Appendix M

Biodiversity Development Assessment Report

REGIS RESOURCES LTD

McPhillamys Gold Project

Amendment Report - Biodiversity Development Assessment Report

Prepared for LFB Resources NL
September 2020

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McPhillamys Gold Project

Amendment Report - Biodiversity Development Assessment Report

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Prepared by	**Approved by**
	
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4 September 2020	4 September 2020

Executive Summary

ES1 The project

LFB Resources NL is a 100% owned subsidiary of Regis Resources Limited (herein referred to as Regis), and 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 project area is approximately 8 kilometres (km) north-east of Blayney, within the Blayney and Cabonne local government areas, and within the Orange IBRA sub-region of the former Lachlan Catchment Management Authority (CMA). The pipeline development traverses four IBRA subregions, comprising Orange, Bathurst, Hill End and Capertee Uplands.

In accordance with the requirements of the EP&A Act, the NSW *Environmental Planning & Assessment Regulation 2000* (EP&A Regulation) and the Secretary's Environmental Assessment Requirements (SEARs) for the project, an Environmental Impact Statement (EIS) was prepared to assess the potential environmental, economic and social impacts of the project. The development application and accompanying EIS was submitted to the NSW Department of Planning, Industry and Environment (DPIE) and subsequently publicly exhibited for six weeks, from 12 September 2019 to 24 October 2019. During this exhibition period Regis received submissions from government agencies, the community, businesses and other organisations regarding varying aspects of the project.

In response to issues raised in submissions received, as well as a result of further detailed mine planning and design, Regis has made a number of refinements to the project. Accordingly, an Amendment Report has been prepared by EMM Consulting Pty Ltd (EMM 2020a) to outline the changes to the project that have been made since the public exhibition of the EIS and to assess the potential impacts of the amended project, compared to those that were presented in the EIS. This report forms part of the Amendment Report and presents an assessment of the biodiversity impacts of the amended project.

ES2 Purpose of this report

In the EIS, biodiversity impacts of the gold mine development were assessed in accordance with the former NSW Framework for Biodiversity Assessment (FBA), while the pipeline development was assessed in accordance with the current Biodiversity Assessment Method (BAM) as per the Secretary's Environmental Assessment Requirements (SEARs) for the project. Regis has subsequently however received legal advice that such a hybrid approach of use of the FBA and BAM for a single project application may expose Regis to the risk of a legal challenge.

Accordingly, to address this risk created by the "hybrid" biodiversity assessment approach, the legal advice obtained recommended re-assessing the mine development component of the project in accordance with the BAM. Due to the need to update the mine and pipeline biodiversity assessments to account for amendments to the mine footprint and pipeline corridor (refer above) and respond to Biodiversity Conservation Division's submission on the existing pipeline biodiversity assessment (OzArk 2019; see Section 1.4), Regis has decided to prepare a combined biodiversity development assessment report (BDAR) for the project, inclusive of both the mine and pipeline development components.

This report has been prepared to assess the potential biodiversity impacts of the amended project into a combined assessment for the mine and pipeline developments. The assessment considers and outlines the differences in impacts compared to the original project as presented in the EIS. Accordingly, this BDAR supersedes the following reports presented in the EIS:

- McPhillamys Gold Project Mine Development Biodiversity Assessment Report (EMM 2019, Appendix N of the McPhillamys Gold Project EIS); and
- McPhillamys Gold Project Pipeline Development Biodiversity Development Assessment Report (OzArk Environmental & Heritage Management Pty Ltd (OzArk) 2019, Appendix Y of the McPhillamys Gold Project EIS).

ES3 Ecological values

ES3.1 Mine development

Field surveys revealed that vegetation within the mine site, which has experienced historic pastural 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 varied from higher condition patches to poor condition patches.

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 a critically endangered ecological community (CEEC) 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 (Box Gum Woodland), also listed as a CEEC under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999.*

Several ecosystem credit species were predicted to be associated with the PCTs in the mine project area by the Biodiversity Assessment Method Calculator (BAMC). Two candidate species, comprising the Koala (*Phascolarctos cinereus*) and Squirrel Glider (*Petaurus norfolcensis*) were also recorded in the mine project area. The Koala is associated with three PCTs across the site, namely PCT 727 (medium and high condition vegetation zones only), PCT 951 and PCT 1330. PCT 727 contains Broad-leaved Peppermint (*E. dives*), Bundy (*E. goniocalyx*), Apple Box (*E. bridgesiana*) and sparse areas of Brittle Gum (*E. mannifera*). PCT 951 contains Manna Gum (*E. viminalis*). PCT 1330 contains Apple Box (*E. bridgesiana;* and Yellow Box (*E. melliodora*). The aforementioned tree species have been identified by *State Environmental Planning Policy (Koala Habitat Protection) 2019* as koala feed trees in the central and southern tablelands koala management area, in which the mine is located. The Squirrel Glider has been associated with all woody communities on site. Approximately 116.95 ha of Koala habitat and 127.35 ha of Squirrel Glider habitat occurs in the mine disturbance footprint and will be directly impacted.

Four species listed under the EPBC Act were recorded in the mine project area. These comprised two species listed as vulnerable (Koala and Superb Parrot *Polytelis swainsonii*) and two migratory species (Latham's Snipe (*Gallinago hardwickii*) and Rainbow Bee-eater (*Merops ornatus*)). PCTs 727, 951 and 1330 in the mine 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 mine 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 mine project area. The breeding range is concentrated on the NSW South Western Slopes and Riverina Bioregions; however, the mine 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 mine project area; however, the mine 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 mine 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 mine project area.

A single Rainbow Bee-eater was recorded in the mine project area. The Rainbow Bee-eater is widely distributed throughout Australia, Asia, Papua New Guinea and Solomon Islands. The majority of the global population breeds in Australia (including on Rottnest Island and islands in the south-west Torres Strait). Breeding has also been recorded in eastern Papua New Guinea (around Port Moresby and the Ramu Valley) and may possibly occur in the Lesser Sundas. The species important breeding habitat occurs outside the mine project area.

ES3.2 Pipeline development

Field surveys revealed that the pipeline development predominantly traverses areas of non-native vegetation, comprising cleared grasslands and pine forests. The western part of the pipeline also traverses fragmented patches of timbered natural vegetation scattered throughout, while fragmented and some intact patches are intersected in the east. Field surveys recorded six native plant community types (PCT), comprising:

- Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion (PCT 1330);
- Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion (PCT 277);
- Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion (PCT 1093);
- Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion (PCT 1191);
- Snow Gum - Mountain Gum tussock grass-herb forest of the South Eastern Highlands Bioregion (PCT 1197); and
- Broad-leaved Peppermint – Brittle Gum – Red Stringybark dry open forest of the South Eastern Highlands Bioregion (PCT 727).

All native plant community types recorded varied from intact patches to derived native grasslands (DNG).

Two PCTs, namely Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion, represent White Box Yellow Box Blakely's Red Gum Woodland and Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion, listed as a critically endangered ecological community (CEEC) under the NSW *Biodiversity Conservation Act 2016* (BC Act). Up to 0.81 ha of this PCT in the southern option and 1.34 ha in the northern option 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.*

All vegetation zones within two PCTs, namely Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion and Snow Gum - Mountain Gum tussock grass-herb forest of the South Eastern Highlands Bioregion, represent Werriwa Tablelands Cool Temperate Grassy Woodland in the South Eastern Highlands and South East Corner Bioregions, listed as a CEEC under the BC Act. The ecological community is not listed under the EPBC Act.

Several ecosystem credit species were predicted to be associated with the PCTs in the pipeline development by the BAMC. Two candidate species, comprising Black Gum (*Eucalyptus aggregata*) and Clandulla Geebung (*Persoonia marginata*) were recorded in the pipeline corridor. Potential host plants for the Bathurst Copper Butterfly (*Paralucia spinifera*) were also recorded. Several fauna species have been assumed as present in limited parts of the pipeline development where suitable habitat occurs, comprising Pink-tailed Worm Lizard (*Aprasia parapulchella*), Basalt Peppercress (*Lepidium hyssopifolium*), Booroolong Frog (*Litoria booroolongensis*), Small Purple-pea (*Swainsona recta*), Silky Swainson-pea (*Swainsona sericea*), Tarengo Leek Orchid (*Prasophyllum petilum*), Austral Toadflax (*Thesium australe*), Squirrel Glider (*Petaurus norfolcensis*), Koala (*Phascolarctos cinereus*), Bush Stone-curlew (*Burhinus grallarius*), Eastern Pygmy Possum (*Cercartetus nanus*), Masked Owl (*Tyto novaehollandiae*), Gang-gang Cockatoo (*Callocephalon fimbriatum*), Barking Owl (*Ninox connivens*), Powerful Owl (*Ninox strenua*). Potential denning/roosting habitat exists east of the pipeline development for the Brush-tailed Phascogale (*Phascogale tapoatafa*) and Large-eared Pied Bat (*Chalinolobus dwyeri*) and Brush-tailed Rock-Wallaby (*Petrogale penicillata*), and therefore an assessment of potential foraging habitat in the pipeline development proximal to these areas has been conducted.

Of the species listed above that have been recorded or have potential to occur in the pipeline development, Austral Toadflax, Basalt Peppercress, Black Gum, Small Purple-pea, Tarengo Leek Orchid, Bathurst Copper Butterfly, Koala and Pink-tailed Worm Lizard are also listed under the EPBC Act. In addition, potential foraging habitat occurs for the Superb Parrot (*Polytelis swainsonii*) and potential habitat for Hoary Sunray (*Leucochrysum albicans var. tricolor*) and Greater Glider (*Petaurus volans*), also listed under the EPBC Act.

ES4 Impact avoidance, minimisation and mitigation

ES4.1 Mine development

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 mine disturbance footprint was minimised to avoid and minimise biodiversity impacts, particularly impacts to White Box Yellow Box Blakely's Red Gum Woodland CEEC 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 mine 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;
- minimisation of impacts to PCT 1330_Medium condition wherever feasible;
- development of a tailings storage facility (TSF) which avoids almost all Box Gum Woodland 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.

ES4.2 Pipeline development

The pipeline has been designed, where possible, to avoid sensitive biodiversity areas. Regis has invested significant time and expense in revising vegetation mapping, conducting targeted surveys and assessing habitat for threatened species in response the BCD's concerns with the EIS pipeline biodiversity assessment.

The additional surveys and assessments have been carried out in parallel with, and have informed the evolution of, the pipeline corridor design. This process has ensured the avoidance of environmental constraints, including impacts on Box Gum Woodland and threatened species habitat, as far as practicable.

Key avoidance measures that have been implemented by Regis comprise:

- selection of a pipeline route that maximises use of existing roads and non-native vegetation and minimises disturbance to native vegetation;
- reducing the pipeline disturbance footprint to 8 m width, with a further restriction to 6 m width where the pipeline intersects EPBC Act-listed Box Gum Woodland;
- underboring large waterways including the Macquarie River to avoid impacts on aquatic habitats and species;
- avoiding direct impacts on Bathurst Copper Butterfly host plants; and
- avoiding direct and indirect impacts on potential Tarengo Leek Orchid habitat (to be informed by the outcomes of a targeted survey in November 2020).

ES5 Biodiversity impacts

ES5.1 Comparison of EIS impacts with amended project

ES5.1.1 Mine development

Impacts on biodiversity have changed for the mine development due to a revision of the mine disturbance footprint. Changes to the mine disturbance footprint have resulted in no change for some PCTS, decreased impacts for some PCTs and small increases for others. Overall, the amended project will reduce the direct impact on PCTs by 1.97 ha, reducing from 132.36 for the EIS mine disturbance footprint to 130.39 in the amended project mine disturbance footprint. Of this area of native vegetation impacted, the amended project will increase the direct impacts on Box Gum Woodland as listed under the BC Act and EPBC Act by 1.93 ha.

Koala habitat impacts were calculated in the EIS based on the repealed SEPP 44 and the feed tree species for the central and southern tablelands koala management area in the Koala Recovery Plan (DECC 2008). Koala impacts were estimated to be 75.77 ha in the EIS, which would increase to 78.57 ha for the amended project based on use of the same method, representing a 2.8 ha increase.

The method for calculating Koala impacts has changed since the EIS, with the introduction of State Environmental Planning Policy (SEPP) (Koala Habitat Protection) 2019. Koala impacts have been re-calculated in this BDAR in accordance with the feed tree species for the central and southern tablelands koala management area in SEPP (Koala Habitat Protection) 2019. Using SEPP (Koala Habitat Protection) 2019, the EIS mine disturbance footprint would have directly impacted 115.06 ha, increasing by 1.89 ha to 116.95 ha for the amended project.

In the EIS, direct impacts on the Squirrel Glider were 129.32 ha. The amended mine development would reduce direct impacts to Squirrel Glider habitat by 1.97 ha to 127.35 ha.

ES5.1.2 Pipeline development

Impacts on biodiversity have changed for the pipeline development, partly relating to a change in the project disturbance footprint and addition of two pipeline options in the Bathurst IBRA subregion. The impacts on biodiversity have mainly changed due to the revision of PCT mapping, additional targeted survey and habitat assessment results. The direct impacts on PCTs have increased by 10.22 ha for the southern option and 7.54 ha for the northern option. Overall, direct impacts to species have increased by 13.57 ha for the southern option and 12.50 ha for the northern option. It should be noted that some of these impacts are combined, as multiple species can occupy the same area of habitat.

ES5.2 Potential biodiversity impacts

ES5.3 Mine development

Following the implementation of avoidance and minimisation measures, the project will remove 130.39 ha of native vegetation. The project will remove 45.84 ha of vegetation (PCT 1330) that represents White Box Yellow Box Blakely's Red Gum Woodland CEEC listed under the NSW BC Act; 20.43 ha of which also represents Box Gum Woodland CEEC listed under the Commonwealth EPBC Act. These impacts will be compensated through the implementation of the project's biodiversity offset strategy.

Three PCTs, comprising retained patches of PCT 727, 951 and 1330 surrounding the mine disturbance footprint overlie shallow groundwater ranging from 0 to 20 metres below ground level. A high proportion of the distribution of two PCTs (951 and 1330) had access to groundwater. Accordingly, these PCTs were identified as opportunistic users of groundwater. The predicted watertable levels at the end of mining and 100 years following mining were compared with existing levels. No negative groundwater access impacts are expected to occur for GDEs.

A conservative approach was used in the groundwater assessment (Appendix K of the EIS) to simulate seepage from the TSF and assess any changes in groundwater quality. The Groundwater Assessment (Appendix K of the EIS) and Groundwater Assessment Addendum (Appendix H of the Amendment Report) identified the potential for groundwater quality changes because of:

- seepage from the TSF to the watertable and the Belubula River;
- seepage from stockpiles to the watertable;
- seepage from water storage ponds to the watertable; and
- introduction of varying water quality via the pipeline.

Potential impacts related to the last three hazard items have been assessed in the Groundwater Assessment (Appendix K of the EIS) and assessed to present minimal to no impacts on the water environment from a water quality perspective. The potential impacts of seepage from the TSF was also assessed in the Groundwater Assessment (Appendix K of the EIS), however as the TSF schedule has been adjusted for the amended project, this assessment has been revisited and is included in Groundwater Assessment Addendum (Appendix H of the Amendment Report).

ES5.4 Pipeline development

Following the implementation of avoidance and minimisation measures, the southern option would remove 18.51 ha of native vegetation, while the northern option would remove 15.84 ha. Of these areas of native vegetation, 12.16 ha in the southern option and 9.49 ha in the northern option represents White Box Yellow Box Blakely's Red Gum Woodland CEEC listed under the NSW BC Act, 0.81 ha in the southern option and 1.34 ha in the northern option of which also represents Box Gum Woodland CEEC listed under the Commonwealth EPBC Act.

In addition, 3.06 ha for both the northern and southern options represents Werriwa Tablelands Cool Temperate Grassy Woodland, listed as a CEEC under the BC Act. The above impacts will be compensated through the implementation of the project's biodiversity offset strategy.

ES6 Biodiversity credits required

ES6.1 Mine development

The mine development requires 2,541 ecosystem credits to compensate for impacts on native PCTs and ecosystem credit species. In addition to ecosystem credits, the project also requires 2,431 species credits for the Koala and 2,651 species credits for the Squirrel Glider. Regis will compensate for these residual impacts through the implementation of a biodiversity offset strategy.

ES6.2 Pipeline development

The pipeline development requires 331 ecosystem credits to compensate for impacts on native PCTs and ecosystem credit species (northern option) and 363 ecosystem credits to compensate for impacts on native PCTs and ecosystem credit species (southern option). In addition to ecosystem credits, the project also requires 833 species credits to offset the residual impacts of the pipeline development (northern option) and 968 to offset the pipeline development (southern option). Regis will compensate for these residual impacts through the implementation of a biodiversity offset strategy.

ES7 Biodiversity offset strategy

Under the NSW Biodiversity Offsets Scheme, proponents can meet their offset requirements through one, or a combination of the following actions:

1. establishment of a biodiversity stewardship site containing the required ecosystem and species credits;
2. purchase and retirement of the required ecosystem and species credits from the biodiversity credit market;
3. payment into the Biodiversity Conservation Fund; and
4. fund a management action that directly benefits the species and/or ecological communities impacted.

For the pipeline, a corridor has been identified, representing the area in which the pipeline disturbance footprint may sit. Impacts and associated offset requirements have been calculated based on the disturbance footprint, which is based on the concept design. The disturbance footprint may shift within the construction envelope. This is designed to allow Regis with some degree of flexibility to microsite the pipeline to avoid impacts and address construction issues (eg areas of shallow rock) during construction. Following detailed design and construction Regis proposes to recalculate the ecosystem and species credit requirements for the pipeline development to ensure impacts are within the limits in this BDAR and EIS. If impacts are greater additional offsets will be provided.

The proponent has purchased and conducted detailed studies to assess native PCTs and threatened species at a future stewardship site in Blayney (ie option 1, above). The property is approximately 388 ha and contains some of the required ecosystem and species credits (PCT 951, PCT 1330 and Koala). It is the proponent's intention to secure the property under a Biodiversity Stewardship Agreement with the Biodiversity Conservation Trust. The proponent will assess the residual ecosystem and species credits and secure these under one, or a combination of options 2 to 4.

ES8 Conclusion

This BDAR has been prepared in accordance with the BAM, 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 project area since acquiring Exploration Licence 5760 in 2012 and biodiversity surveys between 2018 and 2020 in the pipeline corridor. These surveys have been carried out in parallel with, and have informed the evolution of, the mine and pipeline design. This process has ensured the avoidance and minimisation of biodiversity constraints as far as practicable.

The mine development requires 2,541 ecosystem credits to compensate for impacts on native PCTs and ecosystem credit species. In addition to ecosystem credits, the project also requires 2,431 species credits for the Koala and 2,651 species credits for the Squirrel Glider. The pipeline development requires 331 ecosystem credits to compensate for impacts on native PCTs and ecosystem credit species (northern option) and 363 ecosystem credits to compensate for impacts on native PCTs and ecosystem credit species (southern option). In addition to ecosystem credits, the project also requires 833 species credits to offset the residual impacts of the pipeline development (northern option) and 968 to offset the pipeline development (southern option). Regis will compensate for these residual impacts through the implementation of a biodiversity offset strategy.

The BDAR has also considered impacts on species and ecological communities listed under the EPBC Act. The mine development is expected to result in significant impacts on Box Gum Woodland and the Koala, while the pipeline development is not. 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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1 Introduction

1.1 Background

LFB Resources NL is seeking State significant development (SSD) consent under Division 4.7 of Part 4 of the New South Wales (NSW) *Environmental Planning and Assessment Act 1979* (EP&A Act) to develop and operate a greenfield open cut gold mine, associated mine infrastructure and a water supply pipeline in Central West NSW. The mine development project area and pipeline corridor (the project application area) are illustrated at a regional scale in Figure 1.1. LFB Resources NL is a 100% owned subsidiary of Regis Resources Limited (herein referred to as Regis).

As shown in Figure 1.1, the McPhillamys Gold Project (the project) is comprised of 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 supply pipeline which will enable the supply of water from approximately 90 kilometres (km) away near Lithgow to the mine site (the pipeline development). The mine project area is around 8 km north-east of Blayney, within the Blayney and Cabonne local government areas (LGAs). The pipeline is an approximately 90 km long pipeline alignment from Centennial's Angus Place and Springvale Coal Services Operations (SCSO) and Energy Australia's Mount Piper Power Station (MPPS), near Lithgow, to the mine development area. The pipeline development runs through the LGAs of Bathurst and Lithgow.

Up to 8.5 Million tonnes per annum (Mtpa) of ore will be extracted from the McPhillamys gold deposit over a total project life of 15 years. The mine development will include a conventional carbon-in-leach processing facility, waste rock emplacement, an engineered tailings storage facility (TSF) and associated mine infrastructure including workshops, administration buildings, roads, water management infrastructure, laydown and hardstand areas, and soil stockpiles.

In accordance with the requirements of the EP&A Act, the NSW *Environmental Planning & Assessment Regulation 2000* (EP&A Regulation) and the Secretary's Environmental Assessment Requirements (SEARs) for the project, an Environmental Impact Statement (EIS) was prepared to assess the potential environmental, economic and social impacts of the project. The development application and accompanying EIS was submitted to the NSW Department of Planning, Industry and Environment (DPIE) and subsequently publicly exhibited for six weeks, from 12 September 2019 to 24 October 2019. During this exhibition period Regis received submissions from government agencies, the community, businesses and other organisations regarding varying aspects of the project.

In response to issues raised in submissions received, as well as a result of further detailed mine planning and design, Regis has made a number of refinements to the project. Accordingly, an Amendment Report has been prepared by EMM Consulting Pty Ltd (EMM) (2020a) to outline the changes to the project that have been made since the public exhibition of the EIS and to assess the potential impacts of the amended project, compared to those that were presented in the EIS. This report forms part of the Amendment Report and presents an assessment of the biodiversity impacts of the amended project.

1.2 Project amendment overview

A summary of the key amendments to the project since the exhibition of the EIS are summarised below and described in detail in Chapter 2 of the Amendment Report (EMM 2020a):

- **Site access** – a new location for the site access intersection off the Mid Western Highway is proposed, approximately 1 km east of the original location assessed in the EIS, in response to feedback from Transport for NSW (TfNSW, former Roads and Maritime Services) and the community. A new alignment is subsequently proposed for the site access road to the mine administration and infrastructure area.

- **Mine and waste rock emplacement schedule** – revision of the mine schedule and the subsequent construction sequence of the waste rock emplacement has been undertaken, in particular consideration of predicted noise levels in Kings Plains. This achieved a reduction in predicted noise levels at nearby residences while extending the construction timeframe for the southern amenity bund.

- **Pit amenity bund** – the size of the pit amenity bund has been reduced as a result of optimisation of the open cut pit design and the improved location of exit ramps for haul trucks.

- **Tailings Storage Facility (TSF)** – amendments to the design include changes to the embankment design and construction timing, the TSF footprint, and the TSF post closure landform.

- **Water management system** – the secondary water management facility (WMF) has been removed from the water management system resulting in an avoidance of impacts to a potential item of historic heritage (MGP 23 - Hallwood Farm Complex (Hallwood)). The size of the WMFs has also been revised to achieve a reduced likelihood of discharge from the storages within the operational water management system as part of a revised nil discharge design.

- **Mine administration and infrastructure area** – the layout of this area has been revised and optimised.

- **Mine development project area** – a very small change has been made to the mine development project area along the eastern boundary (an additional 1 ha, or 0.04% change), to accommodate the required clean water management system. The change takes the project area from 2,513 ha to 2,514 ha.

Some amendments to the pipeline development have also been made, as follows:

- **Pipeline route** – the route has been amended for approximately 11 km of the 90 km pipeline corridor west of Bathurst, primarily in consideration of land access. Two options for the amended pipeline route have been included and assessed in the amended project, referred to as the northern pipeline option and southern pipeline option.

- **Pipeline corridor/disturbance footprint –** the pipeline corridor has been differentiated from the disturbance footprint with small changes to the pipeline corridor disturbance footprint made in consideration of biodiversity impacts. While the alignment of pipeline sections outside the realigned options hasn't changed, there have been minor variations in the width of the corridor to provide flexibility in the detailed design and subsequent construction phases of the project.

- **Pumping station facilities** – pumping station facility No.3 has been relocated from the vicinity of Energy Australia's Mount Piper Power Station (MPPS), to approximately 4.3 km to the west and located on Pipers Flat Road.

No amendments have been made to other key aspects of the project as presented in the EIS for which approval is sought, such as the proposed mining method, operating hours, maximum annual ore extraction rate of 8.5 Mtpa, maximum annual ore processing rate of up to 7 Mtpa, employee numbers, and rehabilitation methods and outcomes.

The amended mine development project layout, compared to that assessed in the EIS, is shown in Figure 1.2, while the revised section of the pipeline development route associated with the amended project is shown in Figure 1.3. A comparison of the biodiversity impacts of the amended project with the project assessed in the EIS is provided in Section 6.3 of this report.

1.3 Purpose of this report

The requirements of the SEARs issued for the project in relation to the assessment of biodiversity impacts at the state level under the EP&A Act requested a 'hybrid' biodiversity assessment where:

- the mine development was to be assessed against the *Framework for Biodiversity Assessment* (FBA) (OEH 2014) and the NSW *Biodiversity Offsets Policy for Major Projects* (Major Projects Policy) as per the *Biodiversity Conservation (Savings and Transitional) Regulation 2017* (BC Transitional Regulation); and

- a separate biodiversity assessment was required for the pipeline development under the *Biodiversity Conservation Act 2016* (BC Act), in accordance with the Biodiversity Assessment Method (BAM; OEH 2017).

In accordance with the SEARs, two biodiversity assessments were prepared for the project and included in the EIS; one for the mine development in accordance with the FBA (EMM 2019), and one for the pipeline development in accordance with the requirements of the BC Act using the BAM (OzArk 2019).

While the EIS was prepared strictly in accordance with the SEARs issued by DPIE, this BDAR has been prepared in accordance with the BAM to assess the potential biodiversity impacts of the amended project, considering both the mine development and pipeline development components together. The assessment considers and outlines the differences in impacts associated with the amended project compared to the original project as presented in the EIS.

Accordingly, this BDAR supersedes the following reports presented in the EIS:

- McPhillamys Gold Project Mine Development Biodiversity Assessment Report (EMM 2019, Appendix N of the McPhillamys Gold Project EIS); and

- McPhillamys Gold Project Pipeline Development Biodiversity Development Assessment Report (OzArk Environmental & Heritage Management Pty Ltd (OzArk) 2019, Appendix Y of the McPhillamys Gold Project EIS).

The specific objectives of this assessment are to:

- describe biodiversity values of the project application area associated with the amended project;

- assess the likelihood that threatened species and communities (threatened biodiversity) listed under relevant the NSW *Biodiversity Conservation Act 2016* (BC Act) and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) could occur in the project application area associated with the amended project;

- document the strategies implemented to avoid and/or minimise impacts of the amended project on threatened biodiversity;

- assess residual threatened biodiversity impacts potentially associated with the amended project, after avoidance and minimisation strategies have been implemented;

- provide environmental safeguards to mitigate threatened biodiversity impacts during construction and operation of the amended project; and

- provide a strategy to offset residual threatened biodiversity impacts associated with the amended project.

1.4 Submissions on the EIS

Several minor issues were raised relating to the Mine Development BAR (EMM 2019) and several relating to the Pipeline Development BDAR (OzArk 2019) in the BCD's submission on the EIS. These issues have been considered and incorporated into this revised assessment.

Detailed responses to all the submissions received are provided in the Submissions Report prepared for the project (EMM 2020b), which has been prepared in conjunction with the Amendment Report (EMM 2020a). A summary of the key issues relevant to this assessment are provided in Table 1.1, together with how each matter has been addressed within this report.

Table 1.1 Key comments received in BCD's submissions relating to Mine Development BAR and Pipeline Development BDAR, and how they have been addressed

Issue	Where addressed
Mine development	
1. Further assessment of Silky Swainson-pea (*Swainsona sericea*) is required. Targeted surveys were conducted in 2013 for Small Purple-pea (*Swainsona recta*). The 2013 surveys were conducted in Spring, with adequate coverage of two plant community types: • - PCT 654 Apple Box – Yellow Box dry grassy woodland of the South Eastern Highlands Bioregion. • - PCT 727 Broad-leaved Peppermint – Brittle Gum – Red Stringybark dry open forest on the South Eastern Highlands Bioregion. In a letter to the consultants (DOC19/182640) BCD noted that no transects were conducted in the northernmost part of the proposed disturbance footprint. This area contains PCT 1298 – Wet tussock grasslands of cold air drainage areas of the tablelands. As PCT 1298 is potential habitat for Silky Swainson-pea the exclusion of species within this PCT will need to be fully justified. The BAR states that the Silky Swainson-pea is not identified as a threatened species requiring consideration by the BBAM calculator and therefore requires no further assessment. Section 6.5.1.2 of the FBA states that a threatened species is identified as a candidate species for the development site if the geographic distribution of the species is known or predicted to include the IBRA subregion in which the development site is located. As Silky Swainson-pea is predicted to occur in the Orange IBRA subregion it should be assessed and, as no targeted surveys were conducted in PCT 1298, it should either be assumed to be present or an expert report should be obtained. *Recommendation 1* Justification for the exclusion of Silky Swainson-pea should be provided, or conduct targeted surveys, assume presence or obtain an expert report.	Targeted surveys were conducted in PCT 1298 (since revised to PCT 766) for Silky Swainson-pea. The methods for the targeted surveys are described in Section 5.1.3i. The survey did not record any Silky Swainson-pea.
2. A species polygon is required for the Squirrel Glider. Section 7.3 of the BAR concludes that there will be a residual impact of 129.3 ha of habitat for the Squirrel Glider and 75.77 ha of habitat for the Koala. However, Figure 7.3 of the BAR depicts a species credit polygon that is labelled for both Koala and Squirrel Glider totalling 75.76 ha. It is a requirement of the FBA that species polygons for species credit species be provided in the BAR. The species polygon provided reflects the area of habitat likely to be used by the koala (75.77 ha). An additional species polygon is required for the Squirrel Glider (129.3 ha). *Recommendation 2* A figure showing the species polygon for the Squirrel Glider is required.	The species polygons for Koala and Squirrel Glider have been revised to account for changes in the mine footprint and the revised list of feed tree species in the central and southern tablelands koala management area defined in *State Environmental Planning Policy (Koala Habitat Protection) 2019*. These are discussed in Section 6.7 and shown on Figure 5.5.

Table 1.1 Key comments received in BCD's submissions relating to Mine Development BAR and Pipeline Development BDAR, and how they have been addressed

Issue	Where addressed
3. Relocation of koala will require consultation with BCD. Section 7.2 of the BAR includes a mitigation measure to "develop specific procedures for koala pre-clearance inspections and safe relocations outside the clearing area". Any planned relocation of koalas should be consistent with the Office of Environment and Heritage (OEH) Translocation Operational Policy (OEH 2019). The proponent should demonstrate how they will maximise and report on animal welfare outcomes at each stage of the translocation process. Procedures for the potential relocation of koalas, including the selection of nearby habitat suitable for release and monitoring of translocation success, should be developed in consultation with BCD. *Recommendation 3* Any planned relocation of Koalas should be consistent with the OEH Translocation Operational Policy (OEH 2019) and be developed in consultation with BCD.	It is not the intention to formally translocate Koalas from the project application area. Rather, the intention is to conduct a pre-clearance inspection to determine if Koalas are present in areas of native vegetation prior to clearing and follow good-practice methods to allow any Koalas to move into adjacent retained vegetation. Such measures are outlined in Section 6.4.1 and will be detailed in the Biodiversity Management Plan that would be prepared if project approval is granted.
Pipeline development	
4. PCT identification cannot be verified. The field data sheets for each plot should be provided with the BDAR. Appendix 2 of the BDAR contains a full species list for the entire project area but the plots in which the species were present is not specified. Table 4-1 of the BDAR includes the BioNet Vegetation Classification's description of the chosen PCT's but no description of the PCT's characteristics that are present on site. The BDAR does not provide adequate justification for the PCT identification and without field data sheets BCD is unable to assess whether the PCT conclusions are appropriate. As per section 5.2 of the BAM, the identification of PCT's must be in accordance with NSW PCT classification as described in the BioNet Vegetation Classification. As such the BDAR must justify each PCT identification by describing how the sites attributes recorded on the field data sheets meet the chosen PCT's NSW PCT classification. *Recommendation 4* The field data sheets for each plot should be provided in the BDAR. *Recommendation 5* Provide further justification for all PCT identifications.	Vegetation mapping for the pipeline has been revised in response to BCD's submission, refinements to the pipeline route and the pipeline biodiversity assessment. Justification for all PCTs selected is provided in Section 4.3.1. Raw vegetation integrity plot data sheets are provided in Appendix A, while the data is summarised in Appendix B.
5. The BDAR should be certified as BAM compliant within 14 days of the submission date. It is unclear whether or not the exhibited BDAR is final or draft, the document control page of the BDAR indicates that the document status is draft, and it has not been certified as BAM compliant. Section 6.15 of the BC Act states 'a biodiversity assessment report cannot be submitted in connection with a relevant application unless the accredited person certifies in the report that the report has been prepared on the basis of the requirements of (and information provided under) the biodiversity assessment method as at a specified date and that date is within 14 days of the date the report is so submitted' The BDAR that has been submitted has not been certified in accordance with section 6.15 of the BC Act. *Recommendation 6* The assessor should certify the BDAR in accordance with section 6.15 of the BC Act.	This BDAR has been certified in Section 1.8 of this report.

