implementation of the environmental components of the Safety Management System, Regis will:

- Ensure that all operations are undertaken in an environmentally responsible manner;
- Endeavour to conserve resources, reduce waste and minimise the environmental impacts of our operations;
- Record, investigate and implement corrective actions for all environmental incidents and complaints;
- Regularly audit and report on environmental performance;
- Ensure that its employees and contractors are informed about this Policy and made aware of their environmental responsibilities in relation to the Company's activities; and
- Comply with all applicable environmental legislation, regulation, licences, permits, approvals and authorities.

Regis Resources Ltd will endeavour to apply the principles of best practice environmental management wherever it operates around the world.



Jim Beyer
Managing Director and Chief Executive Officer
Regis Resources Ltd
15th January 2019