Table 1.1 Key comments received in BCD's submissions relating to Mine Development BAR and Pipeline Development BDAR, and how they have been addressed

Issue	Where addressed
6. Separate habitat suitability assessments must be completed for each IBRA subregion. BCD have reviewed both the BDAR and the BAM credit calculator and note that although the project footprint spans across four IBRA subregions the assessor has only carried out an assessment for the IBRA subregion where most of the project occurs. This is not the correct method for linear shaped developments. As per section 6.4.1.7 of the BAM for linear shaped developments, the assessor must carry out a separate habitat suitability assessment for each IBRA subregion. This requires the accredited assessor to submit four separate cases in the BAM credit calculator. As separate assessments are required for each IBRA subregion the minimum number of plots and transects required per vegetation zone area may differ from the number that were required for the single assessment that was completed. The assessor must meet the minimum plots and transects required by the BAM for each vegetation zone in each assessment that is carried out. This may also impact the species lists generated for each subregion by adding new species that would require habitat suitability assessments in accordance with section 6 of the BAM. *Recommendation 7* Separate habitat suitability assessments must be completed for each IBRA subregion. This requires the accredited assessor to submit four separate cases in the BAM credit calculator. *Recommendation 8* The assessor must meet the minimum plots and transects required by the BAM.	Separate habitat suitability assessments have been completed in this BDAR for the Orange, Bathurst, Hill End and Capertee Uplands IBRA bioregions. A master case has been created (parent case 0020208) in the BAM calculator, with five associated child cases (one for each IBRA subregion, with two relating to the Bathurst IBRA subregion that covers the two pipeline options currently being considered). Following a meeting with BCD representatives on 19 March 2020, EMM has treated vegetation zones as continuous throughout the four different IBRA subregions assessed and has completed the required number of plots in accordance with the BAM on that basis. EMM has then completed separate candidate species assessments for each of the four IBRA subregions (Section 5.2.3).
7. There are inconsistencies between the plot data in the BDAR and the data entered into the BAM calculator. There are inconsistencies between the plot data provided on page 194 of the BDAR and the data that has been entered into the calculator. BCD has reviewed a number of plots at random against the data in the calculator and found inconsistencies, one example is provided below. The data provided in the report must be consistent with the data entered into the calculator, any errors in the calculator can have an impact on the final credit liability for the project. BCD is unable to clarify which data is correct as the field data sheets have not been provided. The assessor should ensure that the correct data is entered while addressing recommendations 7 and 8 above Plot MAC05: Data / BDAR / Calculator Structure Condition – Tree / 75.0 / 70.0 Function – Stem Class – 5-9 / Not Present / Present Function – Stem Class – 50-79 / Present / Not Present *Recommendation 9* Ensure that the correct data set is entered into the BAM calculator and that it reflects the data in the BDAR.	All plot data was entered into the BAM import template and quality assurance checks undertaken. The BAM import template was uploaded into the BAM calculator to avoid manual data entry errors. Raw plot data sheets have been provided in Appendix A while a summary of plot data is provided in Appendix B.

Table 1.1 Key comments received in BCD's submissions relating to Mine Development BAR and Pipeline Development BDAR, and how they have been addressed

Issue	Where addressed
8. The native vegetation extent mapping is inconsistent with PCT mapping and aerial imagery The native vegetation extent layer is inconsistent with the PCT vegetation mapping for the project. There are areas within the pipeline that have been mapped as a native PCT by the assessor however these areas have not been included in the native vegetation extent layer and calculation. Additionally, there are areas within the buffer area that appear to be native vegetation on the aerial imagery however they not been mapped on the native vegetation extent layer. Examples below. Example 1 – Inconsistencies between the assessors PCT mapping and native vegetation extent mapping - The blue shading is an area identified as PCT 731 by the assessor, the yellow hatching is the native vegetation extent identified by the assessor. Example 2 – Areas of vegetation within the linear buffer that have not been included in the native vegetation extent. *Recommendation 10* Any vegetation that has been mapped as native vegetation by the assessor within the project area and the buffer should be included in the native vegetation extent mapping. *Recommendation 11* All native woody and non-woody vegetation on the subject land and within the buffer should be mapped.	The revised PCT mapping within the study area has been merged with the regional vegetation map beyond the study area to provide the native vegetation extent mapping to calculate the percentage of native vegetation extent in each IBRA subregion. Native vegetation extent is shown on the site map (Figure 3.2) and location map (Figure 3.4).

Table 1.1 Key comments received in BCD's submissions relating to Mine Development BAR and Pipeline Development BDAR, and how they have been addressed

Issue	Where addressed
9. Species cannot be removed from the predicted list where the TBDC does not list habitat constraints. BCD note that the assessor has removed a number of species from the predicted list generated from the BAM calculator. The removal of these species is not consistent with the assessment requirements set out in steps 2 and 3 of chapter 6 of the BAM. A species can only be removed from the list if the species: a) has habitat constraints listed in the TBDC and none of these constraints are present on the site. Documentation in the BDAR should reflect the TBDC information and evidence that the features are not present (field data); or b) is vagrant to the area. Vagrancy is taken as the record being well outside the species range or natural distribution. The suspect record will need to be reviewed against the species known distribution and the assessor will need to confirm with species experts that it is likely to be a vagrant. If agreed by experts the assessor should contact DPIE to have the record quarantined from BioNet Atlas and re-labelled as vagrant. The BDAR will need to contain supporting information such as who was contacted, when, their credentials and the resultant response from DPIE. The following species do not have habitat constraints listed in the TBDC and are not considered vagrant and therefore cannot be removed from the predicted list for any associated PCT regardless of the vegetation zone condition; • Regent Honeyeater (*Anthochaera Phrygia*) • Brown Treecreeper eastern subspecies (*Climacteris picumnus victoriae*) • Varied Sittella (*Daphoenositta chrysoptera*) • Little Lorikeet (*Glossopsitta pusilla*) • Swift Parrot (*Lathamus discolor*) • Black-chinned Honeyeater eastern subspecies (*Melithreptus gularis gularis*) The following species do have habitat constraints listed in the TBDC and therefore could be removed from the predicted list if the assessment requirements set out in steps 2 and 3 of chapter 6 of the BAM have been met: • Glossy Black-cockatoo foraging (*Calyptorhynchus lathami*) • Painted Honeyeater (*Grantiella picta*) For the above two species BCD is unable to verify whether or not the habitat constraints are absent from the vegetation zones as no field data sheets have been provided. *Recommendation 12* Any species that does not have habitat constraints listed in the TBDC must be retained in the calculator for all associated PCT's regardless of the vegetation zone condition. *Recommendation 13* All field vegetation plot and transect, and fauna survey data sheets should be provided.	The predicted species list for the pipeline has been revised due to the revision of PCT mapping and the creation of separate child cases for each IBRA subregion the pipeline intersects. Discussions with John Seidel Acting Manager, Ecosystem Assessment at BCD, have determined that peer reviewed literature including recovery plans can be used in addition to the habitat constraints in the TBDC to undertake the candidate species assessment. Only species with habitat constraints absent from the site have been removed from the predicted species list, shown in Table 5.10. Raw data sheets have been provided in Appendix A while a summary of plot data is provided in Appendix B.

Table 1.1 Key comments received in BCD's submissions relating to Mine Development BAR and Pipeline Development BDAR, and how they have been addressed

Issue	Where addressed
10. PCT mapping is not consistent with plot data. There appears to be a number of locations within the pipeline footprint where areas of vegetation have been identified as a PCT by the plot data however only partly mapped as the identified PCT. Example – The two green points below are plot locations that were identified as PCT 1330, however the mapping within the pipeline footprint only maps two small areas as PCT 1330. For the example shown above if the area between the two mapped areas of PCT 1330 is not PCT 1330, in this case it has been mapped as non-native, the assessor must provide evidence of this. *Recommendation 14* PCT mapping must align with the plot data collected by the assessor. Where the vegetation type varies the assessor must stratify the areas into separate vegetation zones and provide justification of the identified vegetation zones and PCTs.	The PCT mapping dataset has been revised. PCT mapping and plot locations for the pipeline are shown on Figure 4.2.

1.5 Terminology

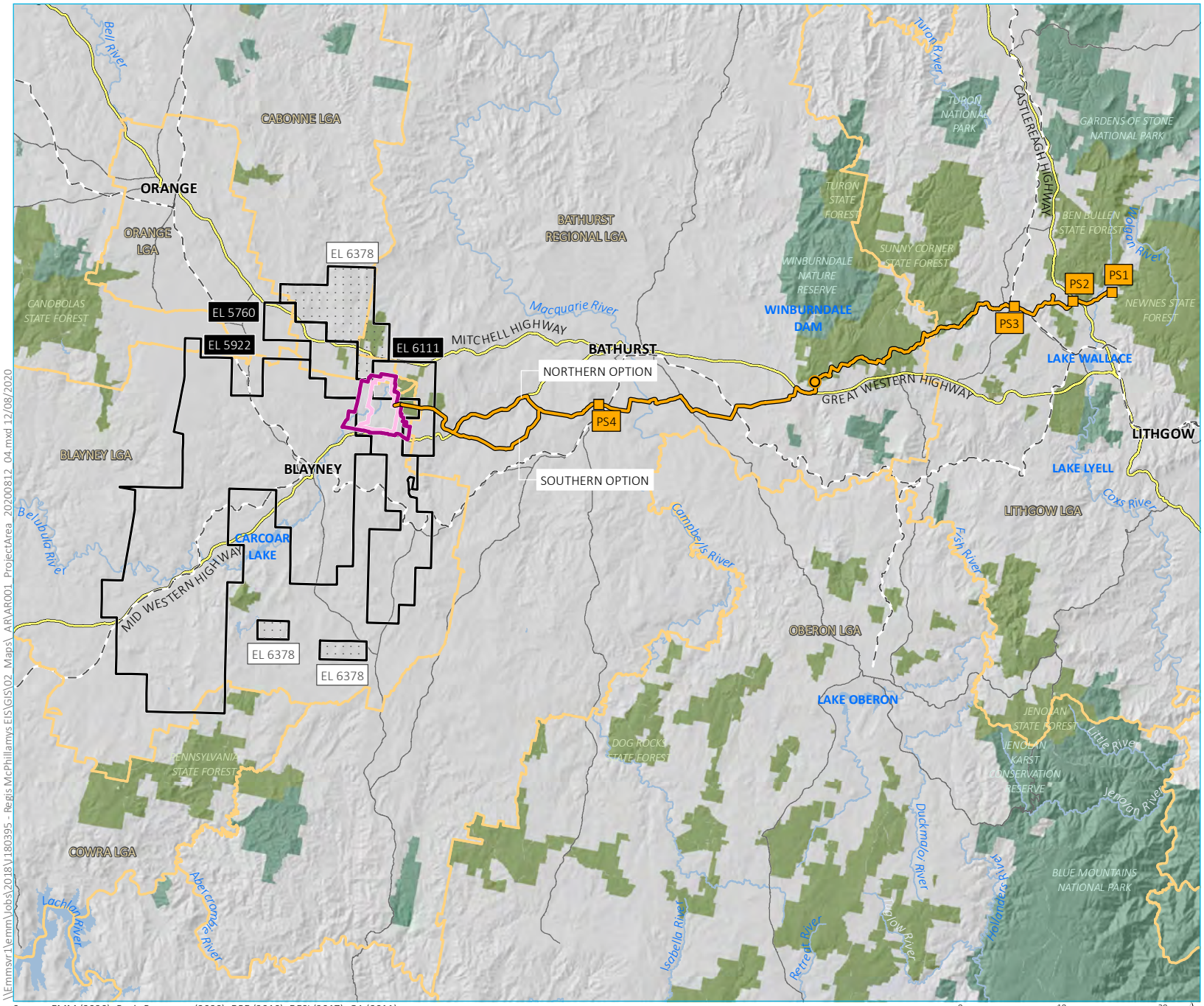
The following terms were used throughout the EIS to describe the project, and remain relevant for this assessment and the amended project:

- **the project** – the project in its entirety; encompassing the mine development and the pipeline development. In this report, the term 'the project' refers to the amended project for which approval is now sought. Where the original project design as presented in the EIS is being discussed, this will be clarified;
- **project application area** – the area in its entirety to which the development application (SSD 9505) relates; comprising the mine development project area and the pipeline corridor as illustrated in Figure 1.1. In this report, the term 'the project application area' refers to the amended area that relates to the development for which approval is now sought. Where the original project application area, as presented in the EIS, is being discussed, this will be clarified;
- **mine project area** – refers to the mine development project area as illustrated in Figure 1.1;
- **pipeline corridor** – an approximately 90 km long pipeline alignment from Centennial's Angus Place and Springvale Coal Services Operations (SCSO) and Energy Australia's Mount Piper Power Station (MPPS), near Lithgow, to the mine project area, as illustrated in Figure 1.1;
- **mine development** – construction and operation of the mine and associated mine infrastructure within the mine project area; and
- **pipeline development** – construction and operation of the pipeline and associated infrastructure to transfer water to the mine development within the pipeline corridor.

Additional terms relevant to this BDAR for the amended project comprise:

- **mine disturbance footprint** - refers to the mine development disturbance footprint as illustrated in Figure 1.2.

- **pipeline disturbance footprint -** refers to the pipeline development disturbance footprint.
- **southern option -** refers to the pipeline corridor (Southern option) as illustrated in Figure 1.3.
- **northern option -** refers to the pipeline corridor (Northern option) as illustrated in Figure 1.3.
- **mine buffer area –** refers to the 1,500 m buffer placed around the mine disturbance footprint for the purpose of defining landscape features in accordance with the BAM.
- **pipeline buffer area -** refers to the 500 m buffer placed either side of the pipeline disturbance footprint for the purpose of defining landscape features in accordance with the BAM.



KEY

Project application area
- Mine development project area (2,514.06 ha)
- Mining lease application area (1,806.17 ha) (Note: boundary offset for clarity)
- Pressure reducing system
- Pumping station facility
- Pipeline

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 development assessment report
Figure 1.1

Source: EMM (2020); Regis Resources (2020); DPE (2018); DFSI (2017); GA (2011)

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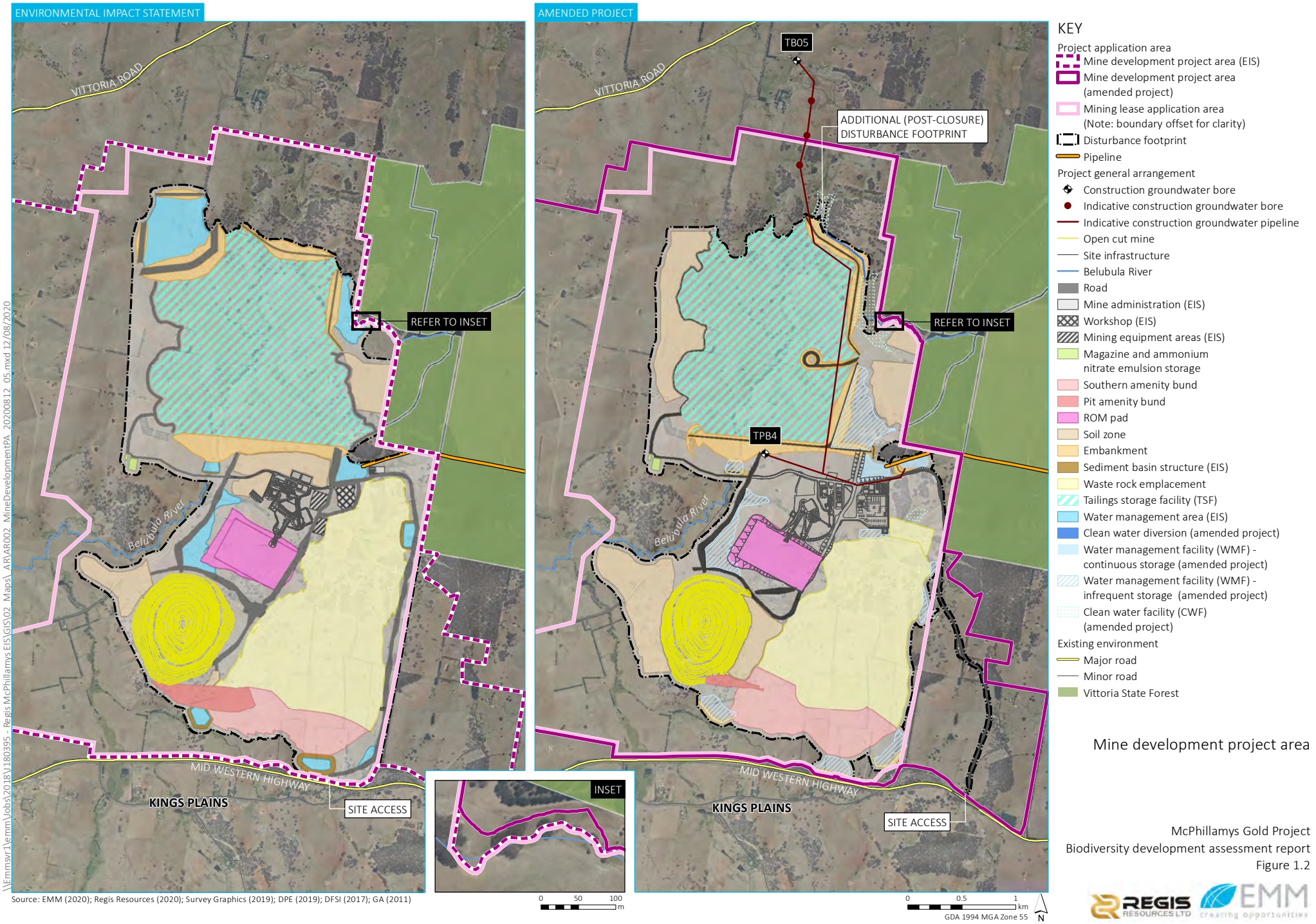

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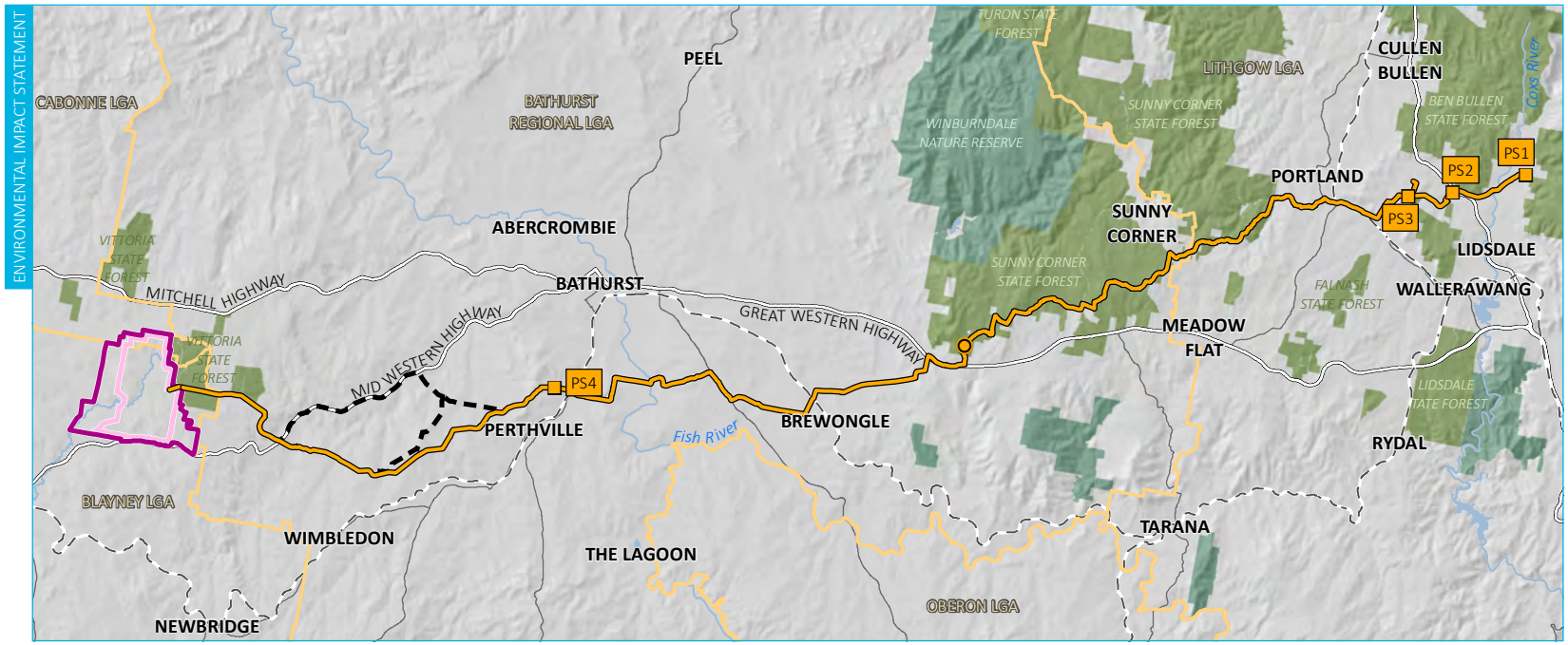
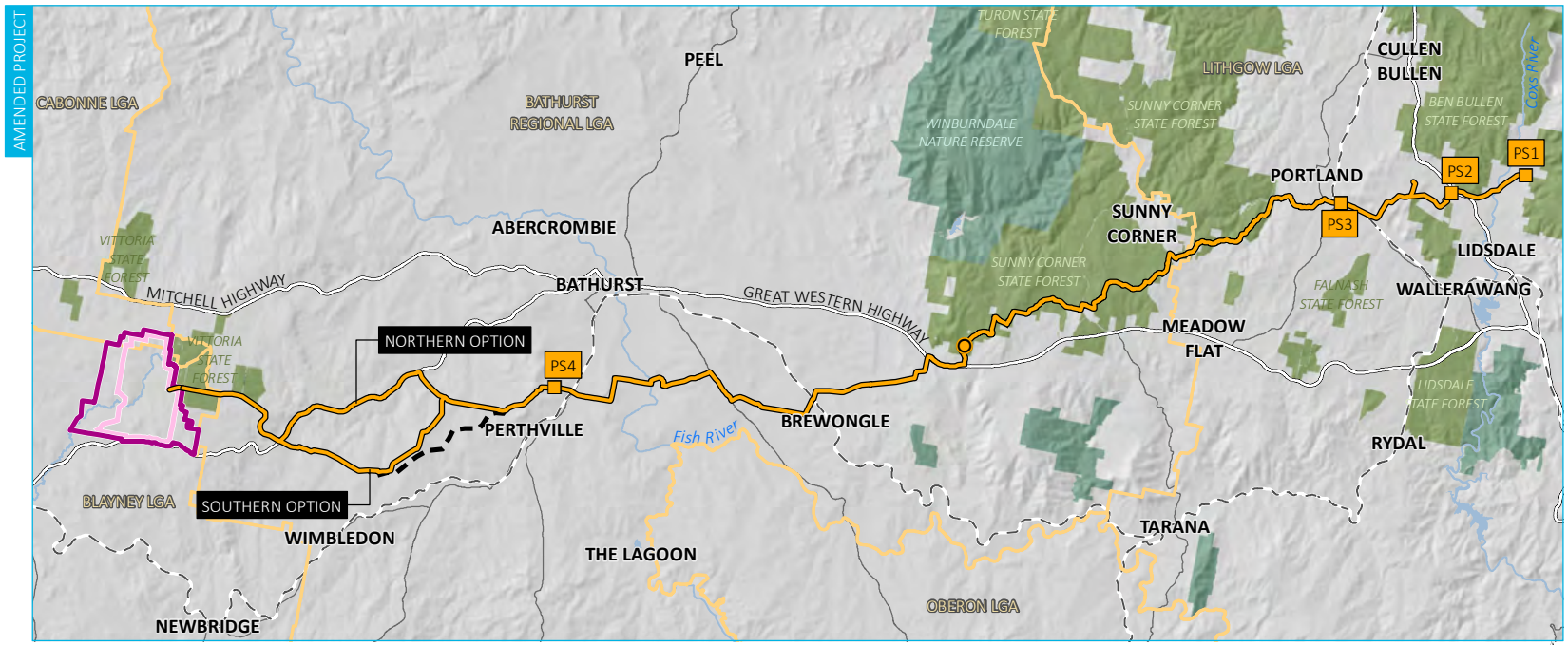
Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DPE (2019); DFSI (2017); GA (2011)

Mine development project area

McPhillamys Gold Project
Biodiversity development assessment report
Figure 1.2





KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Pressure reducing system
- Pumping station facility
- Pipeline
- Comparative pipeline alignment

Existing environment
- Rail line
- Primary road
- Arterial road
- River
- Waterbody
- NPWS reserve
- State forest
- Local government area

Pipeline development project area

Source: EMM (2020); Regis Resources (2020); DPE (2018); DFSI (2017); GA (2011)

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McPhillamys Gold Project
Biodiversity development assessment report
Figure 1.3

REGIS RESOURCES LTD

EMM creating opportunities

1.6 Site description

1.6.1 Mine development

The amended mine project area is 2,514.06 ha. It lies approximately 8 km north-east of Blayney within the Blayney and Cabonne LGAs and the South Eastern Highlands Interim Biogeographic Regionalization of Australia (IBRA) region and Orange IBRA sub-region. Landform elements within the mine project area consist of low hills, small plains and gullies which is consistent with the broader locality. Vegetation within the site has experienced historical pastural use and is therefore mainly open paddock with some fragmented patches of timbered natural vegetation scattered throughout (Photograph 1.1). The upper reaches of the Belubula River catchment lie within the mine project area, and several small unnamed tributaries run through the site with some feeding into dams scattered throughout.

Photograph 1.1 The mine development, comprising cleared low hills with scattered patches of native vegetation

1.6.2 Pipeline development

The amended water supply pipeline corridor will be approximately 90 km in length starting at the Angus Place Colliery and terminating in the mine project area. The pipeline corridor will pass through the South Eastern Highlands and Sydney Basin IBRA regions and Bathurst, Hill End, Orange and Capertee Uplands IBRA subregions.

The pipeline corridor will cross several different landform elements along it 90 km length, as well as a number of state forest and reserves, including Vittoria, Sunny Corner, Ben Bullen and Newnes State Forests and Winburndale Nature Reserve. The pipeline corridor predominantly follows existing roads and tracks with non-native vegetation and native vegetation of varying condition. The pipeline corridor also traverses open paddocks, containing cleared low hills and gullies with fragmented patches of native vegetation that have experienced historical pastural use. There are some fragmented patches of timbered natural vegetation throughout, with larger vegetated corridors between Sunny Corner and Blackman's Flat, in the east of the pipeline corridor (Photograph 1.2).

Photograph 1.2 The pipeline development, typically traversing fragmented patches of native vegetation

1.7 Information sources

1.7.1 Previous studies

In addition to the Mine Development BAR (EMM 2019) and the Pipeline Development BDAR (OzArk 2019) prepared for the EIS, the following studies and reports were also reviewed and considered:

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

Detailed site-based studies (EnviroKey 2013 and 2017) were completed for the mine development to inform preparation of this BDAR. Threatened biodiversity was then verified as present/absent in the mine project area during site-based studies (Envirokey 2013; 2017; EMM 2019 and this report).

Field surveys were also undertaken as a component of the pipeline development BDAR (OzArk 2019). Vegetation mapping was undertaken in 2018 and 2019 and included delineation of plant community types (PCTs) and stratification of PCTs into vegetation zones. Plot/transect surveys were also undertaken using the methods outlined in the BAM (OEH 2017). Targeted surveys were competed for several threatened flora and fauna species and were conducted in August, September, October and December 2018 and January and May 2019.

A detailed description of the above survey methods and subsequent surveys undertaken to inform this BDAR are provided in Section 4.2 and 5.1.

1.7.2 Publications and databases

To provide a context for the project, information about flora and fauna within 15 km of the mine development was obtained from relevant public databases. The centre point of the mine project area was taken as Latitude -33.46, Longitude 149.33. A 15 km buffer was also placed on the pipeline centreline. Records from the following databases were collated and reviewed:

- Department of Agriculture, Water and the Environment (DAWE) Protected Matters Search Tool for matters protected by the EPBC Act;
- NSW BioNet - the database for the Atlas of NSW Wildlife for threatened species listed under the EPBC Act and BC Act;
- PlantNET – NSW Flora online (Royal Botanic Gardens and Domain Trust 2020);

- Other sources of biodiversity information:
    - 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);
    - Groundwater Dependent Ecosystems Atlas (BOM 2013); and
    - Areas of Outstanding Biodiversity Value register (DPIE 2020).

1.7.3 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 for the Amended Project were supplied by Regis in June 2020. Mapping has been produced using a Geographic Information System (GIS). Spatial data relevant to this BDAR will be provided to BCD upon submission of this report.

1.8 Certification

This BDAR is a supplementary assessment to the biodiversity assessments prepared in the EIS. The BDAR has been prepared to assess the impacts of the amended project on biodiversity and to identify measures to avoid, mitigate and/or offset any potential impacts.

In accordance with Section 6.15 of the BC Act, this BDAR has been prepared on the basis of the requirements of (and information provided under) the BAM (OEH 2017), as at 31 August 2020. It follows the required format prescribed by Table 25 and 26 of the BAM and includes the calculation of credit requirements to compensate for the amended project's impacts that cannot be avoided or minimised.

The BDAR has been prepared by Katie Diver, accredited assessor number BAAS17013, and reviewed by Nathan Garvey, accredited assessor number BAAS17037.

2 Legislative context

This chapter provides a brief outline of the key biodiversity legislation and government policy considered in this assessment.

2.1 Commonwealth

2.1.1 Environmental 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 (MNES) protected under the EPBC Act (DoE 2013a).

Nine MNES 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 MNES must be referred to the Commonwealth Minister for the Environment for assessment.

A proposed action was referred to the Commonwealth Minister in April 2019 under the EPBC Act. The referred action included the mine development but excluded the pipeline on the basis that the pipeline was considered unlikely to result in a significant impact on MNES.

The EPBC Act referral decision concluded the referred mine development (the action) was a controlled action on 28 May 2019 requiring assessment under the EPBC Act as the Commonwealth Department of Agriculture, Water and the Environment (DAWE) considered that the action would be likely to have a significant impact on the following MNES:

- listed threatened species and communities;
    - White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland – Critically Endangered; and
    - Koala (QLD, NSW, ACT) – Vulnerable.

The decision also stated that the assessment process for the listed threatened species and communities (ss 18 and 18A of the EPBC Act) impacted by the action was to be completed by the NSW Government pursuant to the accredited bilateral agreement, which commenced on 26 February 2015. Supplementary SEARs for the MNES relevant to the project were provided on 30 May 2019.

The amended project involves a change in the layout and disturbance footprint of the mine development, which has resulted in a small change to the predicted impacts on MNES; particularly the area of Box Gum Woodland to be cleared. Approximately 20.43 ha of the EPBC Act listed White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland will be removed because of the amended project. This is compared to 18.5 ha which would have removed because of the layout proposed in the EIS.

Due to the amendments made to the project since the submission of the EPBC Act referral, an application to vary the action to reflect the amended project under section 156A of the EPBC Act will be submitted to to DAWE. The purpose of the variation will be to provide a revised assessment for the threatened species and ecological communities listed under the EPBC Act, following amendments to the mine development and pipeline development footprints and the additional biodiversity assessments undertaken. The variation application will also provide additional strategies to avoid, minimise, mitigate, and offset biodiversity impacts relating to the amended project.

As described above, a revised biodiversity assessment of the amended project has been prepared to assess the amended project (comprising both the mine development and the pipeline development) in accordance with the BC Act using the BAM to address requirements at a State level. At a Commonwealth level, since the time that the mine development was declared to be a controlled action and following the commencement of the BC Act, an amending bilateral agreement has been executed between the Commonwealth and NSW (in March 2020). However, while an assessment is presented with this Amendment Report of biodiversity impacts in accordance with the NSW BC Act requirements, the varied action needs to be assessed under the FBA and Major Projects Policy in order to be compliant with the 2015 bilateral agreement.

Therefore, an assessment of potential impacts to MNES because of the amended project has been prepared in accordance with the FBA, for the purposes of DAWE's assessment (Appendix F).

2.2 State Legislation

2.2.1 Environmental Planning and Assessment Act 1979

The NSW *Environmental Planning and Assessment Act 1979* (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 EP&A Act is administered by DPIE.

As described in Section 1.2, the project is 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 4.7 of the EP&A Act for the project.

As described above, SEARs were issued by the DPIE on 24 August 2018 and revised on 19 December 2018. The SEARs required that biodiversity impacts related to the project were to be assessed and documented in accordance with the FBA (OEH 2014) by an appropriately accredited person. The report was prepared by Accredited Assessors Katie Diver and Nathan Garvey. Following the declaration of the project as a controlled action, supplementary SEARs relating to MNES were issued by DPIE on 30 May 2019.

The SEARs and supplementary SEARs were satisfied following lodgement of the McPhillamys Gold Project Mine Development Biodiversity Assessment Report (EMM 2019) and McPhillamys Gold Project Pipeline Development Biodiversity Development Assessment Report (OzArk 2019).

2.2.2 State Environmental Planning Policy (Koala Habitat Protection) 2019

State Environmental Planning Policy (Koala Habitat Protection) 2019 (the Koala SEPP) 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. It triggers consideration of a Development Application Map and if areas are mapped as Koala habitat, the subject lots are greater than 1 ha size, and within local government areas listed in Schedule 1 of the Koala SEPP, then a Koala assessment report is required for development.

Assessment of the Koala SEPP is required for development applications under Part 4 of the EP&A Act, which includes SSD projects. The Koala SEPP does not strictly apply to this BDAR in accordance with the savings and transitional provision in Clause 15 as the development application was made upon lodgement of the EIS but has not yet been determined. Notwithstanding, consideration has been given to the potential occurrence and impacts upon the Koala within this report and has been provided in Section 7.2.1.

2.2.3 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.

The BC Act, together with the Biodiversity Conservation Regulation 2017 (BC Regulation), establish the Biodiversity Offsets Scheme (BOS). The BOS includes establishment of the BAM (OEH 2017) for use by accredited persons in biodiversity assessment under the scheme. The purpose of the BAM is to assess the impact of actions on threatened species and threatened ecological communities, and their habitats and determine offset requirements. For major projects, use of the BAM is mandatory, unless a BDAR waiver is granted.

The BAM sets out the requirements for a repeatable and transparent assessment of terrestrial biodiversity values on land to:

- identify the biodiversity values on land subject to proposed development area;
- determine the impacts of a proposed development; and
- quantify and describe the biodiversity credits required to offset the residual impacts of proposed development on biodiversity values.

Biodiversity impacts of the amended project have been assessed in accordance with the Biodiversity Assessment Method (OEH 2017) and the BC Act (as described above).

2.2.4 Biosecurity Act 2015

The *Biosecurity Act 2015* (Biosecurity Act) replaced the *Noxious Weeds Act 1993*. 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 NSW Department of Primary Industries.

Stage 1 – Biodiversity assessment

3 Landscape features

3.1 Landscape features

The landscape features described in the following sections are shown on Figure 3.1 and Figure 3.2 (a to h) and Figure 3.3 and Figure 3.4. A general site description is provided in Section 1.6 above.

3.1.1 Bioregions and landscapes

Bioregions and landscapes relevant to the mine and pipeline developments are listed in Table 3.1.

Table 3.1 Landscape features

Landscape feature	Mine development	Pipeline development
IBRA Bioregion/s	South Eastern Highlands	South Eastern Highlands Sydney Basin*
IBRA subregion/s	Orange	Bathurst Capertee Uplands Hill End Orange Wollemi*
NSW Landscape Regions	Byng Ultramafics Mandurama Slopes Mullion Slopes Rockley Plains Upper Lachlan Channels and Floodplains	Bathurst Granites Capertee Plateau Macquarie Valley Basalts Mount Horrible Plateau Mullion Slopes Newnes Plateau Rockley Plains Upper Macquarie Channels and Floodplains

Notes: *Although the pipeline buffer area traverses the Sydney Basin IBRA Bioregion and Wollemi IBRA subregion, the pipeline corridor does not intersect these areas. Accordingly, assessments have been provided based on the IBRA Bioregions and subregions the pipeline intersects.

3.1.2 Rivers, streams and estuaries

i Mine development

The mine development project area is located within the Lachlan catchment, in eastern NSW. One mapped watercourse, the Belubula River, and several smaller tributaries intersect the mine project area (Figure 3.1). The headwaters of the Belubula River form to the north-east of the mine project area, before flowing through the mine project area and then south-west towards Blayney and, beyond that, Carcoar Dam. In the mine project area, the Belubula River forms a 3rd, 4th and 5th order stream. A 5th order unnamed tributary of the Belubula River occurs within the mine project area to the south-west of the mine disturbance footprint. Where these two waterways meet, within the mine project area but south-west of the mine disturbance footprint, they become a 6th order stream.

ii Pipeline development

The pipeline buffer area (incorporating southern and northern pipeline options) intersects 25 named and several unnamed watercourses ranging from Strahler order 1 to 6 and 8, shown in Table 3.2. Larger streams (ie 4th order and above) in the pipeline buffer area of the southern and northern pipeline options include Dick's Creek, Evans Plains Creek, Kirkconnell Creek, Macquarie River, McLean's Creek, Queen Charlotte's Creek, Salt Water Creek and Coxs River.

Table 3.2 Streams in the pipeline buffer area

Watercourse	Strahler stream order							
	1	2	3	4	5	6	7	8
Unnamed waterway	X	X	X	X	X			
Bobs Creek		X	X					
Coxs River					X			
Diamond Swamp Creek		X						
Dicks Creek			X	X	X			
Dulhuntys Creek		X						
Evans Plains Creek					X	X		
Grassy Gully	X	X	X					
Gulf Stream	X	X						
Kirkconnell Creek			X	X			X	
Macquarie River								X
Marys Lane Gully			X					
McLeans Creek				X				
Pipers Flat Creek				X				
Queen Charlottes Creek						X		
Roundbody Gully	X	X						
Saint Anthonys Creek			X	X				
Salt Water Creek				X	X			
Spring Creek			X	X				
Stonestreets Creek	X	X	X	X				
Sugarloaf Creek	X	X	X	X				
Tindales Flat Creek		X						
Toms Flat Gully		X	X	X				
Wangcol Creek				X				
Williwa Creek				X				
Winters Creek			X					

3.1.3 Wetlands

i Mine development

The mine buffer area does not contain any nationally important wetlands, local wetlands or important wetlands listed on the NSW Wetlands layer (SEED 2020).

ii Pipeline development

The pipeline buffer area does not contain any nationally important wetlands, local wetlands or important wetlands listed on the NSW Wetlands layer (SEED 2020).

3.1.4 Connectivity

i Mine development

The locality of the mine project area 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 mine project area.

The mine project area is located within the riparian buffer of a 5th order stream. A riparian buffer 40 m either side of a 4th order stream will be removed for the project, as shown on Figure 3.1. These riparian buffers occur in a highly disturbed state due to past agricultural practices.

ii Pipeline development

The pipeline corridor intersects areas of agricultural land, pine forests, state forests and four patches of native vegetation. The landscape is highly fragmented, with native vegetation often occurring in isolated patches surrounded by a matrix of agricultural land. In the western extent, the pipeline dissects Vittoria State Forest and moves in an eastward direction through cleared agricultural land. The eastern extent of the pipeline dissects Pine forests, agricultural land, and areas of natural vegetation. The pipeline corridor intersects riparian buffers ranging from 10 to 50 m, which are occur predominantly in a highly disturbed state due to agricultural practices.

3.1.5 Areas of geological significance and soil hazard features

i Mine development

No areas of geological significance occur in the mine project area.

A soil and land capability assessment was completed for the mine development (Sustainable Soils Management 2019) that described soil hazard features in the mine project area. The assessment investigated soil associations and soil hazards defined by OEH (2012a), comprising water logging, acidification, structure decline, wind erosion, water erosion, shallow soils and rockiness, mass movement and salinity. Land and soil capability (LSC) was also rated for each soil association.

Eight soil associations were identified across the mine project area, comprising alluvium, red soil, manganic west, manganic east, upland centre, upland east, upland east aluminic and sodic discharge. Ratings across the mine project area ranged from LSC 4 to 6. Structure decline was a limiting hazard for all soil associations, while the upland associations were susceptible to wind and water erosion with frequent cultivation.

ii Pipeline development

No areas of geological significance occur in the pipeline corridor.

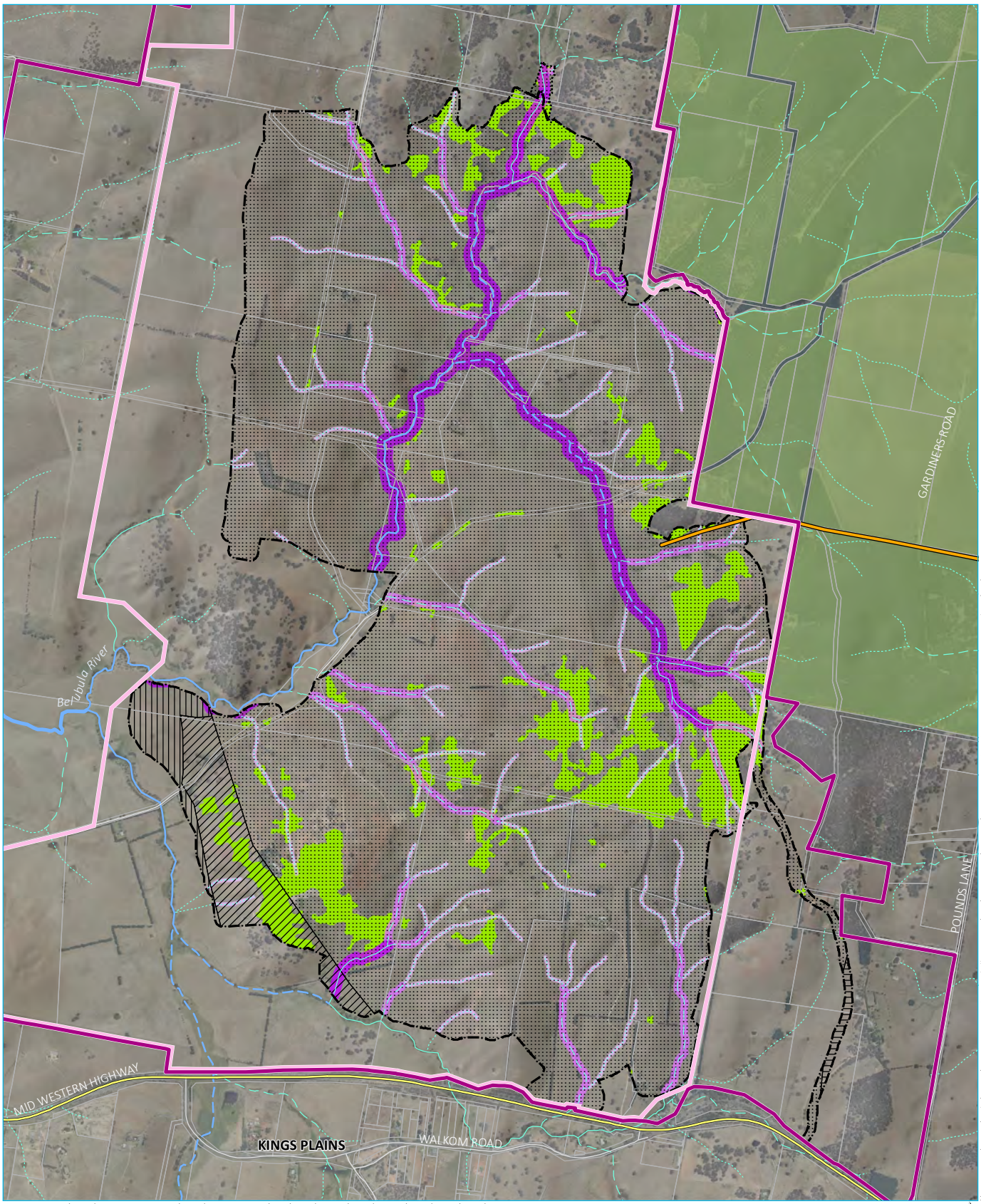
Soil hazards were assessed in Appendix W of the EIS (EMM 2019b) and Chapter 6 of the McPhillamys Gold Project Amendment Report (EMM 2020a. The EIS considered the potential impacts on soil and land resources associated with the construction and operation of the pipeline development through a desktop assessment of available information. Chapter 6 of the McPhillamys Gold Project Amendment Report assessed the potential impacts on soil and land resources of the amended section of the pipeline alignment west of Bathurst, including both the northern and southern options for which approval is sought.

Appendix W of the EIS identified that 52% of the pipeline route may have soils that are prone to tunnel and gully erosion due to their sodic and/or magnesic properties. These soils are likely to require amelioration with calcium sulfate to reduce their potential for dispersion. Regis will undertake soil sampling in each soil landscape along the corridor prior to construction works commencing, focusing on the Kurosols and Sodosols (Cullen Bullen, Lithgow, Capertee, Sunny Corner, Yetholme, Mookerawa, Mullion Creek, Raglan and Rocks Soil Landscapes) to refine the boundaries of reactive soils and determine erosion and agronomic amelioration requirements.

Ridge lines associated with the Great Dividing Range fall within the pipeline buffer in its far eastern extent; however, there will be no direct impacts. There are no important areas of geological significance within the pipeline corridor.

3.1.6 Areas of outstanding biodiversity value

No areas of outstanding biodiversity value exist within the project application area.



Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); OEH (2017); DPI (2015)

0 0.5 1 km

GDA 1994 MGA Zone 55

N

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KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Additional (post-closure) disturbance footprint
- Pipeline

Existing environment
- Major road
- Minor road
- Cadastral boundary
- Vittoria State Forest
- Native vegetation

Mitchell landscapes
- Byng Ultramafics
- Mullion Slopes
- Rockley Plains
- Upper Lachlan Channels and Floodplains

Strahler stream order
- 1st order
- 2nd order
- 3rd order
- 4th order
- 5th order
- 6th order

Riparian buffers
- 10 m
- 20 m
- 30 m
- 40 m

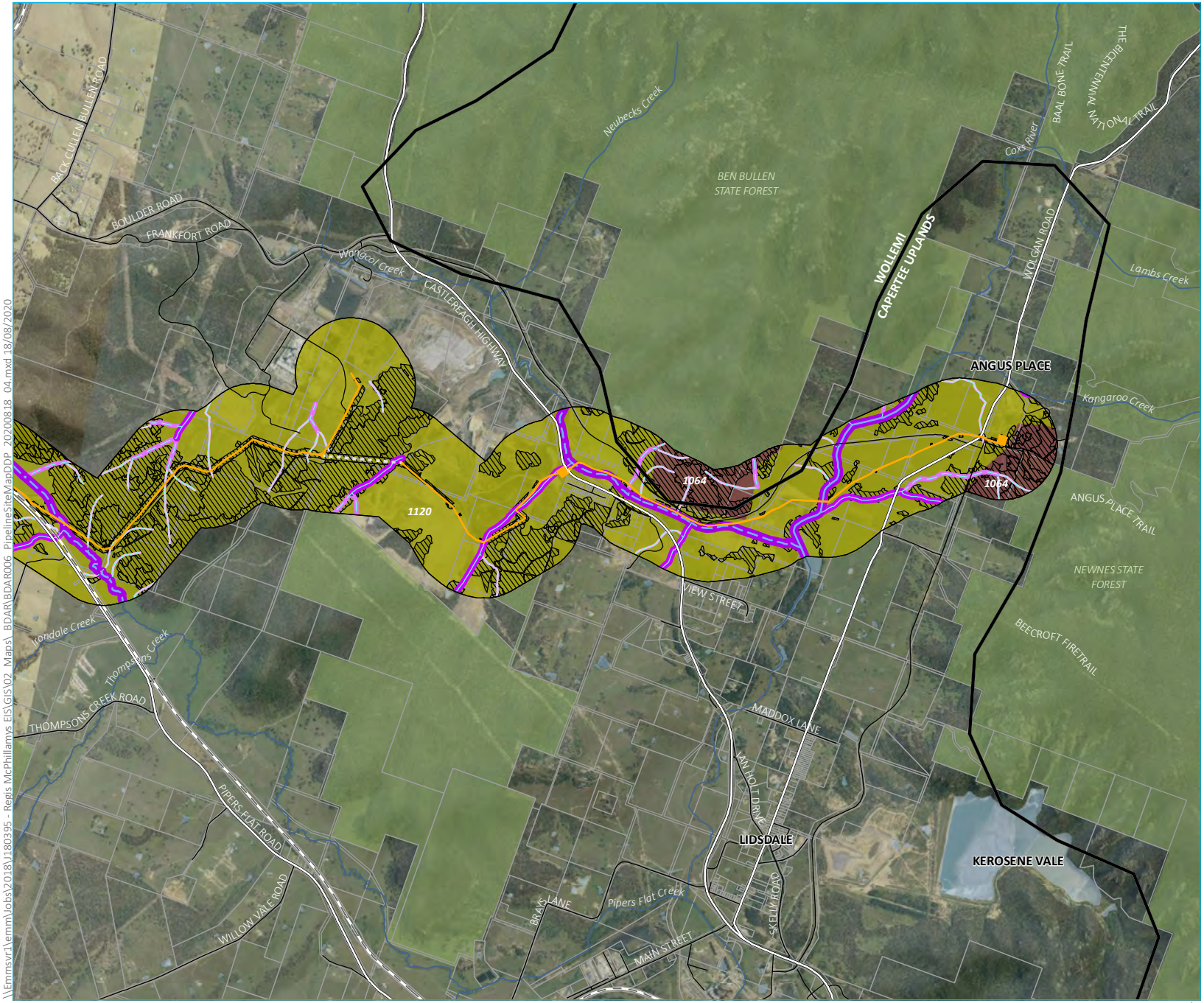
Note:
IBRA7 region: South Eastern Highlands
IBRA7 sub-region: Orange

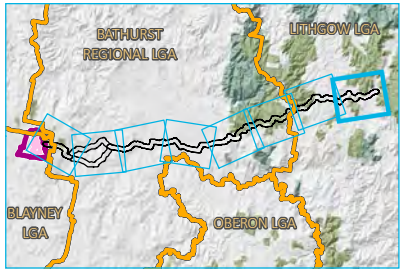
Site map – mine development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 3.1

REGIS RESOURCES LTD

EMM creating opportunities





KEY

- Rail line
- Major road
- Minor road
- Named watercourse
- Waterbody
- Cadastral boundary
- NPWS reserve
- State forest
- Local government area (refer to inset)
- IBRA subregion
- BDAR 500 m buffer
- Native vegetation

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Pipeline direct impact management zone
- Pipeline underbore section

Strahler stream order

- 1st order
- 2nd order
- 3rd order
- 4th order
- 5th order

Riparian buffers

- 10 m
- 20 m
- 30 m
- 40 m

Mitchell landscapes

- 1064 | Newnes Plateau
- 1120 | Capertee Plateau

Source: EMM (2020); Regis Resources (2020); DFSI (2017); OEH (2017); DPI (2015)

0 1 2 km

GDA 1994 NSW Lambert

N

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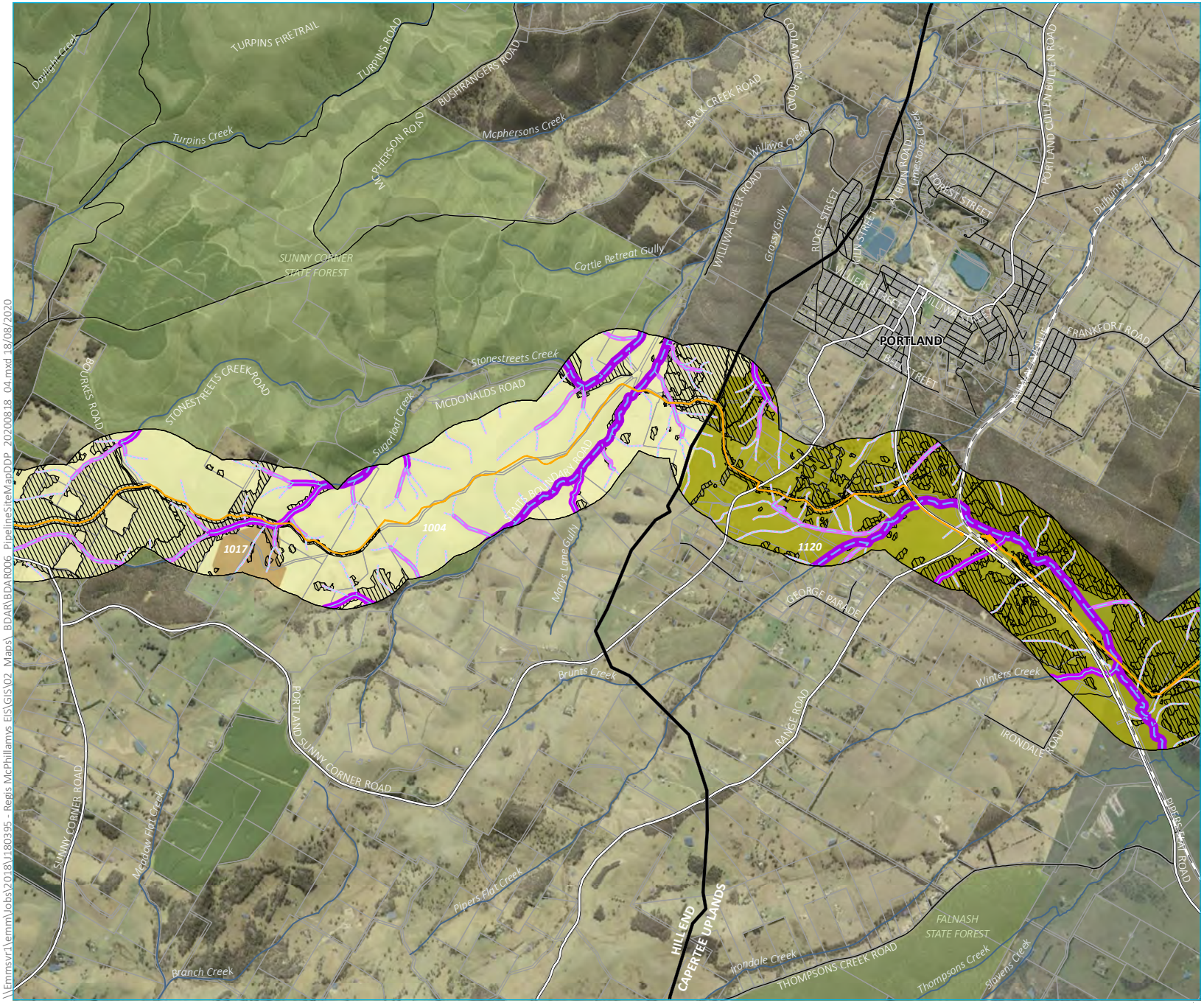
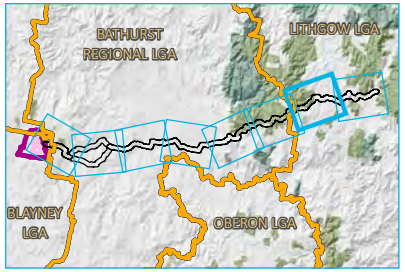
Site map – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 3.2a

REGIS RESOURCES LTD

EMM creating opportunities





KEY

- Rail line
- Major road
- Minor road
- Named watercourse
- Waterbody
- Cadastral boundary
- NPWS reserve
- State forest
- Local government area (refer to inset)
- IBRA subregion
- BDAR 500 m buffer
- Native vegetation

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Pipeline direct impact management zone
- Pipeline underbore section

Strahler stream order

- 1st order
- 2nd order
- 3rd order
- 4th order

Riparian buffers

- 10 m
- 20 m
- 30 m
- 40 m

Mitchell landscapes

- 1004 | Mount Horrible Plateau
- 1017 | Bathurst Granites
- 1120 | Capertee Plateau

Source: EMM (2020); Regis Resources (2020); DFSI (2017); OEH (2017); DPI (2015)

0 1 2 km

GDA 1994 NSW Lambert

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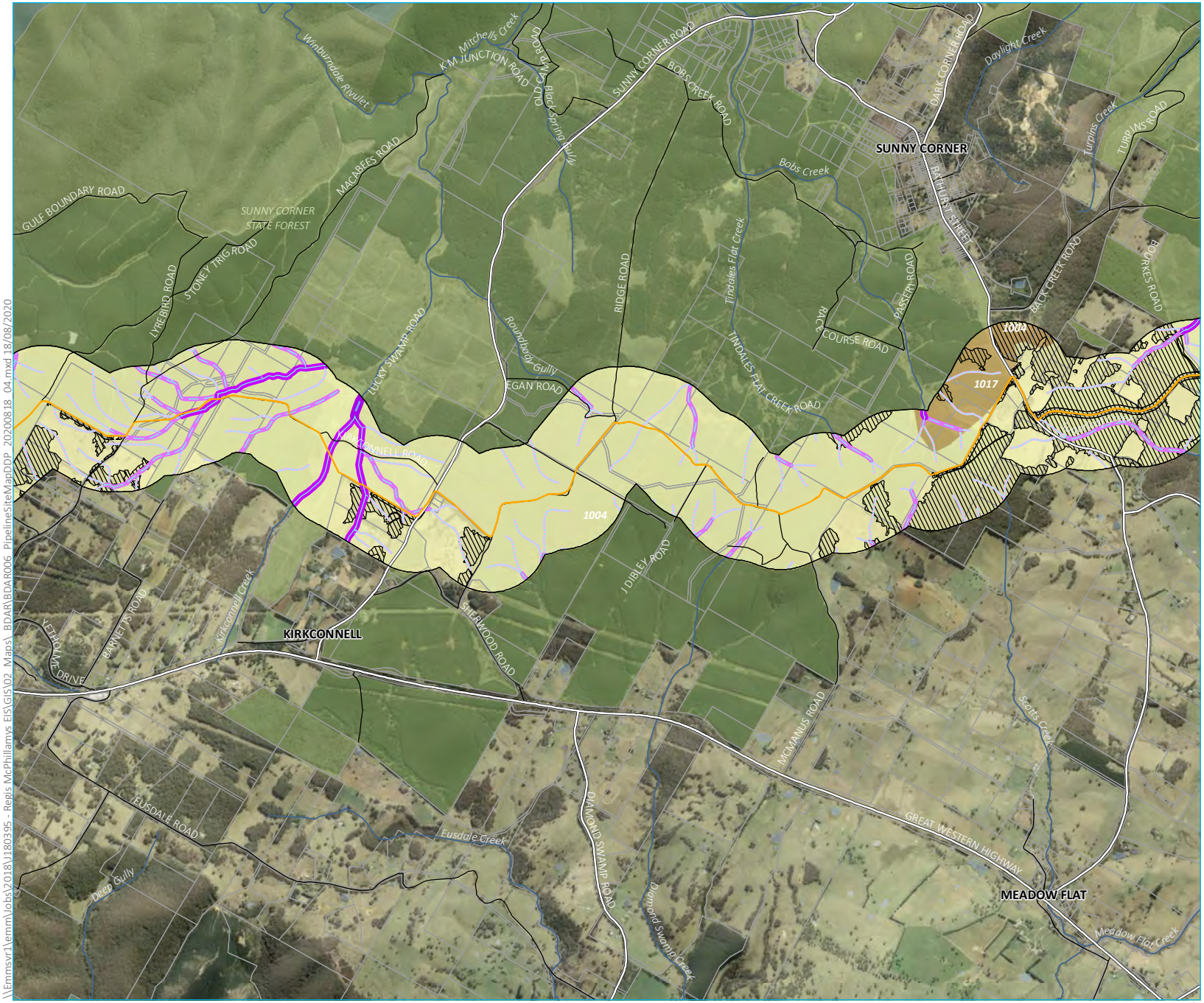
Site map – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 3.2b



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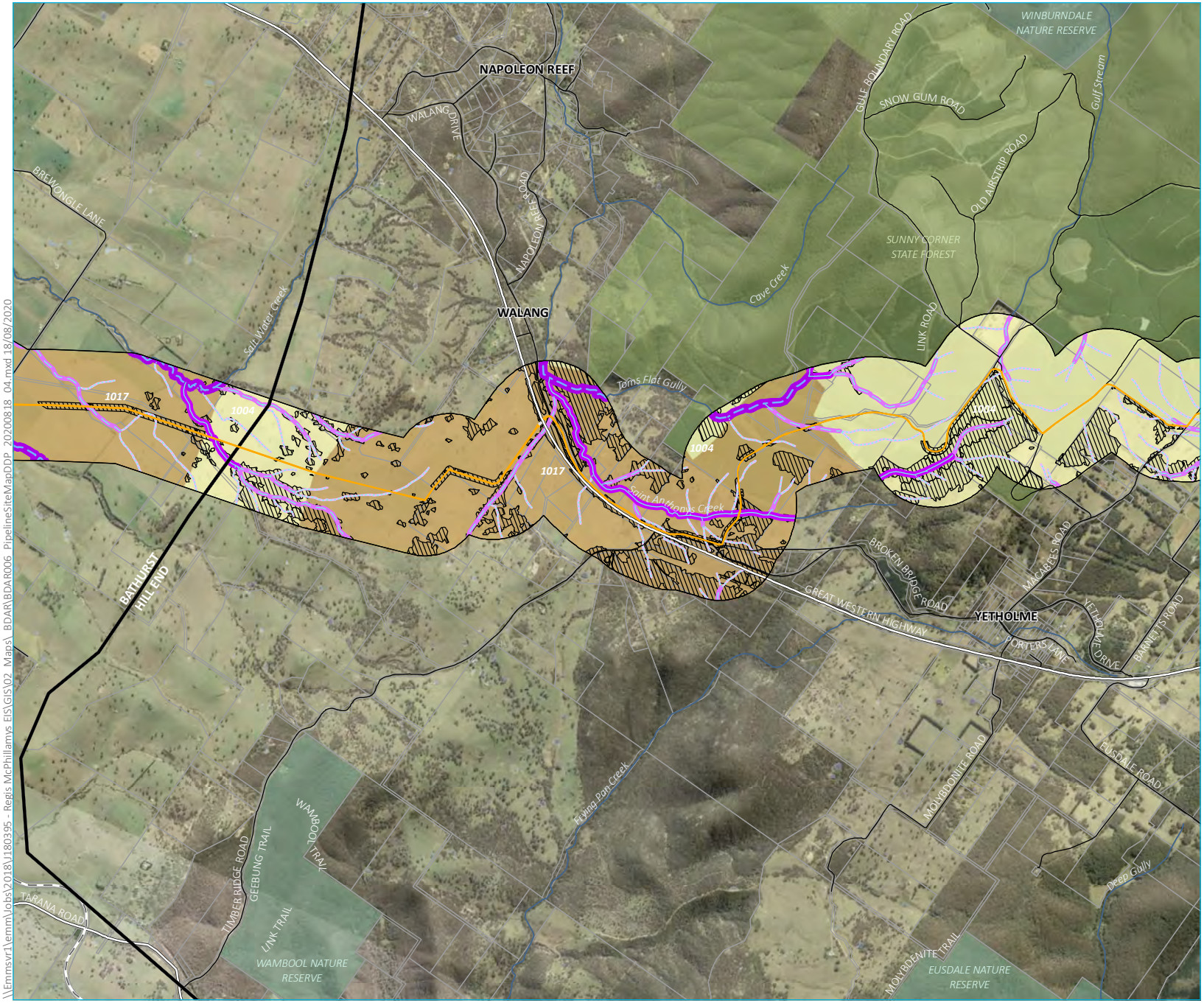
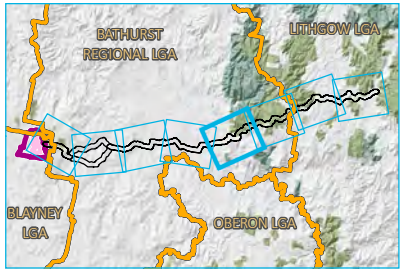
Source: EMM (2020); Regis Resources (2020); DFSI (2017); OEH (2017); DPI (2015)

Site map – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 3.2c





KEY

- Rail line
- Major road
- Minor road
- Named watercourse
- Waterbody
- Cadastral boundary
- NPWS reserve
- State forest
- Local government area (refer to inset)
- IBRA subregion
- BDAR 500 m buffer
- Native vegetation

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Pipeline direct impact management zone
- Pipeline underbore section

Strahler stream order

- 1st order
- 2nd order
- 3rd order
- 4th order
- 5th order

Riparian buffers

- 10 m
- 20 m
- 30 m
- 40 m

Mitchell landscapes

- 1004 | Mount Horrible Plateau
- 1017 | Bathurst Granites

Site map – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 3.2d

Source: EMM (2020); Regis Resources (2020); DFSI (2017); OEH (2017); DPI (2015)

0 1 2 km

GDA 1994 NSW Lambert

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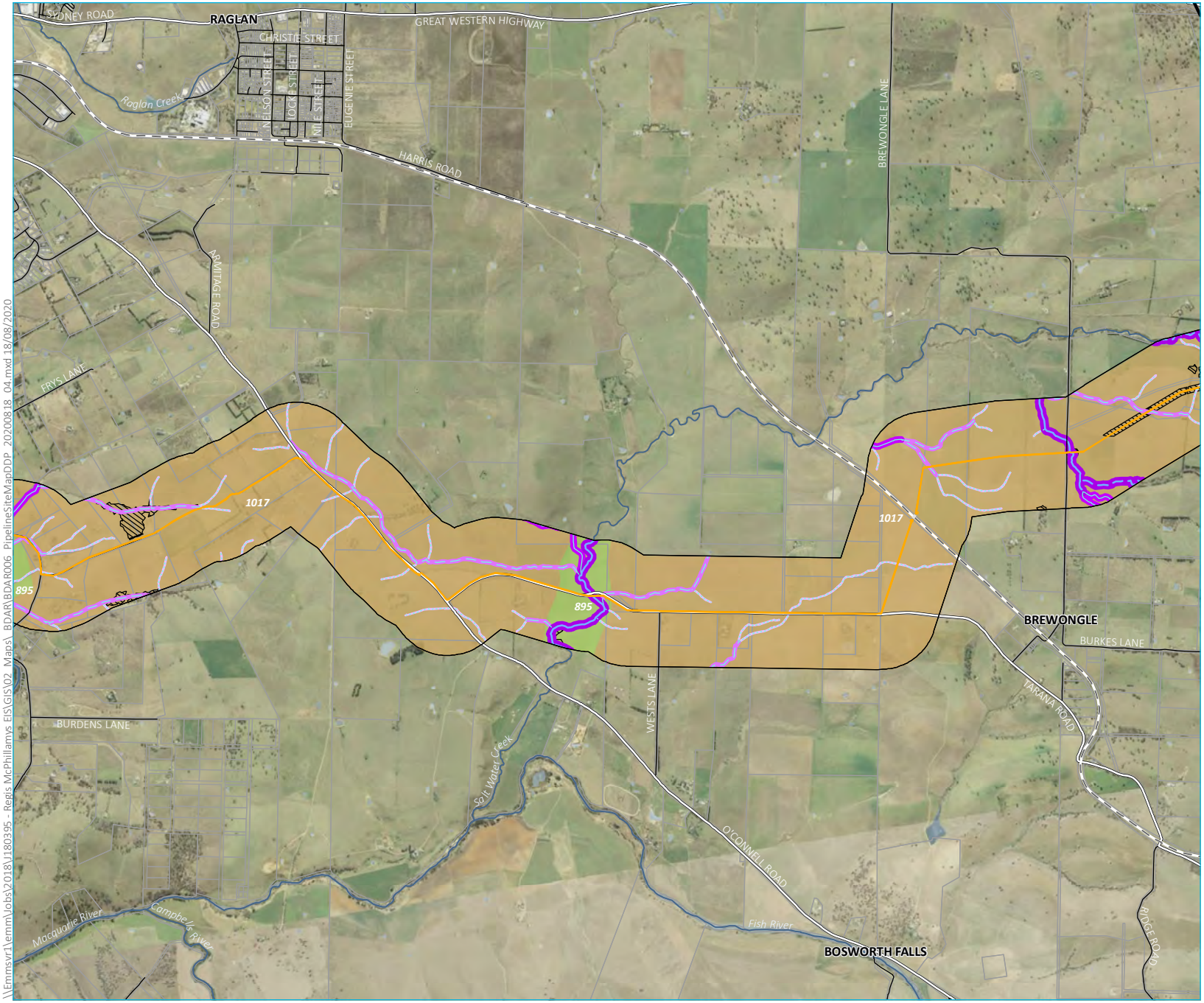

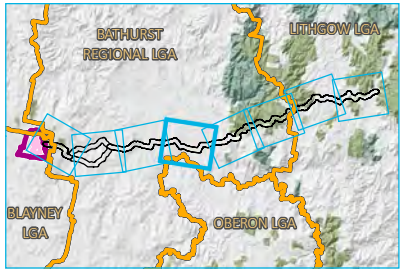

KEY

- Rail line
- Major road
- Minor road
- Named watercourse
- Waterbody
- Cadastral boundary
- NPWS reserve
- State forest
- Local government area (refer to inset)
- IBRA subregion
- BDAR 500 m buffer
- Native vegetation

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Pipeline direct impact management zone
- Pipeline underbore section

Strahler stream order

- 1st order
- 2nd order
- 3rd order
- 4th order
- 5th order
- 6th order
- 8th order

Riparian buffers

- 10 m
- 20 m
- 30 m
- 40 m

Mitchell landscapes

- 895 | Upper Macquarie Channels and Floodplains
- 1017 | Bathurst Granites

Source: EMM (2020); Regis Resources (2020); DFSI (2017); OEH (2017); DPI (2015)

0 1 2 km

GDA 1994 NSW Lambert

N

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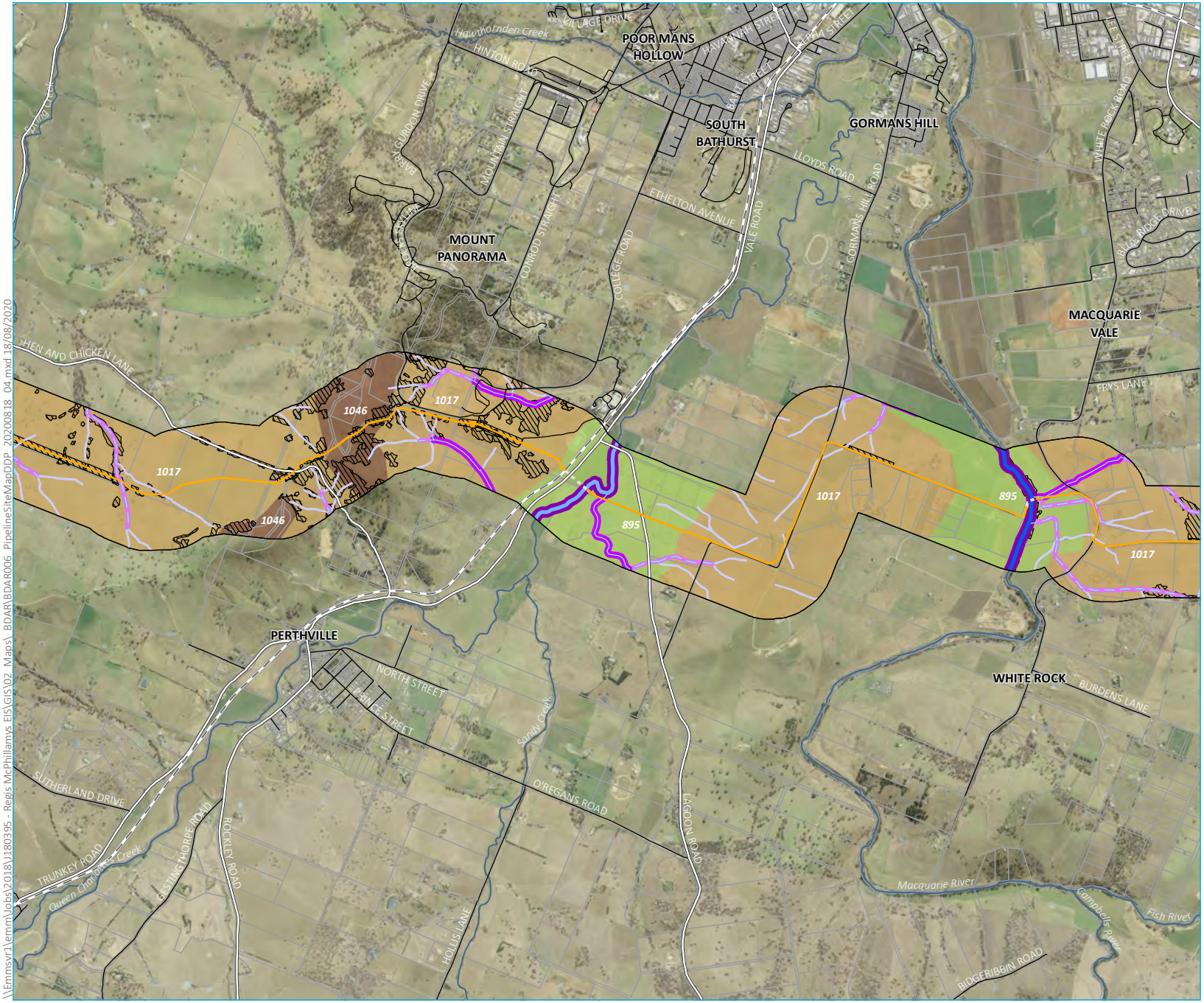
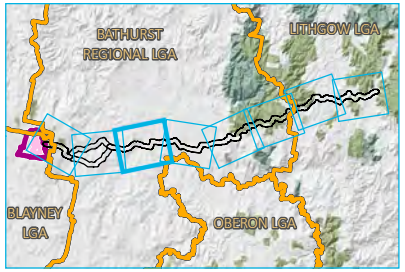
Site map – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 3.2e

REGIS RESOURCES LTD

EMM creating opportunities





KEY

- Rail line
- Major road
- Minor road
- Named watercourse
- Waterbody
- Cadastral boundary
- NPWS reserve
- State forest
- Local government area (refer to inset)
- IBRA subregion
- BDAR 500 m buffer
- Native vegetation

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Pipeline direct impact management zone
- Pipeline underbore section

Strahler stream order

- 1st order
- 2nd order
- 3rd order
- 4th order
- 5th order
- 6th order
- 8th order

Riparian buffers

- 10 m
- 20 m
- 30 m
- 50 m

Mitchell landscapes

- 895 | Upper Macquarie Channels and Floodplains
- 1017 | Bathurst Granites
- 1046 | Macquarie Valley Basalts

Source: EMM (2020); Regis Resources (2020); DFSI (2017); OEH (2017); DPI (2015)

0 1 2 km

GDA 1994 NSW Lambert

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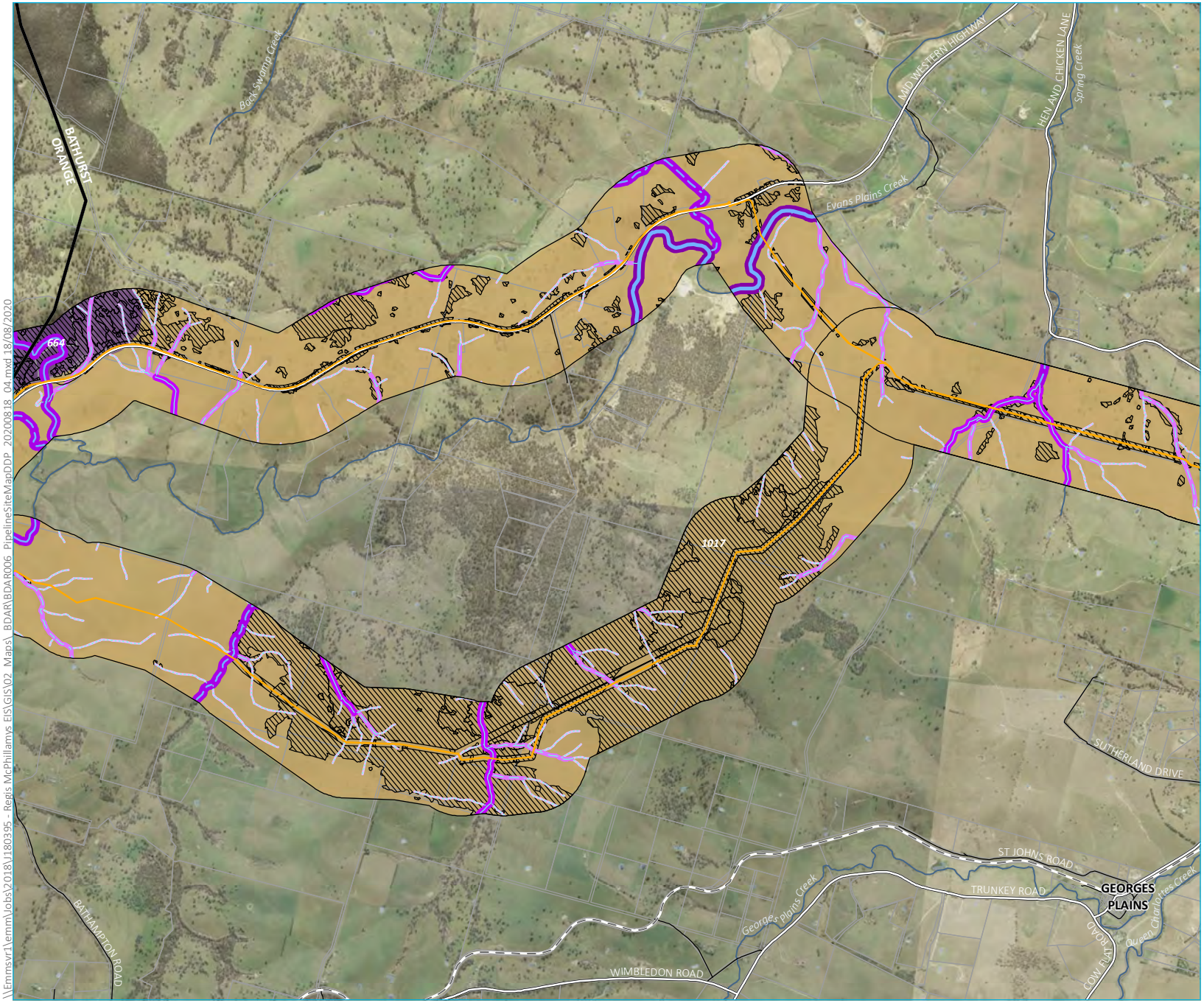
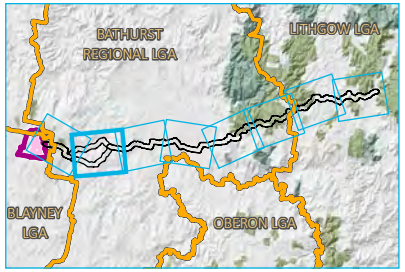
Site map – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 3.2f





KEY

- Rail line
- Major road
- Minor road
- Named watercourse
- Waterbody
- Cadastral boundary
- NPWS reserve
- State forest
- Local government area (refer to inset)
- IBRA subregion
- BDAR 500 m buffer
- Native vegetation

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Pipeline direct impact management zone

Strahler stream order

- 1st order
- 2nd order
- 3rd order
- 4th order
- 5th order
- 6th order

Riparian buffers

- 10 m
- 20 m
- 30 m
- 40 m
- 50 m

Mitchell landscapes

- 664 | Rockley Plains
- 1017 | Bathurst Granites

Source: EMM (2020); Regis Resources (2020); DFSI (2017); OEH (2017); DPI (2015)

0 1 2 km

GDA 1994 NSW Lambert

N

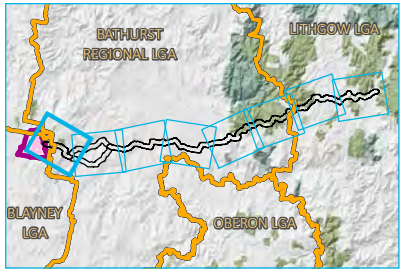
\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02 Maps\ BDAR\BDAR006 PipelineSiteMapDDP 20200818 04.mxd 18/08/2020

Site map – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 3.2g

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Major road
- Minor road
- Named watercourse
- Waterbody
- Cadastral boundary
- NPWS reserve
- State forest
- Local government area (refer to inset)
- IBRA subregion
- BDAR 500 m buffer
- Native vegetation

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Pipeline direct impact management zone
- Pipeline underbore section

Strahler stream order

- 1st order
- 2nd order
- 3rd order
- 4th order
- 5th order

Riparian buffers

- 10 m
- 20 m
- 30 m
- 40 m

Mitchell landscapes

- 632 | Mullion Slopes
- 664 | Rockley Plains
- 1017 | Bathurst Granites

Source: EMM (2020); Regis Resources (2020); DFSI (2017); OEH (2017); DPI (2015)

0 1 2 km

GDA 1994 NSW Lambert

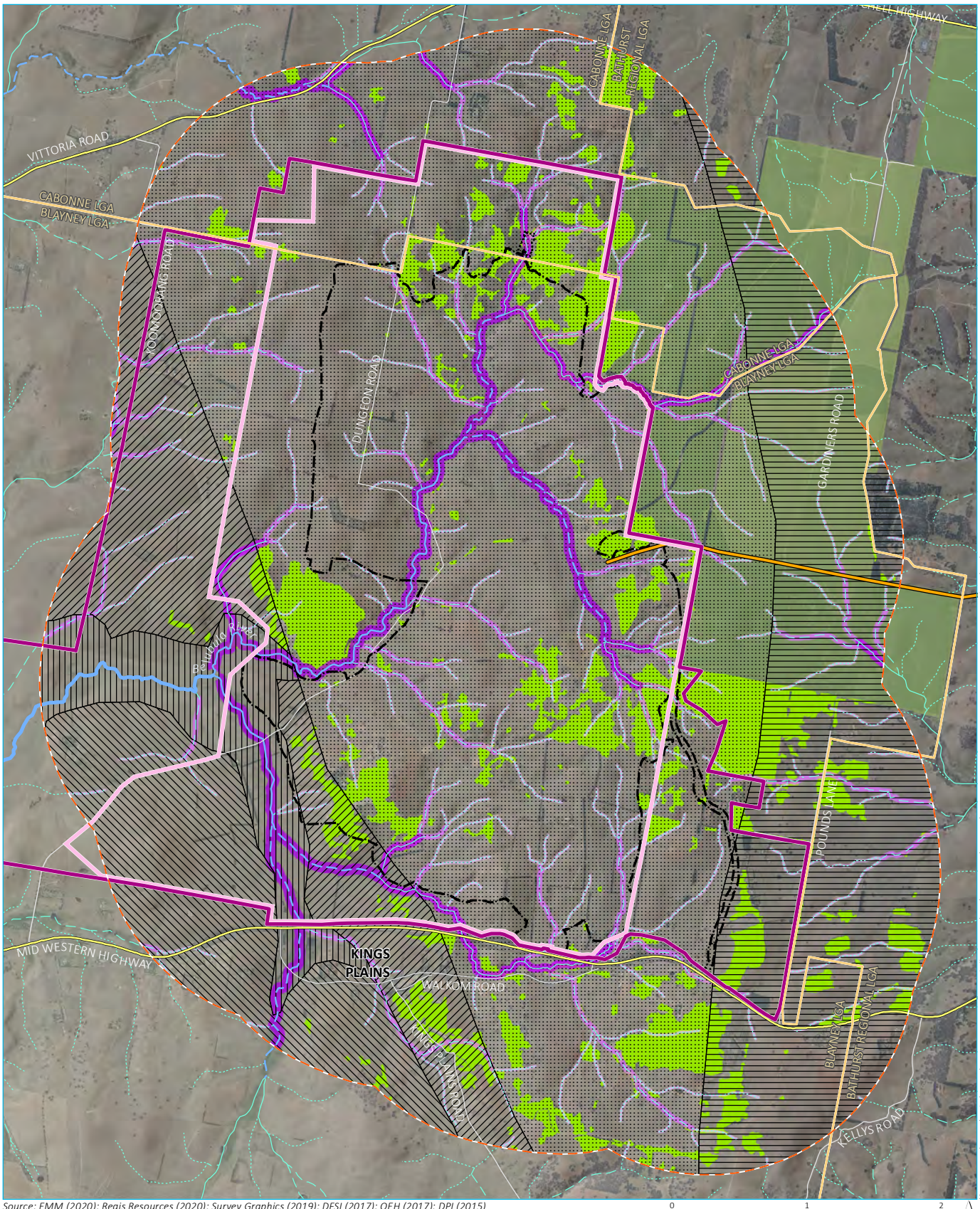
\\Emmsvr1\emm\Jobs\2018\I180395 - Regis McPhillamys EIS\GIS\02 Maps\ BDAR\BDAR006 PipelineSiteMapDDP 20200818 04.mxd 18/08/2020

Site map – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 3.2h

REGIS RESOURCES LTD

EMM creating opportunities



Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); OEH (2017); DPI (2015)

0 1 2 km

GDA 1994 MGA Zone 55

N

\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02_Maps_BDAR\BDAR002_MineLocationMap_20200811_03.mxd 19/08/2020

KEY

- 1500 m buffer

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Additional (post-closure) disturbance footprint
- Pipeline

Existing environment
- Major road
- Minor road
- Vittoria State Forest
- Native vegetation
- Local government area

Mitchell landscapes
- Byng Ultramafics
- Mandurama Slopes
- Mullion Slopes
- Rockley Plains
- Upper Lachlan Channels and Floodplains

Strahler stream order
- 1st order
- 2nd order
- 3rd order
- 4th order
- 5th order
- 6th order

Riparian buffers
- 10 m
- 20 m
- 30 m
- 40 m

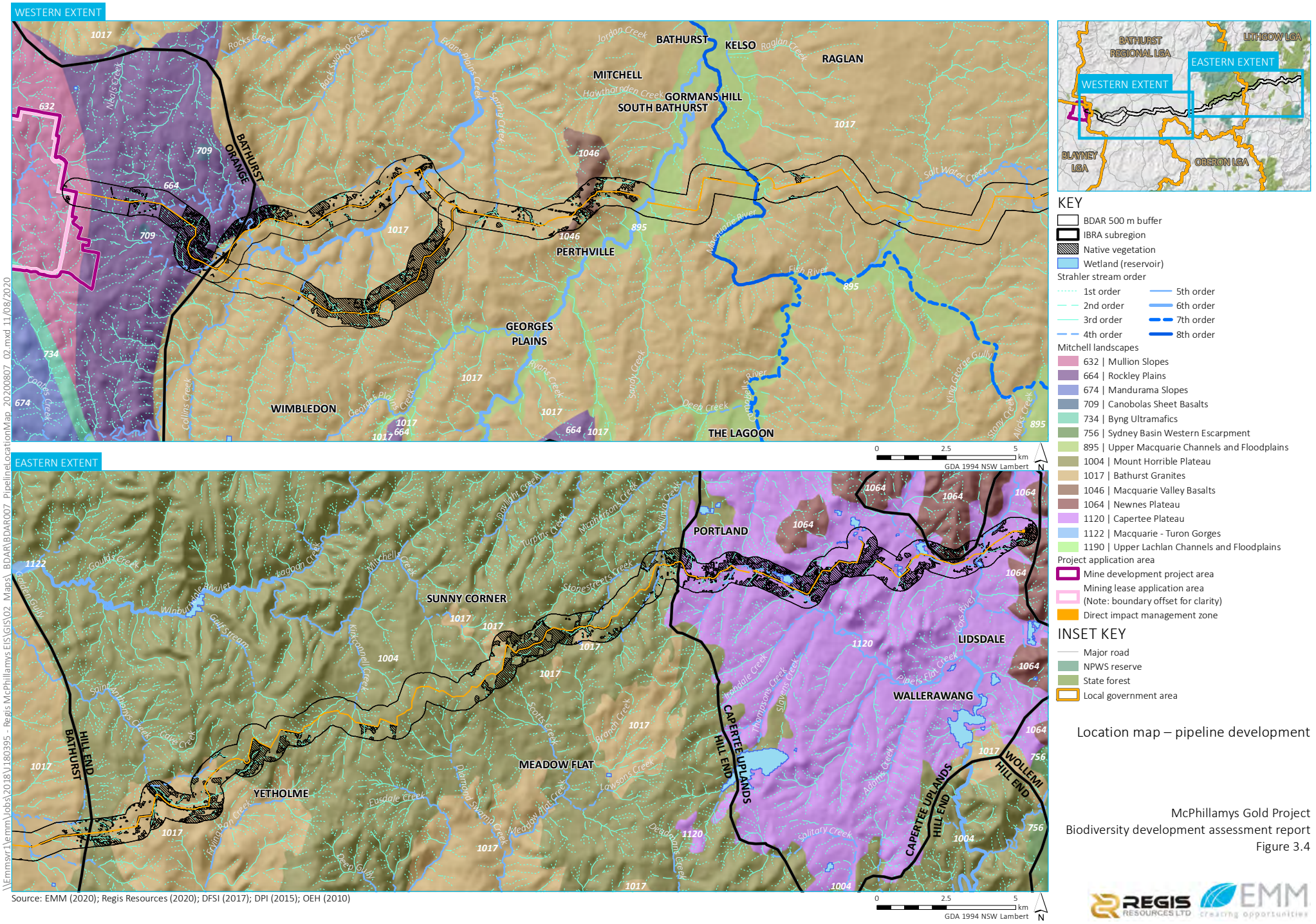
Note:
IBRA7 region: South Eastern Highlands
IBRA7 sub-region: Orange

Location map – mine development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 3.3

REGIS RESOURCES LTD

EMM creating opportunities



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Source: EMM (2020); Regis Resources (2020); DFSI (2017); DPI (2015); OEH (2010)

Location map – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 3.4

3.2 Assessment of site context

Vegetation mapping across the project application area and locality (OEH 2018) identifies a range of vegetation communities. The extent of native vegetation cover based on these data sources is shown in Figure 3.1 to Figure 3.4. To calculate the native vegetation cover and patch size, the following buffer areas were applied consistent with the requirements of the BAM (OEH 2017):

- Mine development – a 1,500 m buffer was placed around the mine disturbance footprint. The area of native vegetation within the buffer and the percent native vegetation was then calculated.

- Pipeline development – a 500 m buffer was placed on either side of the pipeline centreline. The area of native vegetation within the buffer and the percent native vegetation was then calculated.

Vegetation proximal to the mine and pipeline developments are 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 application area. Native vegetation cover for the mine development and pipeline development is provided in Table 3.3 by IBRA subregion. Separate landscape information has been provided for the southern and northern pipeline options in the Bathurst IBRA subregion.

Table 3.3 Percentage of native vegetation cover by IBRA subregion

IBRA subregion	Native vegetation in buffer area (ha)	Buffer area (ha)	Approximate percentage of native vegetation in buffer area
Mine development			
Orange	522.2	4,358.9	12%
Pipeline development			
Orange	323.06	764.65	42%
Bathurst (southern option)	703.42	3,792.58	19%
Bathurst (northern option)	304.63	3,678.51	8%
Hill End	634.30	2,874.69	22%
Capertee Uplands	597.77	1,505.30	40%

4 Native vegetation

4.1 Background review

4.1.1 Mine development

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 mine 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 mine 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 2014).

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

Table 4.1 Preliminary vegetation zones in mine project area (EnviroKey 2017)

PCT ID	PCT name	Vegetation zone[3]
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 (2017) mapped this community as PCT 654; however, in this report and the BAM Calculator the community it is mapped as PCT 1330. Further discussion and justification is provided in Section 4.3.1.
2. Envirokey (2017) mapped this community as PCT 1375; however, in this report and the BAM Calculator the community it is mapped as PCT 766. PCT 1375 was not available in the BAM calculator.
3. In accordance with the FBA and BAM, a vegetation zone comprises areas of a PCT in the same or similar broad condition state.

4.1.2 Pipeline development

Vegetation mapping was undertaken by OzArk in 2018 and 2019 as part of the pipeline development BDAR (OzArk 2019) prepared for the EIS. Vegetation mapping in the pipeline corridor included delineation of PCTs and stratification of PCTs into vegetation zones. Plot/transect surveys were also undertaken using the methods outlined in the BAM (OEH 2017).

Surveys identified 12 PCTs and 20 vegetation zones across the EIS pipeline corridor (Table 4.2).

Table 4.2 Vegetation zones in the pipeline corridor

PCT ID	PCT name	Vegetation zone
85	River Oak forest and woodland wetland of the NSW South Western Slopes and South Eastern Highlands Bioregion[1]	Poor
287	Long-leaved Box - Red Box - Red Stringybark mixed open forest on hills and hillslopes in the NSW South Western Slopes Bioregion[2]	Good
654	Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands Bioregion[3]	Moderate
		Poor
679	Black Sallee - Snow Gum low woodland of montane valleys, South Eastern Highlands Bioregion and Australian Alps Bioregion[4]	Good
		Poor
727	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion	Poor
731	Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills, South Eastern Highlands Bioregion[5]	Good
		Poor
732	Broad-leaved Peppermint - Ribbon Gum grassy open forest in the north east of the South Eastern Highlands Bioregion[6]	Good
		Poor
765	Carex - Juncus sedgeland/wet grassland of the South Eastern Highlands Bioregion[7]	Moderate
1093	Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion.	Good
		Moderate
		Poor
1191	Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion	Poor
1197	Snow Gum - Mountain Gum tussock grass-herb forest of the South Eastern Highlands Bioregion	Good
		Poor
1330	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	Moderate
		Poor

Notes:
1. This report reclassifies areas mapped by OzArk (2019) as PCT 85 into non-native vegetation and/or PCT 1330.
2. This report reclassifies areas mapped by OzArk (2019) as PCT 287 into non-native vegetation and/or PCT 1093.
3. This report reclassifies areas mapped by OzArk (2019) as PCT 654 into PCT 277 and/or 1330.
4. This report reclassifies areas mapped by OzArk (2019) as PCT 679 into PCT 1191 and/or 1197.
5. This report reclassifies areas mapped by OzArk (2019) as PCT 731 into PCT 1093.
6 This report reclassifies areas mapped by OzArk (2019) as PCT 732 into PCT 1093.
7. This report reclassifies areas mapped by OzArk (2019) as PCT 766 into non-native vegetation.

EMM conducted a review of vegetation mapping for the pipeline development and has revised it in accordance with the methods described in 4.2.1ii.

4.2 Methods

4.2.1 Detailed vegetation mapping and habitat assessment

i Mine development

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 mine project area using air photo interpretation (API) and on-ground validation into PCTs. Vegetation mapping involved the mine project 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 FBA (OEH 2014). 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 FBA methodology (EnviroKey 2017). A total of 64 plots were undertaken by EnviroKey across the mine project area, with 39 of these plots located within the mine disturbance footprint (Figure 4.1).

Additional flora surveys were conducted by EMM ecologists on 4 – 8 February 2019 and 11 – 15 March 2019. The first survey event comprised verifying and amending mapped vegetation within the mine 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 BAM (OEH 2017).

Detailed mapping of vegetation communities was conducted using hand-held (uncorrected) tablet computers using the Collector for ArcGIS™ application and API. Areas of native vegetation for which a PCT could validly be assigned were identified and delineated in the field, and their condition determined. Where there was some uncertainty about correct PCT alignment, or to justify PCT alignment, a series of rapid vegetation assessments (RVAs) were undertaken, with the three dominant species in the overstorey, midstorey and groundcover recorded.

Identification of PCTs within the mine 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 included the collection of BAM plot data and is presented in Section 4.2.2. EMM conducted a total of 27 BAM plots. Sixteen of these locations were shared with EnviroKey's plots, while 11 were in new locations.

ii Pipeline development

Native vegetation was assessed in the field by OzArk during the following periods:

- August, September, October and December 2018; and
- January and May 2019.

Field surveys were undertaken by stratifying the mine project area by API by thorough comparisons with the State Vegetation Type Map: Central Tablelands Region V1.0 (OEH 2018), followed by on-ground validation. The entire pipeline corridor was traversed either by foot, where native vegetation was found to be present, or vehicle. Observations made while traversing the pipeline corridor were used to establish the boundaries of PCTs, using dominant upper layer species as an indicator of changes in community. PCT boundaries were determined using characteristic upper, mid and ground layer species.

Identification of PCTs within the pipeline development 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 (OEH 2020a). Plot data was collected using a GPS and hardcopy paper field data sheets (OzArk 2019).

OzArk completed 65 plots, of which 13 plots are located within the pipeline disturbance footprint. All plots were located in the pipeline buffer area. Given the narrow width of the pipeline disturbance footprint, plots were placed in appropriate parts of the buffer area (Figures 4.2a – 4.2v).

Building on OzArk's work, EMM undertook the following additional tasks to inform preparation of this report:

- refinement of vegetation mapping to accurately map PCTs and 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 BAM; and
- undertake targeted flora surveys in accordance with OEH (2020), including transects spaced at 10 m intervals.

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

- 10-14 February 2020;
- 16-20 March 2020;
- 25-27 March 2020;
- 13-15 May 2020; and
- 11 June 2020.

Surveys comprised verifying and amending mapped vegetation within the pipeline corridor, including further stratification of PCTs into vegetation zones. These surveys were carried out on foot and by vehicle.

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 pipeline corridor were confirmed with reference to the community profile descriptions (and diagnostic species tests) held within the NSW Vegetation Information System (VIS): Classification Version 2.1 (OEH 2020a).

iii Limitations

No limitations apply to the mine development.

However, one limitation applies to two areas of the pipeline development. Access was not possible for the portion of the northern option that differs from the southern option in the Bathurst IBRA subregion, which is approximately 900 m in length. In addition, a small part of the southern route changed following the conclusion of ecology surveys to avoid a steep watercourse crossing. In this area, the alignment shifted east (approximately 67 m east for most of the alignment shift) of the original area surveyed by ecologists and represents approximately 2.7 km of the pipeline. For these two areas, vegetation mapping and species polygons have been based on EMM's detailed understanding of PCTs and species habitats directly adjacent to these areas and the remainder of the 90 km pipeline, which has been assessed comprehensively in the field. Further information regarding management of these limitations is provided in Section 6.8.

4.2.2 Vegetation integrity assessment

i Mine development

Native vegetation integrity was assessed using data obtained via a series of plots, as per the methodology outlined in Section 5 of the BAM (OEH 2017). Plot data was collected from the mine project area between 11 and 15 March 2019. All of Envirokey's previous plot locations were revisited to collect BAM-specific data.

At each plot location the following was undertaken:

- one 20 x 20 m plot, for assessment of composition and structure; and
- one 20 x 50 m plots for assessment of function, including a series of five 1 x 1 m plots to assess average leaf litter cover.

The assessment of composition and structure, based on a 20 x 20 m plot, recorded species name, stratum, growth form, cover and abundance rating for each species present within the plot. Cover (foliage cover) was estimated for all species rooted in or overhanging the plot, and recorded using decimals (if less than 1%, rounded to whole number (1-5%) or estimated to the nearest 5% (5- 100%). Abundance was counted (up to 20) and estimated above 20, and recorded using the following intervals: 1, 2, 3, 4, 5, 10, 20, 50, 100, 500, 1,000, 1,500, 2,000 etc.

The assessment of function recorded the number of large trees, the presence of tree stem size class, tree regeneration, number of trees with hollows and length of fallen logs, as well as leaf litter cover within the 20 x 50 m plot and five 1 x 1 m subplots. The minimum number of plots and transects per vegetation zone was determined using Table 4 of the BAM (OEH 2017).

The minimum number of plots/transects per vegetation zone was determined using Table 4 of the BAM (OEH 2017). A total of 27 plots/transects were completed by EMM (2019) across the mine project area, with 23 of the plots/transects located within the mine disturbance footprint (Figure 4.1). Plot data entered into the BAM calculator, along with original datasheets, are provided in Appendix A and 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.

ii Pipeline development

OzArk collected plot data for the pipeline between August 2018 and May 2019. EMM collected plot data for the pipeline between February and June 2020 to address gaps in the minimum plots required based on refined PCT mapping. EMM completed 12 plots in the pipeline corridor, of which 7 plots are located within the pipeline disturbance footprint (Figure 4.1).

Plot and transects were undertaken in accordance with the methods outlined in the BAM (OEH 2017) as outlined above. All plot data collected across each vegetation zone was entered for each subregion; ie plots were not split by subregion.

4.2.3 Management zones

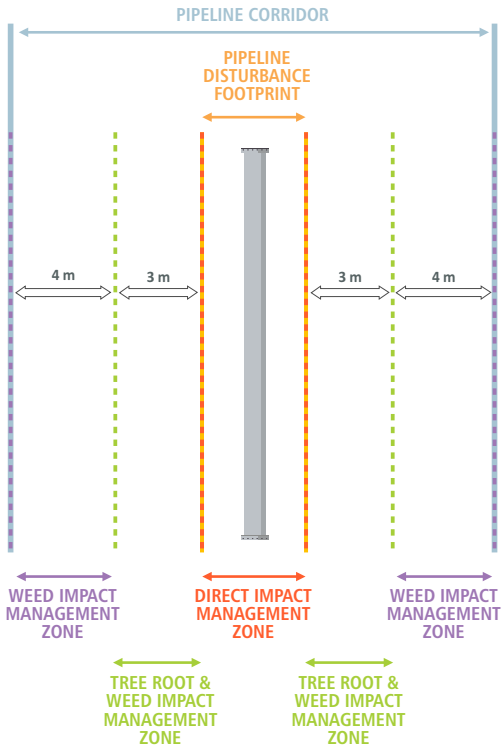
Delineation of a proposed development into different management zones allows for direct impacts (ie total loss of native vegetation and fauna habitat in a given area) and indirect impacts (eg decreasing condition in retained native vegetation and fauna habitats adjacent to direct impacts) to be quantified and offset. The following sections describe how management zones have been defined for the mine and pipeline developments to quantify direct and indirect impacts and allow for offsetting. Notwithstanding, measures have been provided in Section 6.4 to manage these indirect impacts.

The mine development has been delineated into a direct impact management zone (DIMZ, which equates to the mine disturbance footprint) and weed impact management zone (WIMZ), depicted on Plate 4.1. The WIMZ has been defined as a 20 m buffer around the DIMZ in which indirect impacts, including edge effects and inadvertent transport of weeds in this area, may occur.

The pipeline development has been delineated into a DIMZ (ie the pipeline disturbance footprint), tree root and weed impact management zone (TRWIMZ) and WIMZ, depicted on Plate 4.1. The TRWIMZ has been defined as a 3 m buffer either side of the DIMZ. Its purpose is to account for any damage to the roots of trees within the zone from trenching for the pipeline in the DIMZ, edge effects and inadvertent transport of weeds in this area. The WIMZ extends a further 4 m from the edge of the TRWIMZ to fully account for edge effects and inadvertent transport of weeds in from the 8 m wide (average) DIMZ.

Plate 4.1 delineates the management zones for the mine development and describes the method for amending final vegetation integrity scores in the WIMZ to account for a decrease in vegetation and habitat condition. Plate 4.1 also delineates the management zones for the pipeline development and describes the method for amending final vegetation integrity scores in the TRWIMZ and WIMZ to account for a decrease in vegetation and habitat condition.

PIPELINE DISTURBANCE – impacts, construction zones and offset calculations



KEY: Pipeline Development

PIPELINE DISTURBANCE FOOTPRINT ACTIVITIES
Total clearance

Temporary construction fencing at boundaries

PIPELINE CORRIDOR ACTIVITIES
Vehicle and plant movement

Lay-down areas in non-native vegetation

DIRECT IMPACT MANAGEMENT ZONE
When native vegetation occurs in the DMZ, total clearance will be assumed (ie future VI score = 0)

TREE ROOT & WEED IMPACT MANAGEMENT ZONE
No direct impact for TRWIMZ. Indirect impacts only, including impacts to tree roots and vegetation condition through weed infiltration. Structure values for tree layer reduced by 50% from current scores to account for root damage. Composition and structure values reduced by 10% for grass, forbs, ferns and other growth forms., 5% reduction in functional score for litter cover to account for increased weeds.

WEED IMPACT MANAGEMENT ZONE
No direct impact for WIMZ. Indirect impacts only, including impacts to vegetation condition through weed infiltration. Composition and structure values reduced by 10% for grass, forbs, ferns and other growth forms. 5% reduction in functional score for litter cover to account for increased weeds.

Mine and pipeline development management zones

Regis Resources
McPhillamys Gold Project
Plate 4.1

4.3 Results

4.3.1 Flora and plant community types

i Mine development

A total of 123 species (72 native and 51 exotic) were recorded across the plots carried out by Envirokey and EMM within the mine development area. Few midstorey species were recorded, the presence of which was likely limited due to cattle and sheep continuing to graze on the property during the surveys.

PCTs were identified through analysis of data collected during the site visits, including RDP data, and were verified using floristic data collected during plot surveys. A total of four PCTs were identified within the mine project area, summarised in Table 4.3, shown in Figure 4.1 and described in the following sections.

Table 4.3 Plant community types mapped within the mine DIMZ and WIMZ

Plant community type	Vegetation formation	Vegetation class	DIMZ (ha)	WIMZ (ha)	Total (ha)
PCT 727 – Broad-leaved Peppermint – Brittle Gum – Red Stringybark dry open forest of the South Eastern Highlands Bioregion	Dry Sclerophyll Forests (shrubby sub-formation)	Southern Tableland Dry Sclerophyll Forests	48.78	3.94	52.72
PCT 766 – Carex sedgeland of the slopes and tablelands	Freshwater Wetlands	Montane Bogs and Fens	3.04	0.00	3.04
PCT 951 – Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion	Wet Sclerophyll Forests (shrubby sub-formation)	Southern Tableland Wet Sclerophyll Forests	32.73	0.95	33.68
PCT 1330 – Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	Grassy Woodlands	Southern Tableland Grassy Woodlands	45.84	2.87	48.71
Total			**130.39**	**7.75**	**138.14**

Notes: DIMZ = direct impact management zone, WIMZ = weed impact management zone, as depicted on Plate 4.1.

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

PCT 1330 is best described as a dry grassy woodland. PCT 1330 has been heavily grazed across the mine project area. Areas of high to poor quality are distinguished largely by presence or absence of woody debris, and by the species composition. Table 4.4 provides a description of the vegetation zones attributed to this PCT.

Table 4.4 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 – 1330_high Vegetation zone 2 – 1330__medium Vegetation zone 3 – 1330__poor Vegetation zone 4 – 1330_other
Extent within mine disturbance footprint (including indirect impacts)	**45.84 ha (2.87 ha)** High - 1.47 ha (0.16 ha) Medium - 18.96 ha (2.05 ha) Poor - 24.65 ha (0.65 ha) Other - 0.76 ha (0.00 ha)
Description	The canopy is co-dominated by Yellow Box (*Eucalyptus melliodora*) with occasional stands of Apple Box (*Eucalyptus bridgesiana*). The midstorey is largely absent. A single native shrub occurs, being Silver Wattle (*Acacia dealbata* subsp*. dealbata*). Two exotic shrub species occur rarely within the PCT, being Blackberry complex (*Rubus fruticosis* aggregate) and Briar Rose (*Rosa rubiginosa*). The groundlayer is co-dominated by native and exotic grass species. Dominant native grasses are Purplish Wallaby Grass (*Rytidosperma tenuius*), Short Wallaby Grass (*Rytidosperma carphoides*), Snow Grass (*Poa sieberiana*), Common Wheatgrass (*Anthosachne scaber*) and Weeping Grass (*Microlaena stipoides*). Dominant exotic grass species recorded include Harding Grass (*Phalaris aquatica*) and Creeping Bentgrass (*Agrostis stolonifera*).
Survey effort	Nine plots/transects within the mine disturbance footprint: • Vegetation zone 1 –high: 1 • Vegetation zone 2 –medium: 3 • Vegetation zone 3 –other: 1 • Vegetation zone 4 –poor: 4

Table 4.4 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)	
Condition description	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 and western part of the mine project area, but these have largely been avoided during detailed design. The midstorey (shrub layer) is largely absent. An exotic forb and grass species occur within the PCT, being Flatweed (*Hypochaeris radicata*) and Rhodes grass (*Chloris gayana*) respectively. Surrounding land use (mostly grazing and forestry) and associated edge impacts contribute even further to the existing condition of this PCT.
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 Yellow Box and Apple Box, although Blakely's Red Gum (*Eucalyptus blakelyi*) was absent in the mine 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 *Lissanthe 46trigose* and *Melichrus urceolatus*. These two species were not present at McPhillamys, even in ungrazed areas adjacent to the site. 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.
Justification of evidence used to identify the PCT	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): • 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 *Lissanthe 46trigose* and *Melichrus urceolatus*. 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 mine project area. PCT 654 is mapped adjacent, while PCT 277 is not mapped in the vicinity of the site (further than 20 km distance). 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.

Table 4.4 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	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: • 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. The National Recovery Plan for White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland (DECCW 2010a) 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 meet the condition thresholds outlined in DEH (2006): • have a predominantly native understorey (i.e. more than 50% of the perennial ground layer must comprise native species); and • be part of a patch 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 hectare. 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 (poor) and (other) condition do not.
Estimate of percent cleared value of PCT across its distribution	95%

Photograph 4.1 **Yellow Box Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion within the mine project area (high condition – plot ID EMM8Zone1)**

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

PCT 727 is best described as dry open forest with a grassy understorey. This PCT has been heavily grazed across the mine project area. Areas of high quality are distinguished largely by presence or absence of woody debris, and by the species composition. Table 4.5 provides a description of the vegetation zones attributed to this PCT.

Table 4.5 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 –high Vegetation zone 6 –medium Vegetation zone 7 –poor

Table 4.5 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)	
Extent within mine disturbance footprint (including indirect impacts)	**48.78 ha (3.94 ha)** High - 2.84 ha (1.06 ha) Medium - 35.54 ha (1.20 ha) Poor - 10.40 ha (1.68 ha)
Description	The canopy is co-dominated by Broad-leaved Peppermint (*Eucalyptus dives*) and Long-leaved box (*Eucalyptus goniocalyx*), with occasional stands of Brittle Gum (*Eucalyptus mannifera*), Yellow Box, and Apple Box. The native midstorey comprises a sparse cover of Hoary Guinea Flower (*Hibbertia obtusifolia*). About half of the ground layer cover consists of bare ground. The remaining area is dominated by native grasses, comprising of Snow Grass, Purplish Wallaby Grass, Common Wheatgrass, Weeping Grass, Red-anthered Wallaby Grass and Kangaroo Grass (*Themeda triandra*). All other species recorded occur at covers of less than 1% within the PCT.
Survey effort	Thirteen plots/transects within the mine disturbance footprint. Vegetation zone 5 –high: 3 Vegetation zone 6 –medium: 6 Vegetation zone 7 –poor: 4
Condition description	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 project area and to the east. 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.
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	Commonwealth EPBC Act: not listed NSW BC Act: not listed
Estimate of percent cleared value of PCT across its distribution	50%

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

c PCT 951 – Mountain Gum – Manna Gum open forest of the South Eastern Highlands Bioregion

PCT 951 is characterised by open forest, largely along drainage lines. Vegetation in this PCT is highly fragmented, occurring as small, isolated patches. The midstorey and groundcover have been heavily impacted by grazing. Table 4.6 provides a description of the vegetation zone attributed to this PCT.

Table 4.6 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 –poor
Extent within mine disturbance footprint (including indirect impacts)	**32.73 ha (0.95 ha)**

Table 4.6 Vegetation zone 8 description

Vegetation Zone 8 – Mountain Gum – Manna Gum open forest of the South Eastern Highlands Bioregion (PCT 951)	
Description	The canopy is dominated by Manna Gum (*Eucalyptus viminalis*). The midstorey is largely absent. Two native shrubs, Silver Wattle and White Dogwood (*Ozothamnus diosmifolius*) occur rarely. One high-threat-exotic species, Blackberry complex occurs rarely. 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. Dominant native grass-like plants are Tall Sedge (*Carex appressa*) and Common Rush (*Juncus usitatus*). One native forb species is co-dominant, being Slender Knot Weed (*Persicaria decipiens*). Dominant exotic grasses comprise of Harding Grass, Rye Grass (*Lolium perenne*), Prairie Grass (*Bromus catharticus*), Tall Fescue (*Festuca arundinacea*), Soft Brome (*Bromus hordeaceus*), Windmill Grass and Couch Grass (*Cynodon dactylon*). Dominant exotic forbs are Burrclover (*Medicago* spp.), Flatweed (*Hypochaeris radicata*) and White Clover (*Trifolium repens*).
Survey effort	Five plots/transects within the mine disturbance footprint: Vegetation zone 8 –poor: 5
Condition description	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. 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 (eg 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.
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 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.
Justification of evidence used to identify the PCT	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 Calculator does not include this as an option for selection on the site. 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.
Status	Commonwealth EPBC Act: not listed NSW BC Act: not listed
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 (poor – plot ID 103_WL_2_E).**

d PCT 766 – Carex sedgeland of the slopes and tablelands

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 patch of grassland within the mine project area (Figure 4.1). Table 4.7 provides a description of the vegetation zone attributed to this PCT.

Table 4.7 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 –poor
Extent within mine disturbance footprint (including indirect impacts)	**3.04 ha (0.00 ha)**
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, one exotic grass, Tall Fescue, and one exotic forb, White Clover. 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 (*Cirsium vulgare*), Harding Grass, Flatweed (*Hypochaeris radicata*), Prickly Lettuce (*Lactuca serriola*) and Common Dandelion (*Taraxicum officinale*). Two native forbs are also common within this remaining area, being Swamp Dock (*Rumex brownii*) and Common Rush.
Survey effort	Two plots/transects within the mine disturbance footprint: Vegetation zone 9 –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 *Leptospermum* 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 mine 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%

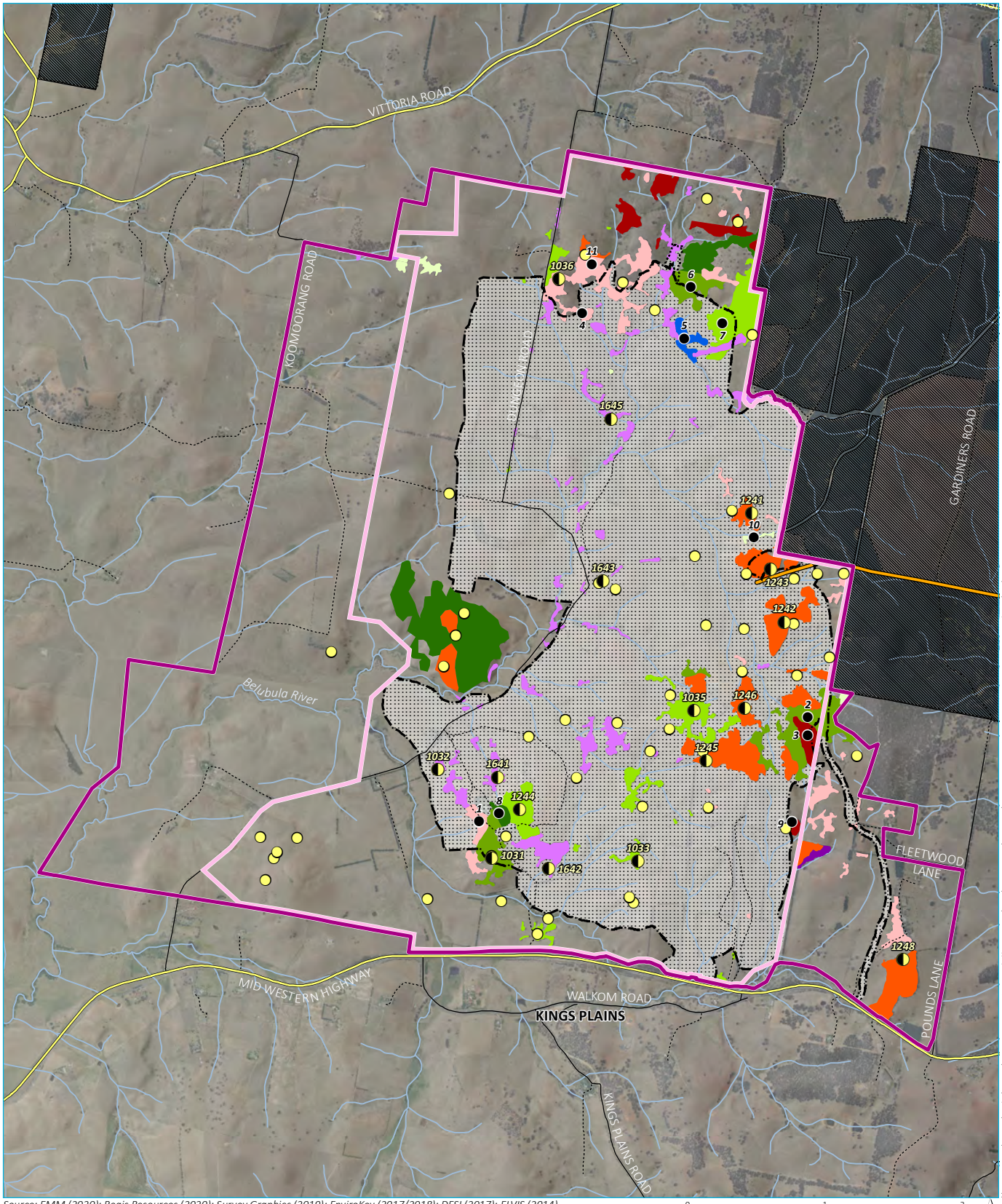
Photograph 4.4 Wet tussock grasslands of cold air drainage areas of the tablelands (poor condition - plot ID EMM5Zone9)

e Exotic grasslands

Exotic grasslands occur within the mine disturbance footprint (Figure 4.1). Exotic grasslands were in a highly disturbed state, meaning that they could not be reliably assigned to a PCT. In the EIS, 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 in the BioBanking Calculator, or otherwise. The site values scores fell below the offset threshold, and therefore these have been mapped in this report as exotic grasslands that do not require further assessment. Table 4.8 provides a description of exotic grasslands in the mine project area.

Table 4.8 Exotic grassland description

Open grasslands	
PCT ID	N/A
Common name	Open grassland
Condition class	N/A
Extent within mine disturbance footprint	**986.79 ha**
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 Burrclover, 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	16 plots within the mine disturbance footprint.
Condition description	The community is in very poor to poor condition with a high cover of exotic pasture grasses and weeds. Some non-native vegetation contains pine plantation where it intersects state forests.
Characteristic species used for identification of PCT	N/A
Justification of evidence used to identify the PCT	N/A
Status	Commonwealth EPBC Act: not listed NSW BC Act: not listed
Estimate of percent cleared value of PCT across its distribution	N/A



Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); EnviroKey (2017/2018); DFSI (2017); ELVIS (2014)

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KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Additional (post-closure) disturbance footprint
- Pipeline

Existing environment
- Major road
- Minor road
- Vehicular track
- Watercourse/drainage line
- Vittoria State Forest

Flora survey effort
- Plot location (EMM, 2019)
- Plot location (EMM (2019); EnviroKey (2017/2018))
- Plot location (EnviroKey (2017/2018))
- Exotic grassland (986.79 ha)

Plant community types

PCT 727 | Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion
- High
- Medium
- Poor

PCT 766 | Carex sedgeland of the slopes and tablelands
- Poor

PCT 951 | Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion
- Medium
- Poor

PCT 1330 | Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
- High
- Medium
- Poor
- Other

Plant community types – mine development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 4.1

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EMM creating opportunities

f Vegetation integrity scores

Four PCTs occur in the mine disturbance footprint, with 9 native vegetation zones mapped and/or entered into the credit calculator to determine vegetation integrity scores. A summary of the vegetation integrity score for each vegetation zone is provided in Table 4.9.

Vegetation integrity scores for wooded vegetation varied between 26.4 and 55. The vegetation integrity score for PCT 766 was 17.4, reflective of the level of past disturbance to this PCT.

Table 4.9 Vegetation zone summary – mine development

PCT ID	PCT name	Condition	Ancillary	Extent in mine disturbance footprint (ha)	Vegetation integrity score
727	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion (LA124)	Mod-Good	High	2.84	41.0
			Medium	35.54	45.4
			Poor	10.40	42.0
766	Carex sedgeland of the slopes and tablelands (LA130)	Mod-Good	Poor	3.04	17.4
951	Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion (LA164)	Mod-Good	Poor	32.73	28.3
1330	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion (LA276)	Mod-Good	High	1.47	39.4
			Medium	18.96	55.0
			Other	0.76	26.4
			Poor	24.65	43.2

ii Pipeline development

A total of 378 species (268 native and 110 exotic) were recorded across the plots carried out by OzArk and EMM. Vegetation in the west of the pipeline corridor traverses agricultural and forestry uses, and therefore is predominantly fragmented and with less species in the midstorey and understorey diversity. The eastern part of the pipeline also traverses agricultural and forestry uses, however intersects larger vegetated corridors with more structurally intact vegetation.

PCTs were identified through analysis of data collected during the site visits and were verified using floristic data collected during plot surveys. A total of six PCTs were identified within the amended pipeline corridor, summarised in Table 4.10, shown in Figure 4.2a – v and described in the following sections.

Table 4.10 Plant community types mapped within the amended pipeline disturbance footprint and management zones

Plant community type	Vegetation formation	Vegetation class	Southern option				Northern option			
			DIMZ (ha)	TRIMZ (ha)	WIMZ (ha)	Total (ha)	DIMZ (ha)	TRIMZ (ha)	WIMZ (ha)	Total (ha)
PCT 1330 – Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	Grassy Woodlands	Southern Tableland Grassy Woodlands	9.80	7.57	10.24	27.6	7.13	5.80	8.00	20.93
PCT 277 - Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Grassy Woodlands	Western Slopes Grassy Woodlands	2.36	1.99	2.65	7.00	2.37	2.00	2.66	7.04
PCT 1093 - Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands; South Eastern Highlands Bioregion	Dry Sclerophyll Forests (shrubby sub-formation)	Southern Tableland Dry Sclerophyll Forests	3.24	3.12	5.02	11.39	3.24	3.12	5.02	11.39
PCT 1191 - Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion	Grassy Woodlands	Subalpine Woodlands	2.11	1.90	2.76	6.77	2.11	1.90	2.76	6.77
PCT 1197 - Snow Gum - Mountain Gum tussock grass-herb forest of the South Eastern Highlands Bioregion	Wet Sclerophyll Forests (shrubby sub-formation)	Southern Tableland Wet Sclerophyll Forests	0.96	1.53	2.73	5.22	0.96	1.53	2.73	5.22

Table 4.10 Plant community types mapped within the amended pipeline disturbance footprint and management zones

Plant community type	Vegetation formation	Vegetation class	Southern option				Northern option			
			DIMZ (ha)	TRIMZ (ha)	WIMZ (ha)	Total (ha)	DIMZ (ha)	TRIMZ (ha)	WIMZ (ha)	Total (ha)
PCT 727 - Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion	Dry Sclerophyll Forests (shrubby sub-formation)	Southern Tableland Dry Sclerophyll Forests	0.03	0.18	0.54	0.75	0.03	0.18	0.54	0.75
Total			**18.5**	**16.29**	**23.94**	**58.73**	**15.84**	**14.53**	**21.71**	**52.1**

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

PCT 1330 is best described as dry grassy woodland. PCT 1330 has been heavily grazed in the pipeline corridor. Areas of high to poor quality are distinguished largely by presence or absence of woody debris, and by the species composition. Table 4.11 provides a description of the vegetation zones attributed to this PCT.

Table 4.11 PCT 1330 vegetation zones 1-5 description

Vegetation Zones 1-6 – 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 – DNG Vegetation zone 2 – Fragment Vegetation zone 3 – Intact Vegetation zone 4 – Shrubland Vegetation zone 5 – Sparse					
Extent within pipeline disturbance footprint (inclusive of indirect impacts)	**Vegetation zone**	**Orange**	**Bathurst (southern option)**	**Bathurst (northern option)**	**Hill End**	**Capertee Uplands**
	DNG	-	18.88 ha	10.21 ha	1.77 ha	-
	Intact	-	0.76 ha	1.66 ha	0.85 ha	-
	Shrubland	-	0.07 ha	0.07 ha	0.13 ha	-
	Sparse	-	4.83 ha	4.65 ha	0.21 ha	-
	Fragments	-	-	0.35 ha	0.11 ha	-
	Total	**-**	**24.54 ha**	**16.94 ha**	**3.07 ha**	**-**
Description	Where present, a sparse canopy is dominated by Blakely's Red Gum. In some areas, particularly the 'Sparse' vegetation zone, the overstorey is co-dominated by Yellow Box with occasional stands of Bundy, River Oak (*Casuarina cunninghamiana*) and Apple Box. In most areas the midstorey is sparse to absent. Where present, midstorey species include Silver Wattle, Sifton Bush (*Cassinia arcuata*) and Daphne Heath (*Brachyloma daphnoides*). Two exotic shrub species occur rarely within the fragmented vegetation zone, being Blackberry complex and Briar Rose. The groundlayer in most areas is dominated or co-dominated by exotic species such as include *Phalaris* spp., Barley Grass (*Hordeum leporinum*), Great Brome (*Bromus diandrus*), Soft Brome, Paspalum (*Paspalum dilatatum*), Catsear, African Lovegrass (*Eragrostis curvula*), Common Crowfoot (*Erodium cicutarium*), Ryegrass, Viper's Bugloss (*Echium vulgare*) and Smooth Catsear (*Hypochaeris glabra*). Native groundcover species include *Austrostipa nodosa*, Common Wheatgrass, Mat Spurge (*Euphorbia dallachyana*), Narrow-leaf Joyweed (*Alternanthera angustifolia*), Windmill Grass (*Chloris truncata*), Cotton Panic Grass (*Digitaria brownii*), Red Grass (*Bothriochloa macra*), Corkscrew Speargrass (*Austrostipa scabra*), Common Couch (*Cynodon dactylon*), Climbing Saltbush (*Einadia nutans*), Stinging Nettle (*Urtica incisa*), Spiny-headed Mat-rush (*Lomandra longifolia*) and Tall Sedge. Multiple other native and exotic groundlayer species are present in very low abundance.					

Table 4.11 PCT 1330 vegetation zones 1-5 description

Vegetation Zones 1-6 – Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion (PCT 1330)	
Survey effort	Nine plots/transects within the pipeline disturbance footprint: Vegetation zone 1 – DNG: one plot Vegetation zone 2 – Fragment: one plot Vegetation zone 3 – Intact: two plots Vegetation zone 4 – Shrubland: one plot Vegetation zone 5 – Sparse: four plots
Condition description	**Vegetation zone 1 – DNG:** Across all sub-regions, the community is largely in Derived Native Grassland state due to a lack of both canopy and midstorey species and the presence of key characteristic groundlayer species. Remnant patches of PCT 1330 were recorded adjacent to mapped areas of DNG. **Vegetation zone 2 – Fragment**: This vegetation zone comprises small patches of native canopy species and a groundlayer that is either largely exotic or of very low condition; ie largely bare ground and occasional disturbance tolerant native species. Planted trees occur in this vegetation zone. **Vegetation zone 3 – Intact:** This vegetation zone comprises moderate to high quality grassy woodland possessing both a native canopy and a native species dominated groundlayer. A native midstorey layer is present in some areas. **Vegetation zone 4 – Shrubland:** This vegetation zone occurs in a derived native shrubland state due to a lack of canopy species and the presence of key characteristic groundlayer and midlayer species. **Vegetation zone 5 – Sparse:** This vegetation zone comprises grassy woodland with a sparse canopy, possessing both a native canopy and a native groundlayer. A native midstorey layer is present in some areas.
Characteristic species used for identification of PCT	According to the NSW VIS Classification Version 2.1, the canopy layer species recorded in vegetation zones 2, 3 and 5 align with the dominant canopy species listed as characteristic of this PCT including Blakely's Red Gum, Yellow Box and Apple Box. Native midstorey was largely lacking among mapped areas of PCT 1330, although Silver Wattle was recorded in vegetation zone 3. However, the midstorey species listed for PCT 1330 under the NSW VIS Classification Version 2.1 are Peach Heath and Urn. These two species were not present along the pipeline corridor, even in ungrazed areas. 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 78% for PCT 1330.

Table 4.11 PCT 1330 vegetation zones 1-5 description

Vegetation Zones 1-6 – Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion (PCT 1330)	
Justification of evidence used to identify the PCT	Revision of vegetation mapping by EMM (2020) 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 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 Peach Heath and Urn Heath. These two species were not present at along the pipeline corridor, even in adjacent, ungrazed areas; • 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 *78*% for PCT 1330 versus 73% for PCT 277 (PCT 1330 provides: 33% canopy species, 100% midstorey species, 100% groundlayer species; PCT 277 provides: 56% canopy species, 100% midstorey species and 62% groundlayer species); and • the State-wide Vegetation Map (OEH 2018) maps PCT 1330 in the pipeline corridor. As the PCT with the pipeline corridor shares greater alignment with key species (in the midstorey and 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.

Table 4.11 PCT 1330 vegetation zones 1-5 description

Vegetation Zones 1-6 – Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion (PCT 1330)	
Status	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: • 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. The National Recovery Plan for White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland (DECCW 2010a) 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 meet the condition thresholds outlined in DEH (2006): • have a predominantly native understorey (i.e. more than 50% of the perennial ground layer must comprise native species); and • be part of a patch 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 hectare. The above criteria were applied to all patches of the PCT in the study area. The following vegetation zones were associated with the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland as listed under the EPBC Act as described below: • Fragments –only patches 2 ha or greater in size, with a predominantly native understorey and with either natural regeneration of the overstorey species or an average of 20 or more mature trees per hectare. • DNG – only patches 0.1 ha or greater which contain 12 or more native understorey species (excluding grasses) including one or more identified important species; typically, in areas with low grazing intensity such as road reserves. • Shrubland – only patches 0.1 ha or greater which contain 12 or more native understorey species (excluding grasses) including one or more identified important species; typically found in roadside areas with a low to moderate level of previous soil disturbance. • Intact – all patches of this zone that are greater than 0.1 ha.
Estimate of percent cleared value of PCT across its distribution	95%

Photograph 4.5 Photograph of PCT - 1330 Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion in a fragmented condition

b PCT 277 - Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion

PCT 277 is best described as dry grassy woodland. PCT 277 is largely in Intact or Moderate condition across the pipeline corridor with small patches of derived native grassland (DNG) recorded. Table 4.12 provides a description of the vegetation zones attributed to this PCT.

Table 4.12 PCT 277 vegetation zones 1-3 description

Vegetation Zones 1-3 - Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion (PCT 277)

PCT ID	277					
Common name	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion					
Condition class	Vegetation zone 1 – DNG Vegetation zone 2 – Intact Vegetation zone 3 – Moderate					
Extent within pipeline disturbance footprint (inclusive of indirect impacts)	**Vegetation zone**	**Orange**	**Bathurst (southern option)**	**Bathurst (northern option)**	**Hill End**	**Capertee Uplands**
	DNG	1.60 ha	0.44 ha	0.48 ha	-	-
	Intact	1.10 ha	-		-	-
	Moderate	3.84 ha	0.02 ha	0.02 ha	-	-
	Total	**6.54 ha**	**0.46 ha**	**0.50 ha**	-	-
Description	The canopy is co-dominated by Yellow Box, Apple Box, Red Stringybark (*Eucalyptus macrorhyncha*) and Bundy. In some vegetation zones, the canopy is sparse or absent. The midstorey is largely absent. Three native shrub species occur occasionally within the moderate vegetation zone, being Tree Violet (*Melicytus dentatus*). Dolly Bush (*Cassinia aculeata*) and a Bush Pea (*Pultenaea microphylla*). A small amount of Hoary Guinea Flower (*Hibbertia obtusifolia*) were also observed. The groundlayer is co-dominated by native and exotic grass species. Dominant native species are Crowfoot (*Erodium* sp.), Weeping Grass, Kangaroo Grass (*Themeda Australia*), Dock (*Rumex sp.*). Wallaby Grass, Corkscrew Speargrass. Red Grass and Snowgrass. Dominant exotic species are a Medic (*Medicago sp.*), Rat's Tail Fescue (*Vulpia myuros*), Lesser Canary Grass (*Phalaris minor*), False Hairgrass (*Pentaschistis airoides*), *Phalaris* spp*.,* White Clover, Capeweed (*Arctotheca calendula*), Catsear and a clover (*Trifolium* sp.).					
Survey effort	Seven plots/transects within the pipeline disturbance footprint: • Vegetation zone 1 – DNG: one plot • Vegetation zone 2 – Intact: one plot • Vegetation zone 3 – Moderate: five plots					
Condition description	**Vegetation zone 1 – DNG:** Across both IBRA sub-regions, a small amount of PCT 277 Derived Native Grassland is present due to a lack of both canopy and midstorey species and the presence of key characteristic groundlayer species. Remnant patches of PCT 277 were recorded adjacent to mapped areas of DNG. **Vegetation zone 2 – Intact:** A small amount of intact woodland occurs, comprising key canopy and groundlayer species and very few exotic species and no high-threat weeds. **Vegetation zone 3 – Moderate:** Over half of the mapped PCT 277 was in moderate condition due to the presence of key canopy and groundlayer species and relatively low levels of exotic species and disturbance.					

Table 4.12 PCT 277 vegetation zones 1-3 description

Vegetation Zones 1-3 - Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion (PCT 277)	
Characteristic species used for identification of PCT	According to the NSW VIS Classification Version 2.1, the canopy, mid and ground-storey layer species recorded in vegetation zones 3 align with the dominant canopy species listed as characteristic of this PCT including Yellow Box and Blakely's Red Gum. Native midstorey was largely lacking among mapped areas of PCT 277, however one midstorey species listed for PCT 277 under the NSW VIS Classification Version 2.1, Hoary Guinea Flower was observed. A second key characteristic midstorey species, Silver Wattle, was not observed within mapped PCT 277. Although the ground-story description under the NSW VIS Classification Version 2.1 for PCT 277 is vast, a number of key groundlayer species matched including Kangaroo Grass, Snow Grass and Red Grass.
Justification of evidence used to identify the PCT	Revision of vegetation mapping by EMM (2020) considered several closely related PCTs (1330, 654 and 277). This PCT was mapped as PCT 277 (over PCT 1330 or 654): • 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 Hoary Guinea Flower in the shrub storey (which is present on site). The midstorey species listed for PCT 1330 are Peach Heath and Urn Heath. These two species were not present at McPhillamys; and • although the ground-storey description under the NSW VIS Classification Version 2.1 for PCT 277 is vast, several key groundlayer species matched the PCT, including Kangaroo Grass, Snow Grass and Red Grass. As the PCT on site shares greater alignment with key species (in the mid and ground layer) and the description of landscape and soils could fit any PCT, PCT 277 was found to be a better fit based on alignment with regional mapping.

Table 4.12 PCT 277 vegetation zones 1-3 description

Vegetation Zones 1-3 - Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion (PCT 277)	
Status	PCT 277 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: • 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. The National Recovery Plan for White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland (DECCW 2010a) 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: • 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. The above criteria were applied to all patches of the PCT in the study area. The following vegetation zones were associated with the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland as listed under the EPBC Act as described below: • Moderate– patches 0.1 ha or greater with a diverse native understorey (ie 12 or more native understorey species (excluding grasses) including one or more identified important species), and patches greater than 2 ha that do not have a diverse native understorey but have either natural regeneration of the overstorey species or an average of 20 or more mature trees per hectare. • Intact – all patches of this zone that are greater than 0.1 ha.
Estimate of percent cleared value of PCT across its distribution	95%

Photograph 4.6 PCT 277 - Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion in a derived native grassland condition

c PCT 1093 - Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands; South Eastern Highlands Bioregion

PCT 1093 is best described as low, dry open woodland. PCT 1093 is largely in Intact or Shrubland condition in the pipeline corridor with small patches of DNG and Fragment condition vegetation recorded. Table 4.13 provides a description of the vegetation zones attributed to this PCT.

Table 4.13 PCT 1093 vegetation zones 1-4 description

Vegetation Zones 1-4 - Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands; South Eastern Highlands Bioregion (PCT 1093)	
PCT ID	1093
Common name	Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands; South Eastern Highlands Bioregion
Condition class	Vegetation zone 1 – Fragment Vegetation zone 2 – Intact Vegetation zone 3 – Shrubland Vegetation zone 4 - DNG

Table 4.13 PCT 1093 vegetation zones 1-4 description

Vegetation Zones 1-4 - Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands; South Eastern Highlands Bioregion (PCT 1093)

Extent within pipeline disturbance footprint (inclusive of indirect impacts)	**Vegetation zone**	**Orange**	**Bathurst (southern option)**	**Bathurst (northern option)**	**Hill End**	**Capertee Uplands**
	DNG	-	-	-	0.22 ha	-
	Fragment	-	-	-	0.35 ha	0.89 ha
	Intact	0.54 ha	-	-	0.95 ha	5.28 ha
	Shrubland	-	-	-	0.58 ha	2.57 ha
	Total	**0.54 ha**	-	-	**2.10 ha**	**8.75 ha**
Description	The canopy contains Brittle Gum, Broad-leaved Peppermint (*Eucalyptus dives*), Silver Wattle, Bundy, Apple Box, Bundy and Red Stringybark. In some vegetation zones, the canopy is sparse or absent. The midstorey is dominated by native species comprising Sifton Bush, Green Wattle (*Acacia deanei*), Pink Five-Corners (*Styphelia triflora*), Honeypots (*Acrotriche serrulata*), Small Red-leaved Wattle (*Acacia nana*), Cherry Ballart (*Exocarpos cupressiformis*), Daphne Heath, Cough Bush (*Cassinia laevis*) and Tea-tree (*Leptospermum sp.*) and Native Cranberry (*Astroloma humifusum*). A small amount of Blackberry complex was observed. The groundlayer varies from predominantly native to co-domination with exotic grasses. Dominant native species are Spiny-headed Mat-rush, Wattle Matt-rush (*Lomandra filiformis*), *Poa sp., Snowgrass* and a Lovegrass (*Eragrostis sp.*), Red-anther Wallaby Grass (*Rytidosperma pallidum*), Forest Hedgehog Grass (*Echinopogon ovatus*), Snowgrass, Corkscrew speargrass, Kidney Weed (*Dichondra repens*), Red Grass, Kangaroo Grass and Purple Wiregrass (*Aristida ramosa*). Dominant exotic species are *Phalaris sp.* and Common Crowfoot.					
Survey effort	Seven plots/transects within the pipeline disturbance footprint: • Vegetation zone 1 – Fragment: two plots • Vegetation zone 2 – Intact: six plots • Vegetation zone 3 – Shrubland: three plots • Vegetation zone 4 – DNG: one plot					
Condition description	**Vegetation zone 1 – Fragment:** A small portion of PCT 1093 is mapped as fragmented due to the occurrence of numerous small patches of native woodland interspersed with exotic groundlayer species. These patches are too small to be mapped as intact and too large to be considered exotic. **Vegetation zone 2 – Intact:** The majority of PCT 1093 within the pipeline corridor was mapped as being intact due to the occurrence of a native canopy, native groundlayer, and optionally a native midstorey. **Vegetation zone 3 – Shrubland:** Part of PCT 1093 was mapped as Shrubland due to the absence of canopy species, the dominance of key midstorey species and the presence of key groundlayer species. **Vegetation zone 4 – DNG:** Across the Hill End IBRA sub-regions, a small amount of PCT 1093 Derived Native Grassland is present due to a lack of both canopy and midstorey species and the presence of key characteristic groundlayer species. Remnant patches of PCT 1093 were recorded adjacent to mapped areas of DNG.					

Table 4.13 PCT 1093 vegetation zones 1-4 description

Vegetation Zones 1-4 - Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands; South Eastern Highlands Bioregion (PCT 1093)	
Characteristic species used for identification of PCT	According to the NSW VIS Classification Version 2.1, the canopy, mid and groundstorey layer species recorded across the vegetation zones aligned with the dominant species listed as characteristic of this PCT. Key characteristic canopy species included Red Stringybark, Brittle gum, Broad-leaved peppermint and Bundy and were present amongst the majority of mapped PCT 1093. Although the description of midstorey and groundstorey species for PCT 1093 is brief, and has few identifying species, two key species were identified with mapped areas of PCT 1093 being Daphne Heath and Wattle Matt-rush.
Justification of evidence used to identify the PCT	Revision of vegetation mapping by EMM (2020) considered several closely related PCTs (1330, 1390 and 277). This PCT was mapped as PCT 1093 (over PCT 1330 or 277): • Canopy species observed were unique and key identifying species (over PCT 1330 or 277) for PCT 1093 including Red Stringybark and Brittle gum. • in the midstorey, no species are listed for PCT 654, while PCT 1093 has Daphne Heath in the shrub storey (which is present on site). The midstorey species listed for PCT 1330 are Peach Heath and Urn Heath. These two species were not present at McPhillamys; and • although the groundstorey description under the NSW VIS Classification Version 2.1 for PCT 1093 is brief, and has few identifying species, on key identifying species, Wattle Matt-rush, was observed in areas mapped as PCT 1093. As the PCT on site shares greater alignment with key species (predominantly in canopy layer) and the description of landscape and soils could fit any PCT, PCT 1093 was found to be a better fit based on alignment with regional mapping.
Status	Commonwealth EPBC Act: not listed NSW BC Act: not listed
Estimate of percent cleared value of PCT across its distribution	61%

Photograph 4.7 PCT 1093 - Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands; South Eastern Highlands Bioregion in an intact confition

d PCT 1191 - Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion

PCT 1191 is a dry open woodland. PCT 1191 varies in condition from DNG to intact patches. Table 4.14 provides a description of the vegetation zones attributed to this PCT.

Table 4.14 PCT 1191 vegetation zones 1-5 description

Vegetation Zones 1-5 Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion (PCT 1191)	
PCT ID	1191
Common name	Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion
Condition class	Vegetation zone 1 – DNG Vegetation zone 2 - Fragments Vegetation zone 3 – Intact Vegetation zone 4 – Shrubland Vegetation zone 5 – Sparse

Table 4.14 PCT 1191 vegetation zones 1-5 description

Vegetation Zones 1-5 Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion (PCT 1191)

Extent within pipeline disturbance footprint (inclusive of indirect impacts)	**Vegetation zone**	**Orange**	**Bathurst (southern option)**	**Bathurst (northern option)**	**Hill End**	**Capertee Uplands**
	DNG	-	-	-	-	0.34 ha
	Fragment	-	-	-	0.12 ha	0.27 ha
	Intact	-	-	-	0.60 ha	3.61 ha
	Shrubland	-	-	-	-	1.25 ha
	Sparse	-	-	-	0.32 ha	0.26 ha
	Total	-	-	-	**1.03 ha**	**5.74 ha**
Description	The canopy ranges from absent to intact. Where a canopy is present it contains one or a combination of Snow Gum (*Eucalyptus pauciflora*), Ribbon Gum. Silver Wattle, Black Sally (*Eucalyptus stellulata*) and Inland Scribbly Gum (*Eucalyptus rossii*), Red Stringybark, Mountain Gum (*Eucalyptus dalrympleana*) or Blackwood (*Acacia melanoxylon*). The midstorey ranges from absent to dense cover. Where a midstorey is present, it contains Blackthorn (*Bursaria spinosa*), Native Raspberry (*Rubus parvifolius*), Cough Bush, Myrtle Teatree (*Leptospermum myrtifolium*), Sifton Bush, a Bitter-pea (*Daviesia* sp.), and Hoary Guinea Flower. The groundlayer is largely dominated by native grasses and forbs but contains exotic grasses in some areas. It contains Snowgrass, Plantain (*Plantago* sp.), River Tussock. The dominant native groundstorey species comprises River Tussock and groundstorey is dominated by the exotic species *Phalaris sp.* The groundstorey is largely dominated by native species including Red-anther Wallaby Grass, Corkscrew speargrass, Native Geranium (*Geranium solanderi*), Snowgrass, Bidgee-widgee (*Acaena novae-zelandiae*), Sheep's Burr (*Acaena echinata*), Plantain, River Tussock, Kangaroo Grass and Snowgrass, Long-leaved Wallaby Grass (*Rytidosperma longifolium*), Weeping Grass. Small patches of exotic Blackberry complex were recorded. Exotic species with the highest cover and abundance are Cocksfoot, Smooth Catsear and White Clover.					
Survey effort	Seven plots/transects within the pipeline disturbance footprint: • Vegetation zone 1 – DNG: one plot • Vegetation zone 2 – Fragments: one plot • Vegetation zone 3 – Intact: three plots • Vegetation zone 4 – Shrubland: one plot • Vegetation zone 5 – Sparse: one plot					

Table 4.14 PCT 1191 vegetation zones 1-5 description

Vegetation Zones 1-5 Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion (PCT 1191)	
Condition description	**Vegetation zone 1 – DNG:** Across the Capertee Uplands IBRA sub-regions, a small amount of PCT 1191 Derived Native Grassland is present due to the predominate lack of both canopy and midstorey species and the presence of key characteristic groundlayer species. Remnant patches of PCT 1191 were recorded adjacent to mapped areas of DNG. **Vegetation zone 2 – Fragments:** A small portion of PCT 1191 is mapped as fragmented due to the occurrence of numerous small patches of native woodland interspersed with exotic groundlayer species. These patches are too small to be mapped as intact and too large to be considered exotic. **Vegetation zone 3 – Intact:** The majority of PCT 1191 within the pipeline corridor was mapped as being Intact due to the occurrence of a native canopy, native groundlayer, and optionally a native midstorey. **Vegetation zone 4 – Shrubland:** A small proportion of PCT 1093 was mapped as Shrubland due to the absence of canopy species, the dominance of key midstorey species and the presence of key groundlayer species. **Vegetation zone 5 – Sparse:** A small proportion of PCT 1093 was mapped as Shrubland due to the presence of sparse canopy species, as well as a native groundlayer and optionally a native midstorey. The canopy species are too sparse to be considered woodland, and too dense to be considered grassland. The distinction is valuable for delineating threatened species potential habitat.
Characteristic species used for identification of PCT	According to the NSW VIS Classification Version 2.1, the canopy, mid and groundstorey layer species recorded across the vegetation zones aligned with the dominant species listed as characteristic of this PCT. Key characteristic canopy species included Snow Gum, Black Sally and Ribbon Gum and were present amongst the majority of mapped PCT 1191. Few characteristic midstorey and groundlayer species were recorded. Of note are the key characteristic species Silver Wattle and Weeping Grass, which were common in the mid and ground layers respectively.
Justification of evidence used to identify the PCT	Revision of vegetation mapping by EMM (2020) considered two closely related PCTs (1191 and 1197). This PCT was mapped as PCT 1191 (over PCT 1197) because: • Canopy species observed were unique and the key identifying species for PCT 1191 (over PCT 1197) included black Sally and Ribbon Gum. Note that midstorey and groundstorey species observed fitted both PCT 1191 and 1197 and thus could not be used a key-distinguishing factors. As the PCT on site shares greater alignment with key species (predominantly in canopy layer) and the description of landscape and soils could fit any PCT, PCT 1191 was found to be a better fit based on alignment with regional mapping.
Status	NSW BC Act: PCT 1191 represents Werriwa Tablelands Cool Temperate Grassy Woodland in the South Eastern Highlands and South East Corner Bioregions as it: • occurs within the area bounded by the eastern fall of the Great Dividing Range between Golspie in the north and Majors Creek in the south, Marulan in the east as Marulan and Carwoola in the west. • ranges in structure from woodland to low open woodland. • is characterised by a sparse to very sparse tree stratum dominated by *E. pauciflora* either in monospecific stands or with *E. rubida* as a co-dominant. • has an understorey comprised of native herbs and grasses. Commonwealth EPBC Act: not listed

Table 4.14 PCT 1191 vegetation zones 1-5 description

Vegetation Zones 1-5 Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion (PCT 1191)

Estimate of percent cleared value of PCT across its distribution	95%

Photograph 4.8 PCT 1191 - Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion in a sparse condition

e PCT 1197 - Snow Gum - Mountain Gum tussock grass-herb forest of the South Eastern Highlands Bioregion

PCT 1197 is tall, moist forest with highly variable condition. PCT 1197 is largely in intact condition, however it was also recorded in DNG, shrubland and sparse condition. Table 4.15 provides a description of the vegetation zones attributed to this PCT.

Table 4.15 PCT 1197 vegetation zones 1-4 description

Vegetation Zones 1-4 Snow Gum - Mountain Gum tussock grass-herb forest of the South Eastern Highlands Bioregion (PCT 1197)

PCT ID	1197					
Common name	Snow Gum - Mountain Gum tussock grass-herb forest of the South Eastern Highlands Bioregion					
Condition class	Vegetation zone 1 – DNG Vegetation zone 2 – Intact Vegetation zone 3 – Shrubland Vegetation zone 4 – Sparse					
Extent within pipeline disturbance footprint (inclusive of indirect impacts)	**Vegetation zone**	**Orange**	**Bathurst (southern option)**	**Bathurst (northern option)**	**Hill End**	**Capertee Uplands**
	DNG	-	-	-	0.16 ha	-
	Intact	-	-	-	4.43 ha	-
	Shrubland	-	-	-	0.35 ha	-
	Sparse	-	-	-	0.28 ha	-
	Total	-	-	-	**5.22 ha**	-
Description	The canopy varies in density from absent to intact. Where a canopy is present, it contains Mountain Gum, Inland Scribbly Gum, Snow Gum, Blackwood and Silver Wattle, Broad-leaved Peppermint and Yellow Box. A small number of exotic Radiata Pine were also observed where the route traverses pine forest. The midstorey varies from absent to dense. Where a native midstorey is present, it contains Sifton Bush, Hoary Guinea Flower, *Acrotriche spp.,* Dwarf Cherry (*Exocarpos strictus*). *Dillwynia spp.,* Narrow Leaf Bitter-pea (*Daviesia corymbosa*). Patches of exotic Blackberry complex and English Broom (*Cytisus scoparius*) were also observed. The groundlayer is largely dominated by the native species and contains *Poa spp.*, Wallaby grass and Weeping Grass. Bracken (*Pteridium esculentum*), Snowgrass, Spiny-headed Mat-rush and River Tussock. Kangaroo Grass*,* Weeping Grass, River Tussock and a Wallaby Grass Exotic species in the groundlayer comprise Catsear, Scarlet Pimpernel (*Lysimachia arvensis*), *Phalaris spp.* And Lamb's Tongues (*Plantago lanceolata*).					
Survey effort	Seven plots/transects within the pipeline disturbance footprint: • Vegetation zone 1 – DNG: one plot • Vegetation zone 2 – Intact: four plots • Vegetation zone 3 – Shrubland: one plot • Vegetation zone 4 – Sparse: one plot					

Table 4.15 PCT 1197 vegetation zones 1-4 description

Vegetation Zones 1-4 Snow Gum - Mountain Gum tussock grass-herb forest of the South Eastern Highlands Bioregion (PCT 1197)	
Condition description	**Vegetation zone 1 – DNG:** Across the Hill End IBRA sub-regions, a small amount of PCT 1197 Derived Native Grassland is present due to the predominate lack of both canopy and midstorey species and the presence of key characteristic groundlayer species. Remnant patches of PCT 1197 were recorded adjacent to mapped areas of DNG. **Vegetation zone 2 – Intact:** The majority of PCT 1191 comprises moderate to high quality grassy woodland possessing both a native canopy and a native groundlayer, and optionally a native midstorey layer. **Vegetation zone 3 – Shrubland:** A small proportion of PCT 1197 was mapped as Shrubland due to the absence of canopy species, the dominance of key midstorey species and the presence of key groundlayer species. **Vegetation zone 4 – Sparse:** A small proportion of PCT 1197 was mapped as Shrubland due to the presence of sparse canopy species, as well as a native groundlayer and optionally a native midstorey. The canopy species are too sparse to be considered woodland, and too dense to be considered grassland. The distinction is valuable for delineating threatened species potential habitat.
Characteristic species used for identification of PCT	According to the NSW VIS Classification Version 2.1, the canopy, mid and groundstorey layer species recorded across the vegetation zones aligned with the dominant species listed as characteristic of this PCT. Key characteristic canopy species present in the impact area included Snow Gum and Mountain Gum. Although the description of mid-storey species had few identifying species, all four identifying species were observed in vegetation mapped as being PCT 1197 including Silver wattle, Blackwood, Dwarf Cherry and Hoary Guinea Flower. A number of key groundstorey species were also recorded including Weeping grass, Hoary Guinea Flower and Snowgrass.
Justification of evidence used to identify the PCT	Revision of vegetation mapping by EMM (2020) considered two closely related PCTs (1191 and 1197). This PCT was mapped as PCT 1197 (over PCT 1191): • Canopy species associations observed were unique and a key identifying aspect for PCT 1197 (over PCT 1191) including both Snow Gum and Mountain Gum; • in the midstorey, the presence of all four key identifying species for PCT 1197 were observed; and • several key groundstorey species for PCT 1197 were observed including Weeping grass, Hoary Guinea Flower and Snowgrass As the PCT on site shares greater alignment with key species (predominantly in canopy layer) and the description of landscape and soils could fit any PCT, PCT 1197 was found to be a better fit based on alignment with regional mapping.
Status	NSW BC Act: PCT 1197 represents Werriwa Tablelands Cool Temperate Grassy Woodland in the South Eastern Highlands and South East Corner Bioregions as it: • occurs within the area bounded by the eastern fall of the Great Dividing Range between Golspie in the north and Majors Creek in the south, Marulan in the east as Marulan and Carwoola in the west. • ranges in structure from woodland to low open woodland. • is characterised by a sparse to very sparse tree stratum dominated by *E. pauciflora* either in monospecific stands or with *E. rubida* as a co-dominant. • has an understorey comprised of native herbs and grasses. Commonwealth EPBC Act: not listed
Estimate of percent cleared value of PCT across its distribution	90%

Photograph 4.9 **PCT 1197 - Snow Gum - Mountain Gum tussock grass-herb forest of the South Eastern Highlands Bioregion in a shrubland condition**

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

PCT 727 is a tall forest with a shrubby understorey. PCT 727 varies from Intact to Shrubland condition in the pipeline corridor. Table 4.16 provides a description of the vegetation zones attributed to this PCT.

Table 4.16 PCT 727 vegetation zones 1- 2 description

Vegetation Zones 1-2 Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion (PCT 727)

PCT ID	727					
Common name	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion					
Condition class	Vegetation zone 1 – Intact Vegetation zone 2 – Shrubland					
Extent within pipeline disturbance footprint (inclusive of indirect impacts)	**Vegetation zone**	**Orange**	**Bathurst (southern option)**	**Bathurst (northern option)**	**Hill End**	**Capertee Uplands**
	Intact	-	-	-	0.29 ha	-
	Shrubland	-	-	-	0.46 ha	-
	Total	-	-	-	**0.75 ha**	-
Description	The canopy is contains several native species including Brown Barrel (*Eucalyptus fastigata*), Brittle Gum, Broad-leaved Peppermint, Blackwood and Mountain Gum. Some exotic Radiata Pine was also observed. The midstorey is largely dominated by native species including Broad-leaved Hickory (*Acacia falciformis*), Tall Everlasting (*Coronidium elatum*), Dolly Bush, Broad-leaved Hickory, Hoary Guinea Flower and Common Beard-heath (*Leucopogon virgatus*). Patches of exotic Blackberry complex and English Broom were also recorded. The groundstorey is largely dominated by native species including Bracken, Weeping Grass, Spiny-headed Mat-rush, Snowgrass, Button Everlasting (*Coronidium scorpioides*) and Red-anther Wallaby Grass. Few exotic groundstorey species were observed.					
Survey effort	Four plots/transects within the pipeline disturbance footprint: • Vegetation zone 1 – Intact: two plots • Vegetation zone 2 – Shrubland: two plots					
Condition description	**Vegetation zone 1 – Intact:** The community comprises moderate to high quality grassy woodland possessing both a native canopy and a native groundlayer, and optionally a native midstorey layer. **Vegetation zone 2 – Shrubland:** The community is largely in a derived native shrubland state due to a lack of canopy species and the presence of key characteristic groundlayer and midlayer species.					
Characteristic species used for identification of PCT	According to the NSW VIS Classification Version 2.1, the canopy, mid and groundstorey layer species recorded across the vegetation zones aligned with the dominant species listed as characteristic of this PCT. Key characteristic canopy species included Broad-leaved Peppermint and Brittle Gum. These two species were present amongst the majority of mapped PCT 727. Although the description of mid-storey species had few identifying species, Broad-leaved Hickory was recorded across vegetation mapped as PCT 727, a key midstorey species. Hoary Guinea Flower, Red-anther Wallaby Grass and Snowgrass are key groundstorey species identified across PCT 727.					

Table 4.16 PCT 727 vegetation zones 1- 2 description

Vegetation Zones 1-2 Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion (PCT 727)	
Justification of evidence used to identify the PCT	Revision of vegetation mapping by EMM (2020) considered PCT 727 unique from other mapped PCTs within the pipeline corridor: • Canopy species observed were unique and the key identifying species for PCT 727 included Broad-leaved Peppermint and Brittle Gum; and • midstorey and groundstorey species observed fitted both PCT 727 As the PCT on site shares greater alignment with key species (predominantly in canopy layer) and the description of landscape and soils could fit any PCT, PCT 727 was found to be a better fit based on alignment with regional mapping.
Status	Commonwealth EPBC Act: not listed NSW BC Act: not listed
Estimate of percent cleared value of PCT across its distribution	50%

Photograph 4.10 PCT 727 - Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion in an intact condition

g Non-native vegetation

The main components of non-native vegetation are areas of pine forest and exotic grassland which are dissected several times along the length of the pipeline. Most of the pine forests are present on the eastern side of the pipeline, which becomes dominated with agricultural land as it moves to the west. Exotic grasslands were in a highly disturbed state, meaning that they could not be reliably assigned to a PCT. Table 4.17 provides a description of non-native vegetation in the pipeline corridor.

Table 4.17 Non-native vegetation description

Non-native vegetation	
PCT ID	N/A
Common name	Non-native vegetation
Condition class	N/A
Extent within pipeline disturbance footprint	140.78 ha (all IBRA subregions with northern option) 160.64 ha (all IBRA subregions with southern option)
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 Sheep Sorrel, Patterson's Curse, St. Johns Wart, Smooth Catsear and Blackberry. 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	16 plots
Condition description	The community is in very poor to poor condition with a high cover of exotic pasture grasses and weeds. Areas of non-native vegetation are dominated by pine trees where the pipeline intersects state forests.
Characteristic species used for identification of PCT	N/A
Justification of evidence used to identify the PCT	N/A
Status	Commonwealth EPBC Act: not listed NSW BC Act: not listed
Estimate of percent cleared value of PCT across its distribution	N/A

Photograph 4.11 Photograph of non-native vegetation

h Vegetation integrity scores

Six PCTs occur in the pipeline corridor, with 23 vegetation zones mapped and or entered into the credit calculator (varying with occurrence across the IBRA subregions) to determine vegetation integrity scores. A summary of the vegetation integrity score for each vegetation zone is provided in Table 4.18.

VI scores for intact vegetation zones were typically high and varied between 51.3 and 71.8. Intact zones of PCT 1330 and 277 recorded were lower, ranging from 19.2 to 27.8. Shrubland zones had typically higher VI scores, ranging from 44 to 51.2, with a lower VI score (28.2) recorded for PCT 1197.

Sparse vegetation zones had low VI scores ranging from 20.1 to 26.8, with a lower score (3.4) recorded for PCT 1191. Fragments had moderate (31.6) to high (60.9) VI scores, with a lower score recorded for PCT 1330. DNG zones varied from low (3.5 for PCT 277) to moderate (43.4 for PCT 1093).

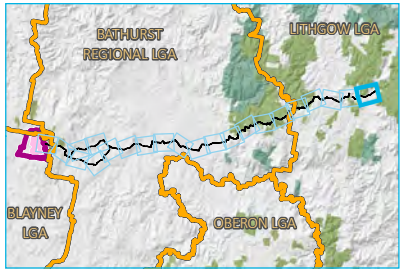
Comparatively lower VI scores were recorded in some grassy woodland vegetation zones (PCT 1330_Intact, 277_Intact, 1197_Shrubland, 1330_Sparse, 277_DNG) may be indicative of the drought conditions experienced when earlier plots were undertaken in 2018/2019. Some grass species and forbs may not have been present during these dry conditions, compared with when vegetation zones were revised for this report, following higher rainfall.

Table 4.18 Vegetation zone summary – pipeline development

PCT ID	PCT name	Vegetation zone	Orange IBRA subregion		Bathurst IBRA subregion (southern option)		Bathurst IBRA subregion (northern option)		Hill End IBRA subregion		Capertee Uplands IBRA subregion	
			Extent in pipeline disturbance footprint (ha)	Vegetation integrity score	Extent in pipeline disturbance footprint (ha)	Vegetation integrity score	Extent in pipeline disturbance footprint (ha)	Vegetation integrity score	Extent in pipeline disturbance footprint (ha)	Vegetation integrity score	Extent in pipeline disturbance footprint (ha)	Vegetation integrity score
277	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	DNG	1.60	3.5	0.44	3.5	0.48	3.5	-	-	-	-
		Intact	1.10	27.8	-	-		-	-	-	-	-
		Moderate	3.84	31.6	0.02	31.6	0.02	31.6	-	-	-	-
727	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion (LA124)	Intact	-	-	-	-	-	-	0.29	79.0	-	-
		Shrubland	-	-	-	-	-	-	0.46	44.1	-	-
1093	Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion	DNG	-	-	-	-	-	-	0.22	43.4	-	-
		Intact	0.54	77.1	-	-	-	-	0.35	77.1	0.89	77.1
		Fragments	-	-	-	-	-	-	0.95	60.9	5.28	60.9
		Shrubland	-	-	-	-	-	-	0.58	44.0	2.57	44
1191	Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion	DNG	-	-	-	-	-	-	-	-	0.34	32.6

Table 4.18 Vegetation zone summary – pipeline development

PCT ID	PCT name	Vegetation zone	Orange IBRA subregion		Bathurst IBRA subregion (southern option)		Bathurst IBRA subregion (northern option)		Hill End IBRA subregion		Capertee Uplands IBRA subregion	
			Extent in pipeline disturbance footprint (ha)	Vegetation integrity score	Extent in pipeline disturbance footprint (ha)	Vegetation integrity score	Extent in pipeline disturbance footprint (ha)	Vegetation integrity score	Extent in pipeline disturbance footprint (ha)	Vegetation integrity score	Extent in pipeline disturbance footprint (ha)	Vegetation integrity score
		Intact	-	-	-	-	-	-	0.12	51.3	0.27	51.3
		Sparse	-	-	-	-	-	-	0.60	3.4	3.61	3.4
		Fragments	-	-	-	-	-	-	-	31.6	1.25	31.6
		Shrubland	-	-	-	-	-	-	0.32	-	0.26	64.5
1197	Snow Gum - Mountain Gum tussock grass-herb forest of the South Eastern Highlands Bioregion	DNG	-						0.16	20.4		
		Intact	-	-	-	-	-	-	4.43	71.8	-	-
		Sparse	-	-	-	-	-	-	0.35	26.8	-	-
		Shrubland	-	-	-	-	-	-	0.28	28.2	-	-
1330	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion (LA276)	DNG	-	-	18.88	17.4	10.21	17.4	1.77	17.4	-	-
		Intact	-	-	0.76	19.2	1.66	19.2	0.85	19.2	-	-
		Shrubland	-	-	0.07	51.2	0.07	51.2	0.13	51.2	-	-
		Sparse	-	-	4.83	20.1	4.65	20.1	0.21	20.1	-	-
		Fragments	-	-	-	-	0.35	3.8	0.11	3.8	-	-



KEY

- Plot location (OzArk, 2019)
- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Pipeline underbore section
- Non-native vegetation (Northern option: 372.82 ha Southern option: 364.79 ha)

Plant community types (PCTs)

PCT 1093 | Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion

- Shrubland

PCT 1191 | Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion

- Shrubland
- Sparse
- Derived native grassland

\\Emmsvr1\emm\Jobs\2018\I180395 - Regis McPhillamys EIS\GIS\02 Maps\ BDAR\BDAR008 PipelinePCTsDDP 20200818 02.mxd 18/08/2020

Source: EMM (2020); Regis Resources (2020); ESRI (2020); OzArk (2019); DFSI (2017)

0 250 500 m

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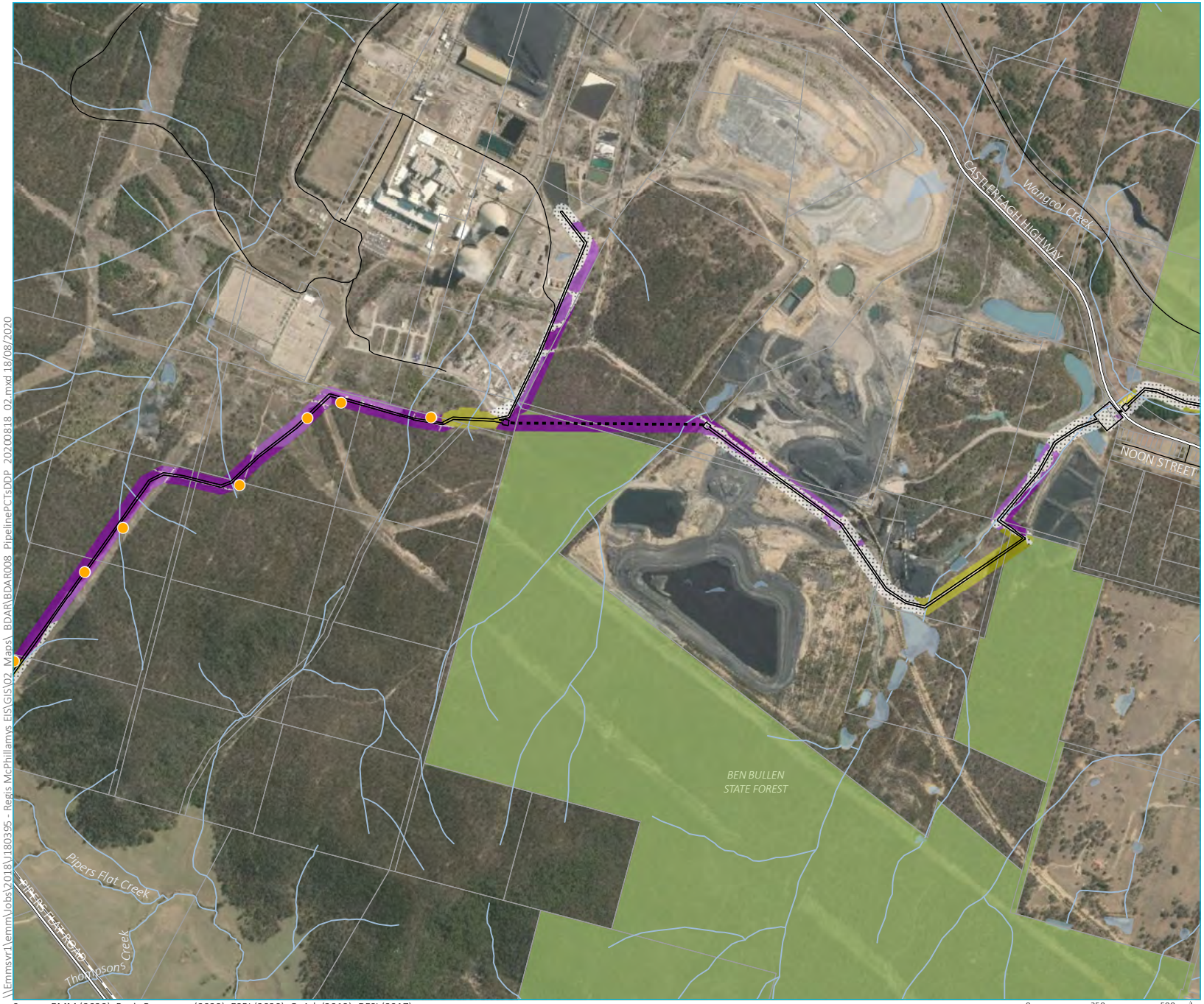
N

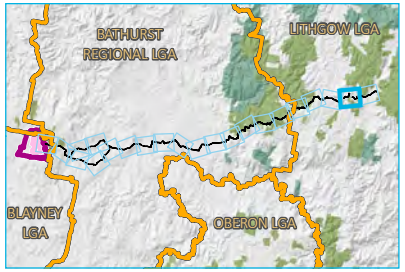
Plant community types – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 4.2.a

REGIS RESOURCES LTD

EMM creating opportunities





KEY

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Project application area

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- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Pipeline underbore section
- Non-native vegetation (Northern option: 372.82 ha Southern option: 364.79 ha)

Plant community types (PCTs)

PCT 1093 | Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion

- Intact
- Shrubland
- Fragments

PCT 1191 | Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion

- Intact
- Shrubland
- Derived native grassland

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Source: EMM (2020); Regis Resources (2020); ESRI (2020); OzArk (2019); DFSI (2017)

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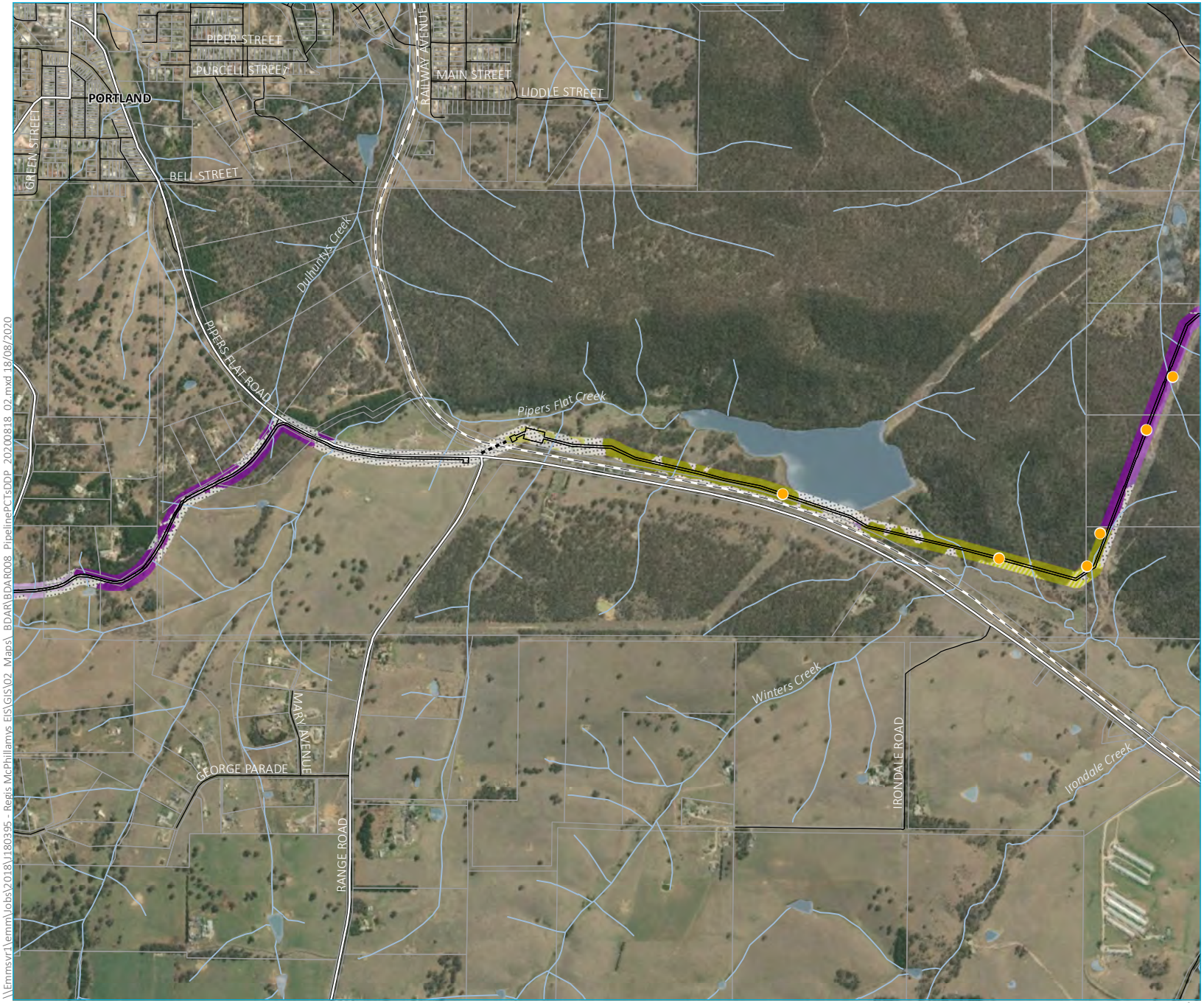
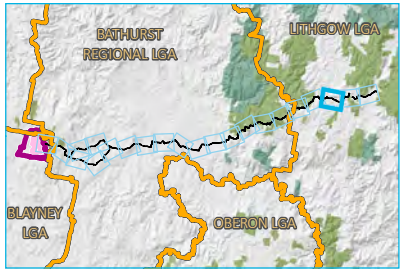
Plant community types – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 4.2.b

REGIS RESOURCES LTD

EMM creating opportunities





KEY

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- Rail line
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- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Pipeline underbore section
- Non-native vegetation (Northern option: 372.82 ha Southern option: 364.79 ha)

Plant community types (PCTs)

PCT 1093 | Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion

- Intact
- Shrubland
- Fragments

PCT 1191 | Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion

- Intact
- Fragments
- Derived native grassland

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Source: EMM (2020); Regis Resources (2020); ESRI (2020); OzArk (2019); DFSI (2017)

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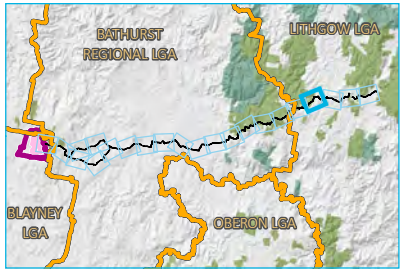
Plant community types – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 4.2.c

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Plot location (EMM, 2020)
- Plot location (OzArk, 2019)
- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Non-native vegetation (Northern option: 372.82 ha Southern option: 364.79 ha)

Plant community types (PCTs)

PCT 1093 | Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion

- Intact
- Shrubland
- Fragments

PCT 1191 | Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion

- Intact
- Fragments

PCT 1197 | Snow Gum - Mountain Gum tussock grass-herb forest of the South Eastern Highlands Bioregion

- Sparse
- Derived native grassland

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Source: EMM (2020); Regis Resources (2020); ESRI (2020); OzArk (2019); DFSI (2017)

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Plant community types – pipeline development

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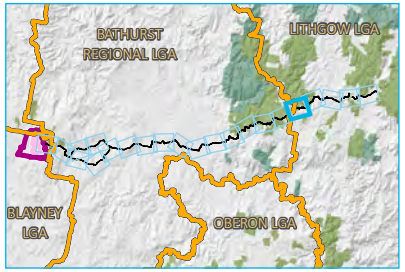
Biodiversity development assessment report
Figure 4.2.d

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Plot location (EMM, 2020)
- Plot location (OzArk, 2019)
- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Non-native vegetation (Northern option: 372.82 ha Southern option: 364.79 ha)

Plant community types (PCTs)

PCT 1191 | Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion

- Sparse

PCT 1197 | Snow Gum - Mountain Gum tussock grass-herb forest of the South Eastern Highlands Bioregion

- Intact
- Shrubland
- Sparse
- Derived native grassland

Source: EMM (2020); Regis Resources (2020); ESRI (2020); OzArk (2019); DFSI (2017)

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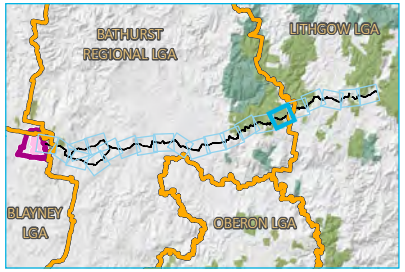
Plant community types – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 4.2.e

REGIS RESOURCES LTD

EMM creating opportunities



KEY

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- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Non-native vegetation (Northern option: 372.82 ha Southern option: 364.79 ha)

Plant community types (PCTs)

PCT 1191 | Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion

- Intact
- Sparse

PCT 1197 | Snow Gum - Mountain Gum tussock grass-herb forest of the South Eastern Highlands Bioregion

- Intact

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Source: EMM (2020); Regis Resources (2020); ESRI (2020); OzArk (2019); DFSI (2017)

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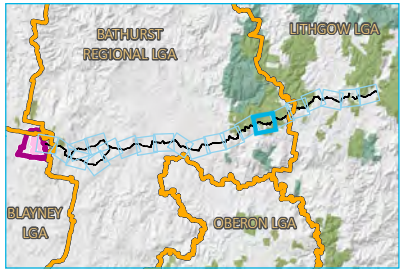
Plant community types – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 4.2.f

REGIS RESOURCES LTD

EMM creating opportunities



KEY

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- Minor road
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- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Non-native vegetation (Northern option: 372.82 ha Southern option: 364.79 ha)

Plant community types (PCTs)

PCT 1191 | Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion

- Intact
- Sparse

PCT 1197 | Snow Gum - Mountain Gum tussock grass-herb forest of the South Eastern Highlands Bioregion

- Intact

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Source: EMM (2020); Regis Resources (2020); ESRI (2020); OzArk (2019); DFSI (2017)

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Plant community types – pipeline development

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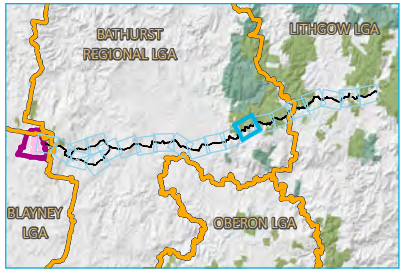
Biodiversity development assessment report
Figure 4.2.g

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Plot location (EMM, 2020)
- Plot location (OzArk, 2019)
- Major road
- Minor road
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Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Non-native vegetation (Northern option: 372.82 ha Southern option: 364.79 ha)

Plant community types (PCTs)

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

- Intact
- Shrubland

PCT 1093 | Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion

- Intact

PCT 1197 | Snow Gum - Mountain Gum tussock grass-herb forest of the South Eastern Highlands Bioregion

- Intact
- Shrubland

\\Emmsvr1\emm\Jobs\2018\I180395 - Regis McPhillamys EIS\GIS\02 Maps\ BDAR\BDAR008 PipelinePCTsDDP 20200818 02.mxd 18/08/2020

Source: EMM (2020); Regis Resources (2020); ESRI (2020); OzArk (2019); DFSI (2017)

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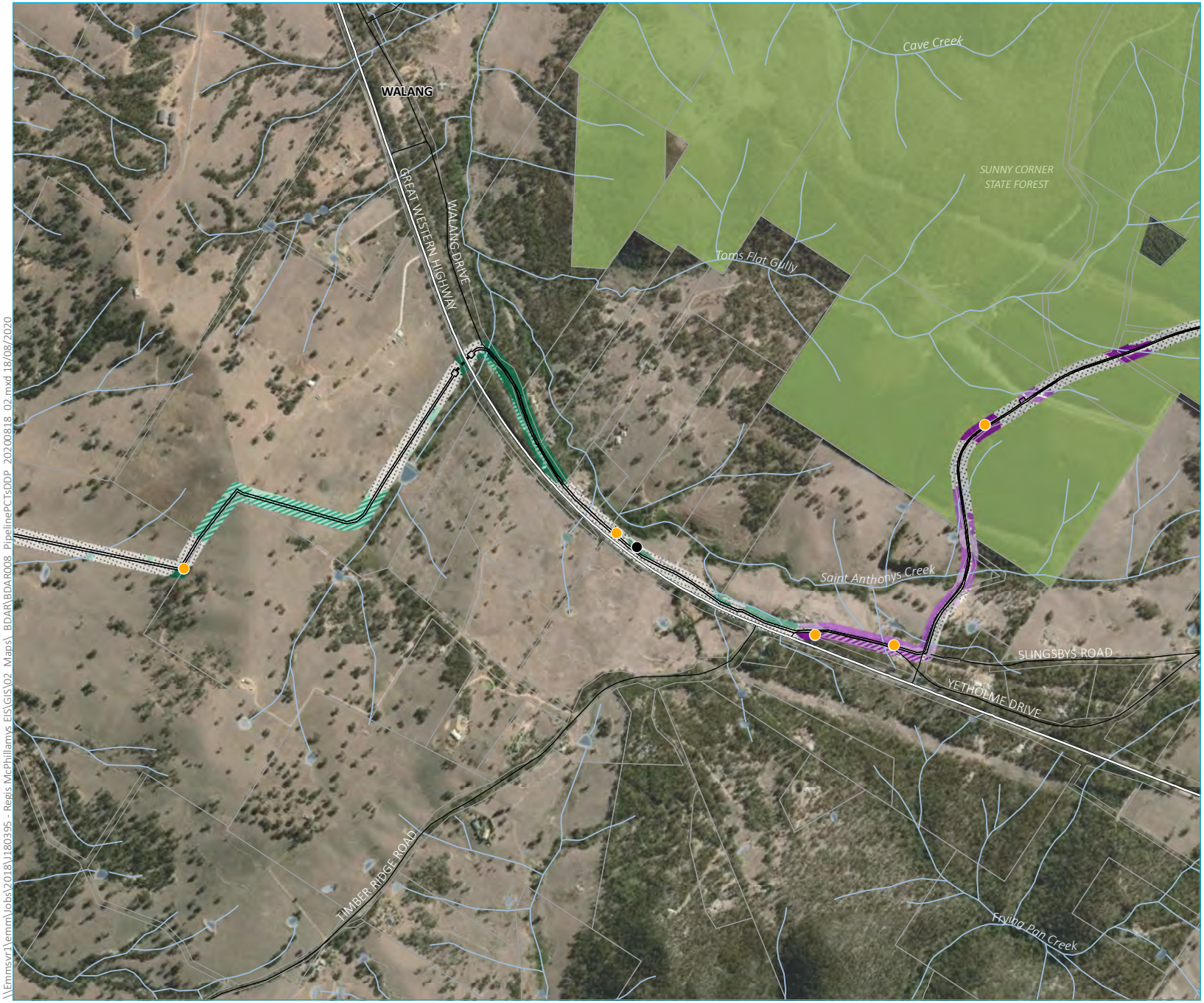
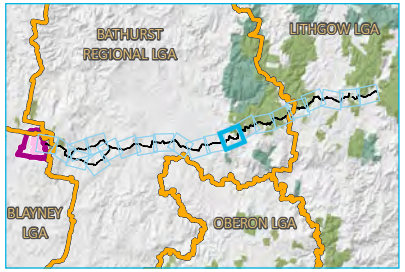
Plant community types – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 4.2.h

REGIS RESOURCES LTD

EMM creating opportunities





KEY

- Plot location (EMM, 2020)
- Plot location (OzArk, 2019)
- Major road
- Minor road
- Watercourse/drainage line
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- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Pipeline underbore section
- Non-native vegetation (Northern option: 372.82 ha Southern option: 364.79 ha)

Plant community types (PCTs)

PCT 1093 | Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion

- Intact
- Shrubland
- Fragments
- Derived native grassland

PCT_1330 | Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

- Intact
- Shrubland
- Fragments
- Sparse
- Derived native grassland

\\Emmsvr1\emm\Jobs\2018\I180395 - Regis McPhillamys EIS\GIS\02 Maps\ BDAR\BDAR008 PipelinePCTsDDP 20200818 02.mxd 18/08/2020

Source: EMM (2020); Regis Resources (2020); ESRI (2020); OzArk (2019); DFSI (2017)

0 250 500 m

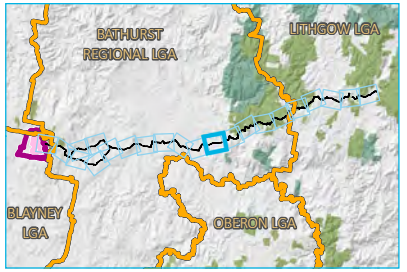
GDA 1994 NSW Lambert

Plant community types – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 4.2.i

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Plot location (OzArk, 2019)
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- Cadastral boundary
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- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
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- Direct impact management zone
- Non-native vegetation (Northern option: 372.82 ha Southern option: 364.79 ha)

Plant community types (PCTs)

PCT_1330 | Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

- Shrubland
- Sparse
- Derived native grassland

\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02 Maps\ BDAR\BDAR008 PipelinePCTsDDP 20200818 02.mxd 18/08/2020

Source: EMM (2020); Regis Resources (2020); ESRI (2020); OzArk (2019); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

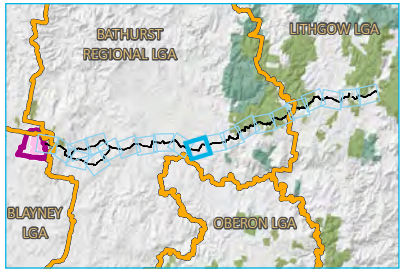
N

Plant community types – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 4.2.j

REGIS RESOURCES LTD

EMM creating opportunities



KEY

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Project application area

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- Pipeline underbore section
- Non-native vegetation (Northern option: 372.82 ha Southern option: 364.79 ha)

Plant community types (PCTs)

PCT_1330 | Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

- Sparse

\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02 Maps\ BDAR\BDAR008 PipelinePCTsDDP 20200818 02.mxd 18/08/2020

Source: EMM (2020); Regis Resources (2020); ESRI (2020); OzArk (2019); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

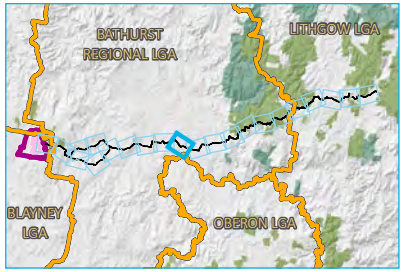
N

Plant community types – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 4.2.k

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Major road
- Minor road
- Watercourse/drainage line
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- NPWS reserve
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- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
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- Direct impact management zone
- Non-native vegetation (Northern option: 372.82 ha Southern option: 364.79 ha)

\\Emmsvr1\emm\Jobs\2018\I180395 - Regis McPhillamys EIS\GIS\02 Maps_BDAR\BDAR008 PipelinePCTsDDP 20200818 02.mxd 18/08/2020

Source: EMM (2020); Regis Resources (2020); ESRI (2020); OzArk (2019); DFSI (2017)

0 250 500 m

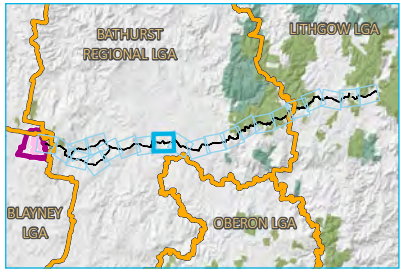
GDA 1994 NSW Lambert

Plant community types – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 4.2.l

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Plot location (OzArk, 2019)
- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Pipeline underbore section
- Non-native vegetation (Northern option: 372.82 ha Southern option: 364.79 ha)

Plant community types (PCTs)

PCT_1330 | Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

- Sparse
- Derived native grassland

\\Emmsvr1\emm\Jobs\2018\I180395 - Regis McPhillamys EIS\GIS\02 Maps\ BDAR\BDAR008 PipelinePCTsDDP 20200818 02.mxd 18/08/2020

Source: EMM (2020); Regis Resources (2020); ESRI (2020); OzArk (2019); DFSI (2017)

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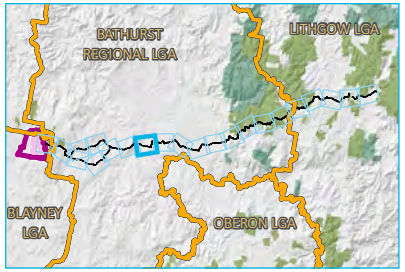
Plant community types – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 4.2.m

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Plot location (OzArk, 2019)
- Rail line
- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Pipeline underbore section
- Non-native vegetation (Northern option: 372.82 ha Southern option: 364.79 ha)

Plant community types (PCTs)

PCT_1330 | Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

- Intact
- Sparse
- Derived native grassland

\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02 Maps\ BDAR\BDAR008 PipelinePCTsDDP 20200818 02.mxd 18/08/2020

Source: EMM (2020); Regis Resources (2020); ESRI (2020); OzArk (2019); DFSI (2017)

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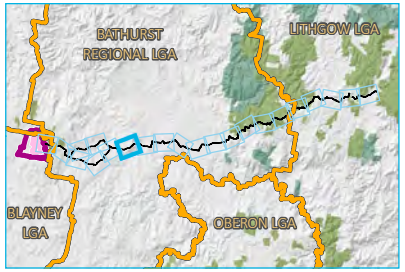
Plant community types – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 4.2.n

REGIS RESOURCES LTD

EMM creating opportunities



KEY

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- Major road
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- Waterbody
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- Non-native vegetation (Northern option: 372.82 ha Southern option: 364.79 ha)

Plant community types (PCTs)

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- Intact
- Sparse
- Derived native grassland

Source: EMM (2020); Regis Resources (2020); ESRI (2020); OzArk (2019); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

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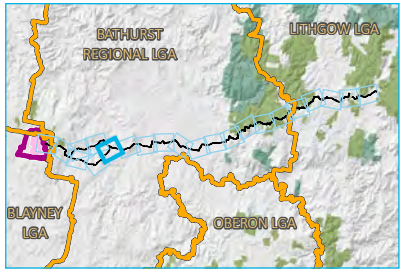
Plant community types – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 4.2.o

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Plot location (OzArk, 2019)
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- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

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- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Non-native vegetation (Northern option: 372.82 ha Southern option: 364.79 ha)

Plant community types (PCTs)

PCT_1330 | Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

- Intact
- Sparse
- Derived native grassland

\\Emmsvr1\emm\Jobs\2018\I180395 - Regis McPhillamys EIS\GIS\02 Maps\ BDAR\BDAR008 PipelinePCTsDDP 20200818 02.mxd 18/08/2020

Source: EMM (2020); Regis Resources (2020); ESRI (2020); OzArk (2019); DFSI (2017)

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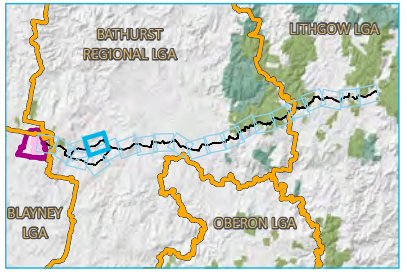
GDA 1994 NSW Lambert

Plant community types – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 4.2.p

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Plot location (EMM, 2020)
- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
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- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Non-native vegetation (Northern option: 372.82 ha Southern option: 364.79 ha)

Plant community types (PCTs)

PCT_1330 | Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

- Intact
- Fragments
- Sparse
- Derived native grassland

Source: EMM (2020); Regis Resources (2020); ESRI (2020); OzArk (2019); DFSI (2017)

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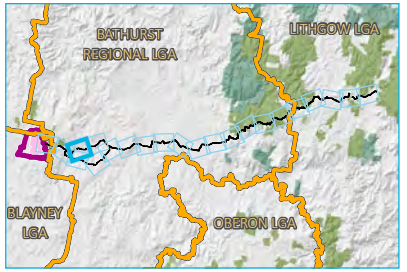
Plant community types – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 4.2.q

REGIS RESOURCES LTD

EMM creating opportunities



KEY

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- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Non-native vegetation (Northern option: 372.82 ha Southern option: 364.79 ha)

Plant community types (PCTs)

PCT_1330 | Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

- Intact
- Fragments
- Sparse
- Derived native grassland

Source: EMM (2020); Regis Resources (2020); ESRI (2020); OzArk (2019); DFSI (2017)

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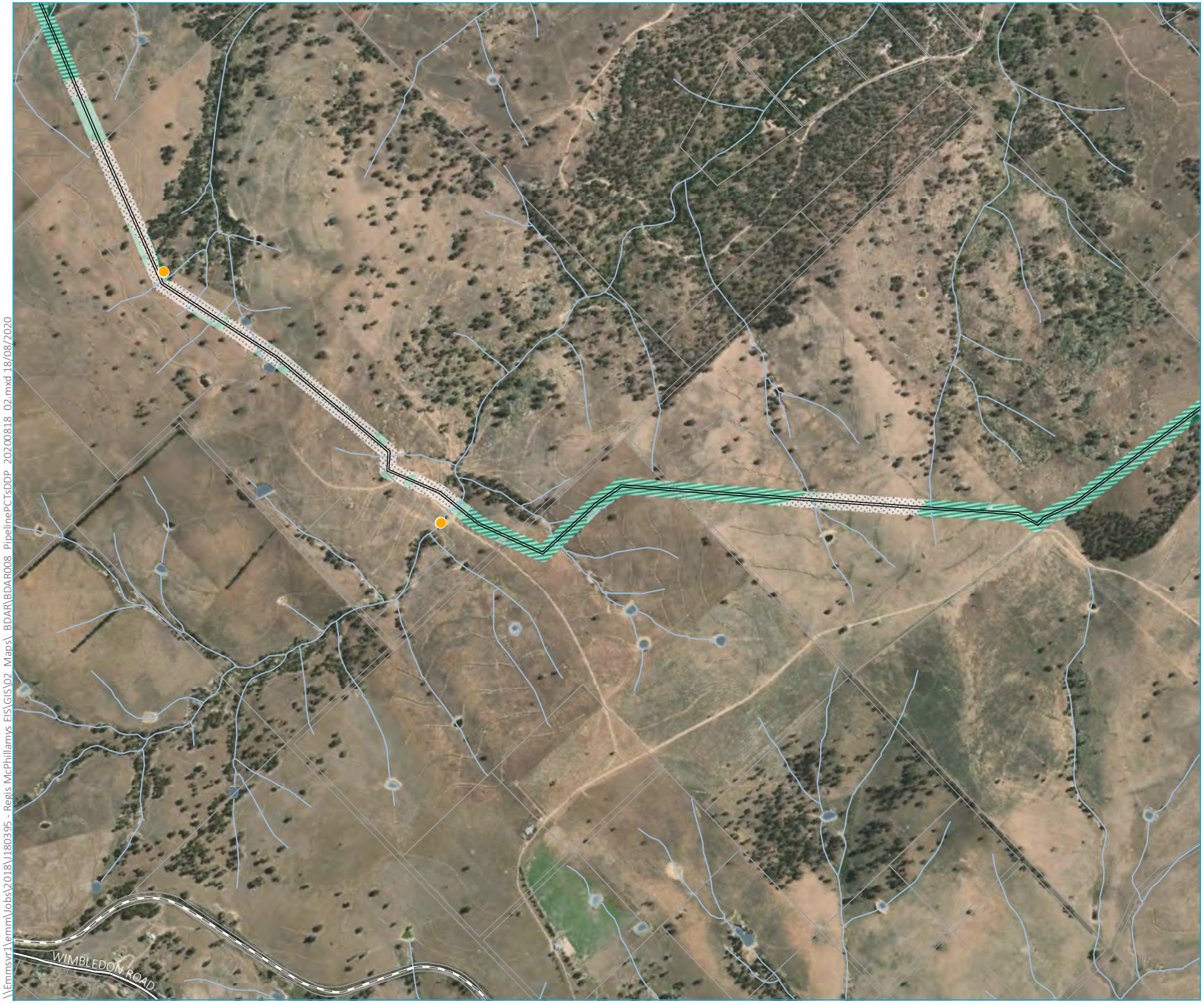
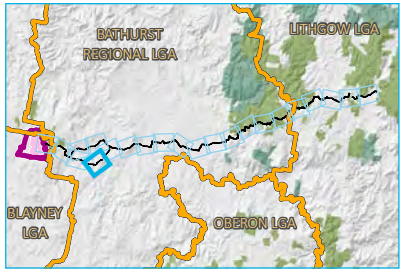
Plant community types – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 4.2.r





KEY

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- Major road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
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- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Non-native vegetation (Northern option: 372.82 ha Southern option: 364.79 ha)

Plant community types (PCTs)

PCT_1330 | Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

- Intact
- Sparse
- Derived native grassland

Source: EMM (2020); Regis Resources (2020); ESRI (2020); OzArk (2019); DFSI (2017)

0 250 500 m

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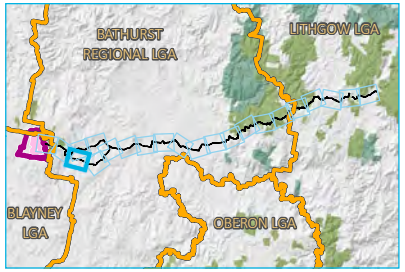
Plant community types – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 4.2.s

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Plot location (OzArk, 2019)
- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Pipeline underbore section
- Non-native vegetation (Northern option: 372.82 ha Southern option: 364.79 ha)

Plant community types (PCTs)

PCT 277 | Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion

- Intact
- Moderate
- Derived native grassland

PCT_1330 | Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

- Intact
- Fragments
- Sparse
- Derived native grassland

\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02 Maps\ BDAR\BDAR008 PipelinePCTsDDP 20200818 02.mxd 18/08/2020

Source: EMM (2020); Regis Resources (2020); ESRI (2020); OzArk (2019); DFSI (2017)

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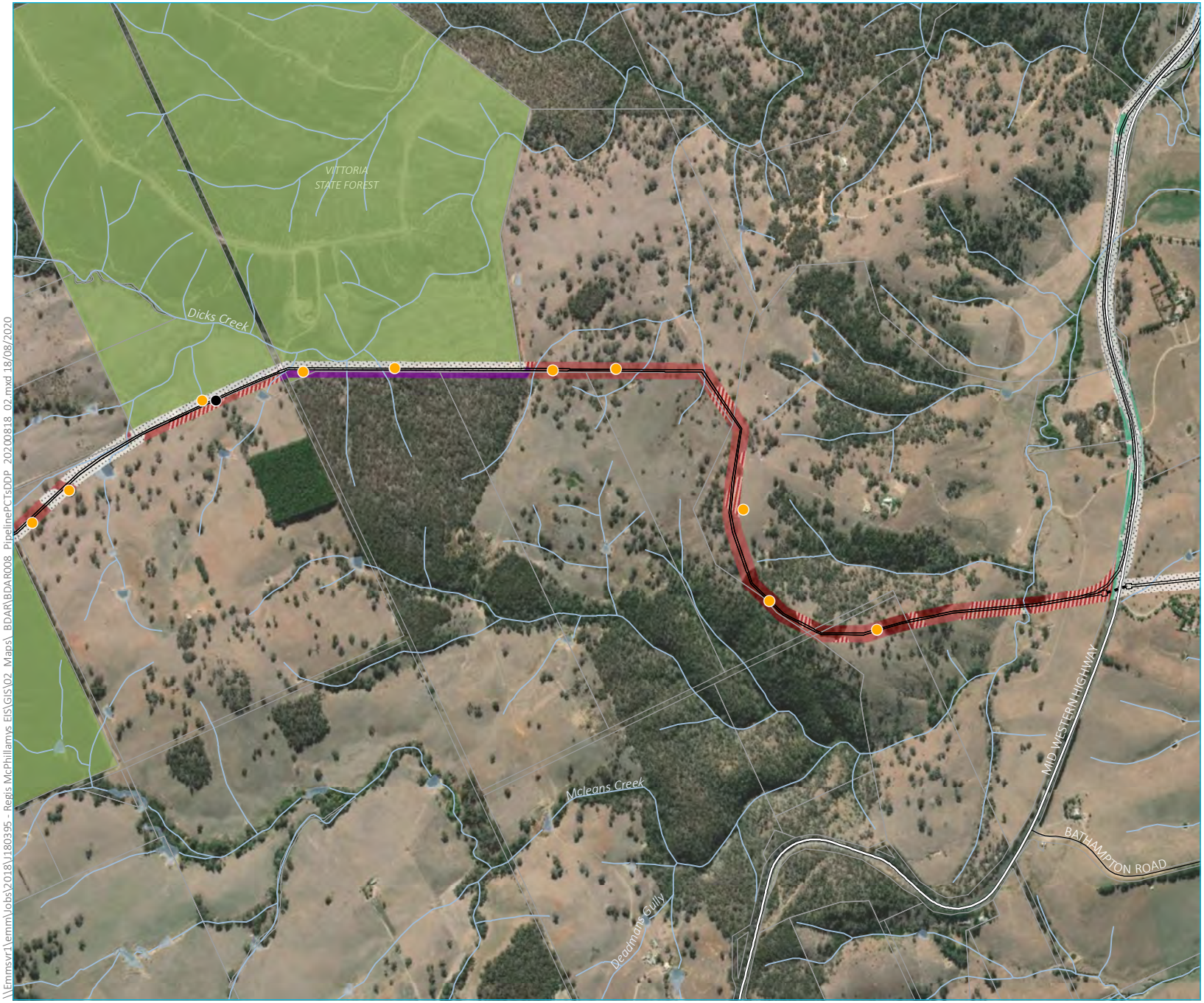
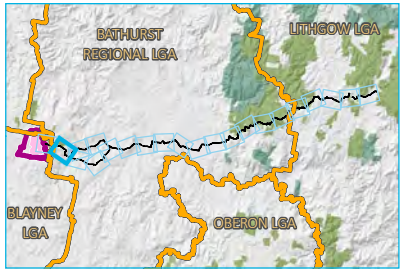
Plant community types – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 4.2.t

REGIS RESOURCES LTD

EMM creating opportunities





KEY

- Plot location (EMM, 2020)
- Plot location (OzArk, 2019)
- Major road
- Minor road
- Watercourse/drainage line
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Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Pipeline underbore section
- Non-native vegetation (Northern option: 372.82 ha Southern option: 364.79 ha)

Plant community types (PCTs)

PCT 277 | Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion

- Intact
- Moderate
- Derived native grassland

PCT 1093 | Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion

- Intact

PCT_1330 | Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

- Fragments
- Sparse
- Derived native grassland

\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02 Maps\ BDAR\BDAR008 PipelinePCTsDDP 20200818 02.mxd 18/08/2020

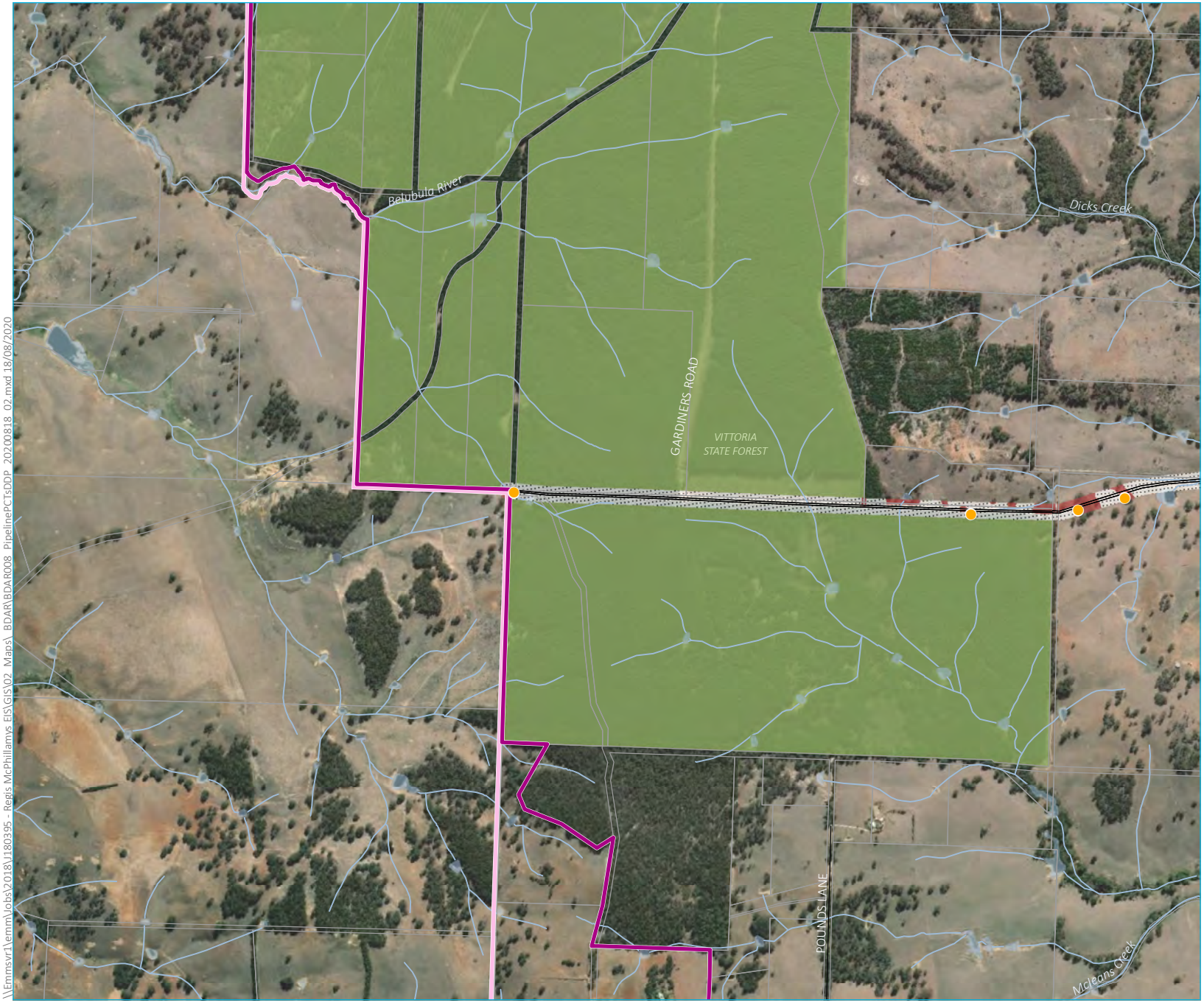
Source: EMM (2020); Regis Resources (2020); ESRI (2020); OzArk (2019); DFSI (2017)

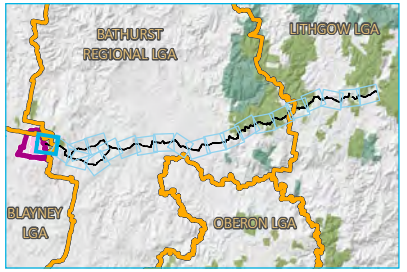
0 250 500 m

GDA 1994 NSW Lambert

Plant community types – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 4.2.u





KEY

- Plot location (OzArk, 2019)
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Non-native vegetation (Northern option: 372.82 ha Southern option: 364.79 ha)

Plant community types (PCTs)

PCT 277 | Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion

- Moderate

\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02 Maps\ BDAR\BDAR008 PipelinePCTsDDP 20200818 02.mxd 18/08/2020

Source: EMM (2020); Regis Resources (2020); ESRI (2020); OzArk (2019); DFSI (2017)

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GDA 1994 NSW Lambert

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Plant community types – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 4.2.v

REGIS RESOURCES LTD

EMM creating opportunities

5 Threatened species

5.1 Methods

5.1.1 Identification of threatened species for assessment

i Ecosystem credit species

Predicted species for further assessment were identified in accordance with Step 1 to 2 (Section 6.4.1.2 to 6.4.1.16) of the BAM.

ii Species credit species

Candidate species for further assessment were identified in accordance with Step 1 to 2 (Section 6.4.1.2 to 6.4.1.16) of the BAM.

5.1.2 Habitat assessment

In accordance with Step 3 (Section 6.4.1.17 to 6.4.1.19 of the BAM), a field assessment of habitat constraints and microhabitats was undertaken in the field to determine the suitability of habitat within the project application area for:

- predicted species (ecosystem credit species associated with recorded PCTs, predicted by the Biodiversity Assessment Method Calculator (BAMC));
- candidate species (species credit species associated with specific geographic and landscape feature constraints); and
- species predicted to occur by the EPBC Act Protected Matters Search Tool.

i Ecosystem credit species

Twenty-nine ecosystem credit species were predicted for the mine development, while 37 species were predicted for the pipeline development (Section 5.2.2). In accordance with the BAM, ecosystem credit species do not require targeted survey, and therefore their presence was assumed where suitable habitat was present.

ii Species credit species

A list of candidate species requiring targeted surveys (Section 5.1.3) was generated. These candidate species are described in the following sections.

a Mine development

Four candidate threatened flora species were assessed for the mine development, comprising:

- *Acacia meiantha*;
- Black Gum (*Eucalyptus aggregata*);
- Silky Swainson-pea (*Swainsona sericea*); and

- Small Purple-pea (*Swainsona recta*).

Twelve candidate threatened fauna species were assessed for the mine development, comprising:

- Barking Owl (*Ninox connivens*);
- Brush-tailed Phascogale (*Phascogale tapoatafa*);
- Bush Stone-curlew (*Burhinus grallarius*);
- Eastern Pygmy Possum (*Cercartetus nanus*);
- Gang-gang Cockatoo (*Callocephalon fimbriatum*);
- Koala (*Phascolarctos cinereus*);
- Little Eagle (*Hieraeetus morphnoides*);
- Pink-tailed Worm Lizard (*Aprasia parapulchella*);
- Powerful Owl (*Ninox strenua*);
- Southern Myotis (*Myotis macropus*);
- Squirrel Glider (*Petaurus norfolcensis*); and
- White-bellied Sea-eagle (*Haliaeetus leucogaster*).

b Pipeline development

Fifteen candidate threatened flora species were assessed for the pipeline development, comprising:

- *Acacia meiantha*;
- Austral Toadflax (*Thesium australe*);
- Basalt Peppercress (*Lepidium hyssopifolium*);
- Black Gum;
- Bynoe's Wattle (*Acacia bynoeana*);
- Capertee Stringybark (*E. cannonii*);
- Clandulla Geebung (*Persoonia marginata*);
- Flockton Wattle (*Acacia floctoniae*);
- *Grevillea divaricata*;
- Robertson's Peppermint (*Eucalyptus robertsonii* subsp. *hemispherica*);
- Silky Swainson-pea (*Swainsona sericea)*;

- Silver-leaved Stringybark (*E. pulverulenta*);
- Small Purple-pea;
- Tarengo Leek Orchid (*Prasophyllum petilum*); and
- *Veronica blakelyi*.

Fifteen candidate threatened fauna species were assessed in total for the pipeline development, comprising:

- Barking Owl;
- Bathurst Copper Butterfly (*Paralucia spinifera*);
- Booroolong Frog (*Litoria booroolongensis*);
- Brush-tailed Phascogale;
- Brush-tailed Rock Wallaby (*Petrogale penicillata*);
- Bush Stone-curlew;
- Eastern Pygmy Possum;
- Gang-gang Cockatoo;
- Koala;
- Large-eared Pied Bat (*Chalinolobus dwyeri*);
- Little Eagle;
- Masked Owl (*Tyto novaehollandiae*);
- Pink-tailed Worm Lizard;
- Powerful Owl; and
- Squirrel Glider.

Not all candidate species were predicted or assessed in each IBRA subregion. Rather, species are present in one or more IBRA subregions, with a separate assessment conducted for each.

5.1.3 Targeted candidate species surveys

i Mine development – flora

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 from 18-22 February 2019 in accordance with OEH *Guide to surveying threatened plants* (OEH 2020b) using transects spaced at 10 m intervals (Figure 5.1). These surveys primarily targeted the Hoary Sunray. 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 provided correspondence to BCD on 11 February 2019 seeking confirmation 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 listed PCTs. However, they noted that no transects were conducted in the northernmost part of the mine 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). It was noted this area contains suitable habitat for the Silky Swainson-pea. BCD advised that the exclusion of species within this PCT will need to be fully justified in the BDAR. In this regard, and to address the feedback provided by BCD, targeted surveys of Silky Swainson-pea were conducted in PCT 766 on 10 September 2019. The area was traversed via thirty-three transects spaced ten metres apart (Figure 5.1).

ii Mine development – fauna

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

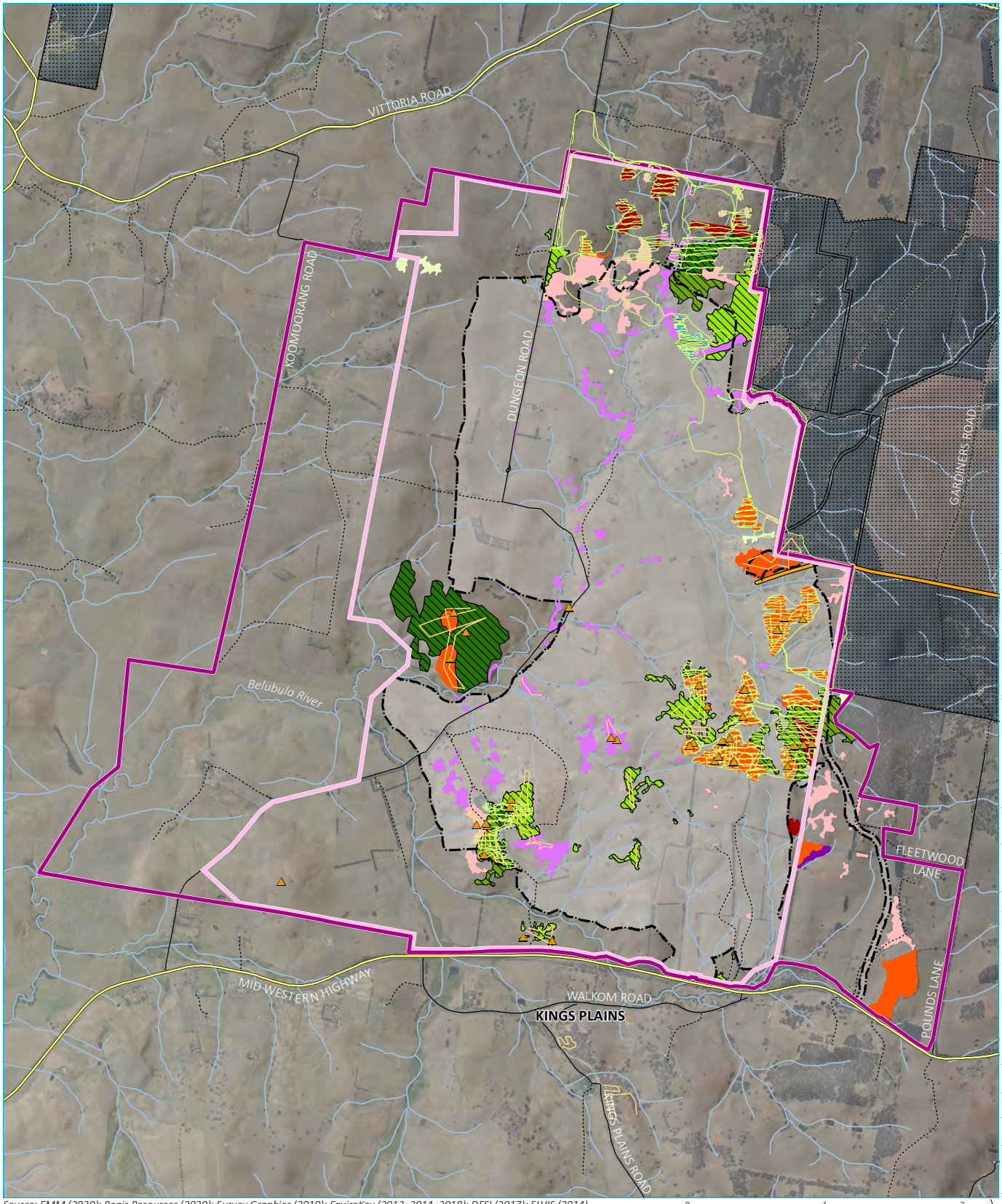
- 21 – 25 May 2013;
- 9 – 14 September 2013;
- 23 – 24 October 2013;
- 6 – 7 November 2013;
- 20 – 26 November 2013; and
- 24 – 30 March 2014.

Fauna surveys consisted of habitat assessments, bird surveys (Regent Honeyeater) including diurnal surveys (Gang-gang Cockatoo and White-bellied Sea-eagle), funnel traps (small terrestrial fauna), Elliot trapping (Eastern Pygmy-possum and Squirrel Glider), echolocation call recording (or Anabat, for Microchiropteran bats), camera trapping (Eastern Pygmy-possum), call playback (Masked Owl, Barking Owl, Squirrel Glider, Bush Stone Curlew and Koala), nocturnal searches and spotlighting (Squirrel Glider and Koala), reptile searches and tile-grid surveys (Pink-tailed Worm Lizard), frog searches (herpetological surveys), track and scat searches (Koala) (EnviroKey 2017). General surveys were also completed including rapid assessments of riparian condition (RARC) and platypus surveys.

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. Survey methods using included cameras, Elliott trapping, Koala SAT surveys and nocturnal transects.

A targeted survey was also completed for the Powerful Owl (*Ninox strenua*) over three days and three nights between 27 and 29 August 2019. Diurnal surveys to identify suitable hollows were conducted by meandering searches in PCT's 727 and 951, which are considered suitable to support breeding habitat for the species. Hollows identified during diurnal surveys were also surveyed after dark using call playback.

Fauna survey methods are described further below and shown on Figure 5.2.



Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); EnviroKey (2013, 2014, 2018); DFSI (2017); ELVIS (2014)

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KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Additional (post-closure) disturbance footprint
- Pipeline

Existing environment
- Major road
- Minor 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

PCT 727 | Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion
- High
- Medium
- Poor

PCT 766 | Carex sedgeland of the slopes and tablelands
- Poor

PCT 951 | Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion
- Medium
- Poor

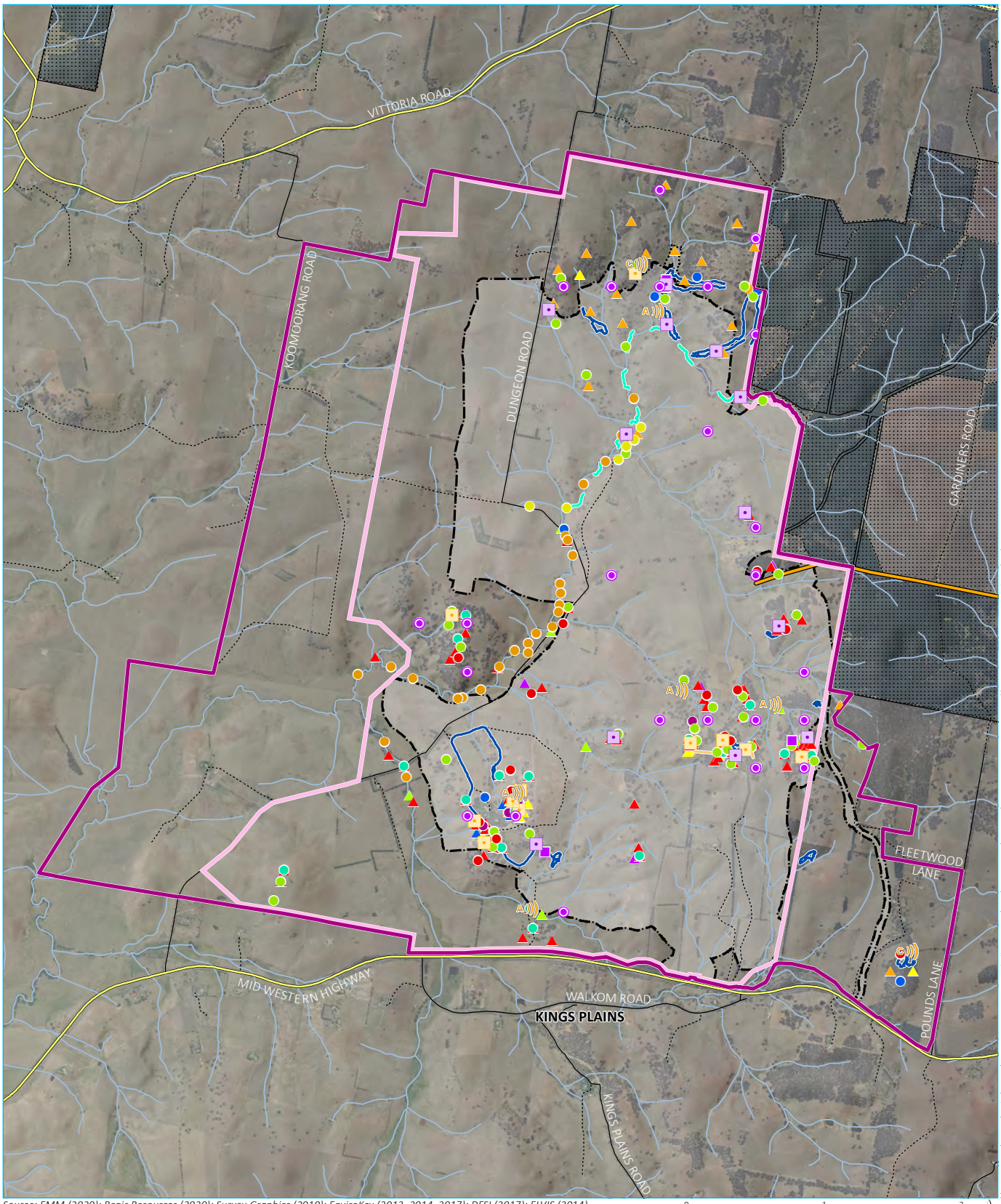
PCT 1330 | Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
- High
- Medium
- Poor
- Other

Flora survey effort – mine development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.1

REGIS RESOURCES LTD

EMM creating opportunities



Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); EnviroKey (2013, 2014, 2017); DFSI (2017); ELVIS (2014)

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KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Additional (post-closure) disturbance footprint
- Pipeline

Existing environment
- Major road
- Minor 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 (23)
- Frog survey (8)
- Funnel trap (5)
- Habitat assessment (10)
- Nocturnal survey (19)
- Platypus assessment (25)
- RARC (6)
- Reptile survey (37)
- Scat and sign (19)
- Spotlight survey (7)
- Tile grid survey (10)
- Elliott trap (EnviroKey, 2013)
- RARC (EnviroKey, 2017)

Fauna survey effort – mine development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.2

REGIS RESOURCES LTD

EMM creating opportunities

a Diurnal birds

Bird surveys were undertaken to target the Gang-gang Cockatoo and White-bellied Sea-eagle. Stratification units and area of each survey unit in the mine project area are shown in Table 5.1.

Table 5.1 Stratification units and mine project area – diurnal birds

Stratification unit	Area (ha)
PCT 727 moderate/good – high, medium and poor	48.78
PCT 951 moderate/good – poor	32.73
PCT 1330 moderate/good – high, medium, other and poor	45.84

Bird survey methods and survey effort have been developed in accordance with DEC (2004) and DEWHA (2010b) 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 mine project area as possible but with a focus on suitable habitat for threatened species (Figure 5.2). 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 mine project area and locality.

Table 5.2 Methods and survey effort – diurnal birds

Method	Survey description	Survey effort
Area searches	• 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.	DEC (2004) has not resolved bird survey requirements. DEWHA (2010b) specifies 20 hours of surveys over 10 days for areas of less than 50 ha. No replication of survey effort is specified. A total of 143 bird surveys were undertaken by EnviroKey (2017) equating to an estimated 47.7 person hours of bird surveys.

b Small terrestrial mammals

Small terrestrial mammal surveys were undertaken to target the Eastern Pygmy Possum and Brush-tailed Phascogale. Stratification units and area of each survey unit in the mine project area is shown in Table 5.3. All vegetation in the study area was considered a low likelihood of the species occurring 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 5.3 Stratification units and mine project area – small terrestrial mammals

Target species	Vegetation class	Area (ha)
Eastern Pygmy Possum	PCT 727 high and medium	48.78
	PCT 1330 high and medium	20.43

Methods and survey effort have been developed in accordance with DEC (2004) and included a mix of terrestrial trapping and remote camera surveys (Figure 5.2). Methods and survey effort are outlined in Table 5.4.

Table 5.4 Methods and survey effort – small terrestrial mammals

Method	Survey description	Survey effort
Trapping	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): • 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.	DEC (2004) specifies one site per 50 ha stratification unit with replication of effort for every additional 100 ha. 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. EnviroKey completed three trap sites in PCT 727 and one trap site in PCT 1330, equating to 400 trap nights.
Remote cameras	Remote camera surveys were undertaken in accordance with the following guidelines: • Two cameras placed at least 100 m apart. • 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.	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. 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. 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.

c Arboreal mammals

Arboreal mammal surveys were undertaken to target the Brush-tailed Phascogale, Squirrel Glider and Koala. Stratification units and area of each survey unit in the mine project area is shown in Table 5.5.

Table 5.5 Stratification units and mine project area – arboreal mammals

Stratification unit	Area (ha)
PCT 727 moderate/good – high, medium and poor	48.78
PCT 951 moderate/good – poor	32.73
PCT 1330 moderate/good – high, medium, other and poor	45.84

Methods and survey effort have been developed in accordance with DEC (2004), Phillips and Callaghan (2011) and DoE (2014). Methods and survey effort are outlined in Table 5.6.

Table 5.6 Methods and survey effort – arboreal mammals

Method	Survey description	Survey effort
Arboreal trapping (Squirrel Glider)	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: • 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.	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). Based on the above stratification units, this would equate to 4 survey sites (one in each of PCTs 951 and 1330 and two in PCT 727). 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.
Spotlighting (Squirrel Glider and Koala)	Surveys included: • 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.	DEC (2004) recommends 2 x 1 km transects, completed on separate nights, per 200 ha of stratification unit. No survey effort for larger sites is specified. This would equate to three 1 km transects (one per PCT) completed on two nights (6 transects total). 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.

Table 5.6 Methods and survey effort – arboreal mammals

Method	Survey description	Survey effort
Spot Assessment Technique (SAT) (Koala)	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 • 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).	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. Twenty-four SAT surveys were completed across the mine project area.

Funnel trap lines

Small terrestrial fauna species such as reptiles (ie Pink-tailed Worm Lizard), frogs and mammals were targeted using funnel trap lines across various locations within the mine 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.

Echolocation (Anabat) call recording

Microchiropteran bats, particularly the Southern Myotis, 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 mine 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.

Call playback

Call playback was conducted across the mine project area to detect threatened nocturnal fauna. The target species for this assessment were Masked Owl, Powerful Owl, Barking Owl, Squirrel Glider, Bush Stone Curlew and Koala. Call playback was undertaken at across the mine 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.

Spotlighting and nocturnal surveys

Spotlighting was undertaken to target the Bush Stone-curlew, Brush-tailed Phascogale, Eastern Pygmy Possum, Koala and Squirrel Glider. Spotlighting was conducted 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.

Reptile searches

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.

Herpetofauna searches were conducted across the mine project area. 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.

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.

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.

iii Pipeline development – flora

Initial targeted threatened flora surveys were carried out by OzArk in August, September, October and December 2018 and in January and May 2019. Surveys were conducted accordance with NSW Guide to Surveying Threatened Plants (OEH 2016). The transect was walked inside the pipeline corridor of the associated PCT. Where the survey area was dissected by a road, both sides of road were traversed. The targeted surveys are described in further detail in Table 5.7.

Table 5.7 Targeted flora surveys

Species	Associated PCT/s
Acacia floctoniae	1330
Black Gum	1191, 1197
Silver-leaved Gum	1093
Robertson's Peppermint	727, 1197
Rough Eyebright	1191, 1197
Grevillea divaricata	1093, 277
Lepidium hyssopifolium	277, 1093, 1191, 1197, 1330
Clandulla Geebung	277, 1093
Silky Swainson-pea	277, 1191, 1330
Austral Toadflax	1093, 1191, 1197, 1330
Veronica blakelyi	277, 1093, 1197
Capertee Stringybark	277, 1093

At the time of the survey, climatic conditions were dry, with significantly less rainfall having occurred in the months leading up to the survey. As a result, the diversity of grasses and forbs was low throughout the survey period.

Further targeted surveys were conducted by EMM (2020) across the pipeline, as well as habitat assessments. pipeline corridor. Significant rain fell prior to the survey period, which would have increased the diversity of grasses and forbs compared with the OzArk surveys.

Targeted searches comprised visiting all accessible parts of the pipeline route on five separate trips between 10 February and 11 June 2020 (Section 4.2.1(ii), Figure 5.3). The route was driven slowly in a 4WD vehicle and stops were made wherever safe to do so. Where potential habitat occurred, the route was walked thoroughly at a spacing no greater than 10 metres apart, in accordance with *NSW Guide to Surveying Threatened Plants* (OEH 2016).

The first EMM survey comprised targeted searches of all flora species that are detectable in February, comprising:

- Black Gum;
- Bynoe's Wattle;
- Clandulla Geebung;
- Capertee Stringybark;
- Flockton Wattle;
- Silver-leaved Gum; and
- Capertee Stringybark.

The second, third and fourth survey events targeted areas that could not be accessed during the first survey event. The fifth survey event focused on targeted surveys for *Acacia meiantha* and the Tarengo Leek Orchid (*Prasophyllum petilum*) with survey methodology outlined in Section 5.1.3iii.

Habitat assessments comprised interpretation of satellite imagery followed by on-ground vegetation and structural mapping. Vegetation was mapped into plant community types (PCTs) whilst structures (eg. dams and riparian areas) were mapped as potential habitat features. The dominant species in each vegetation strata were recorded. This was important to assist in identifying the original vegetation type prior to European settlement for each site.

a Expert flora assessment

Dr Colin Bower of Premise Australia prepared separate Expert Reports on the likelihood of the following threatened species occurring on the pipeline disturbance footprint (Appendix E):

- *Acacia meiantha*; and
- Tarengo Leek Orchid.

Acacia meiantha surveys comprised targeted searches in the month prior to the optimal survey period and habitat matching assessments conducted by Dr Bower on 11 and 12 June 2020.Targeted searches comprised inspecting all parts of the pipeline. The route was driven slowly in a 4WD vehicle and regular stops were made where shrubby vegetation occurred on or near the disturbance corridor, or where visibility was poor, e.g. steep slopes and gullies.

Habitat matching comprised recording the habitat for each area inspected to determine whether the area matched the habitat features identified for the relevant targeted species. The dominant tree and shrub species in the immediate surrounds were recorded. This was important to assist in identifying the original vegetation type prior to European settlement for each site.

The Tarengo Leek Orchid cannot be surveyed for using the targeted search method unless reference populations are suitably visible (that is, where emergent leaves of any plants are visible). The reference population at Ilford Cemetery was not sufficiently visible when it was inspected on 12 June 2020. Therefore, Dr Bower conducted Habitat Matching assessments only to assess presence of the Tarengo Leek Orchid in the pipeline corridor, in accordance with the relevant guidelines; viz., NSW Guide to Surveying Threatened Plants (OEH 2016) and Draft Survey Guidelines for Australia's Threatened Orchids (DoE 2013b).

Suitable habitat for the Tarengo Leek Orchid was assessed using the following information from the National Recovery Plan for the Tarengo Leek Orchid, *Prasophyllum petilum* (DECCW 2010b):

- the site is relatively undisturbed, i.e. the soil profile is intact with no soil disturbance by farm or mining machinery;
- the dominant tree species include any of Snow Gum, Black Gum, Blakely's Red Gum, or Yellow Box, or is a natural grassland; and
- the site is prone to waterlogging.

iv Pipeline development – fauna

OzArk completed habitat assessments and targeted surveys for threatened species in August, September, October and December 2018, and in January and May 2019. Habitat assessments comprised traversing the pipeline disturbance footprint on foot or in a slow-moving vehicle and mapping the locations of any habitat features observed. Assessments were completed by OzArk for 15 species. Survey methods are outlined in Table 5.8.

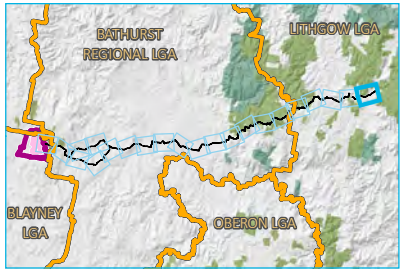
Table 5.8 OzArk threatened fauna species survey methodology – pipeline

Species	Method
Superb Parrot (breeding)	Hollow-bearing trees on the pipeline corridor located within PCTs 277 and 1330 were observed and monitored for Superb Parrot activity for a thirty-minute period.
Bathurst Copper Butterfly	All areas of native vegetation above 850 m elevation were searched for the presence of Blackthorn (*Bursaria spinosa*) using the field transverse method. Sites of known records around the Yetholme and Sunny Corner regions were also searched for the presence of habitat as there was potential for the proposal to be re-routed through this area. Areas where Blackthorn were recorded were mapped and a 40 m buffer drawn around each location to indicate suitable habitat for the species, as suitable butterfly habitat is not found further than this distance from Blackthorn plants.
Grey-headed Flying Fox (breeding)	Treed areas (both native and introduced) and other suitable habitat within the pipeline corridor was searched using a field transverse method (both on foot and from slow moving vehicle) for the presence of Grey-headed Flying Fox breeding camps.
Breeding locations for: White-bellied Sea-Eagle, Little Eagle, and Square-tailed Kite	Searches were carried out in suitable treed areas (native and introduced) within the pipeline corridor for raptors and raptor nests that might indicate the presence of breeding White-bellied Sea-Eagle, Little Eagle, Spotted Harrier and Square-tailed Kite. A field transverse method was used (both on foot and from slow moving vehicle). The Little Eagle was observed; however no breeding evidence was recorded by OzArk.
Breeding locations for: Barking Owl, Powerful Owl, Masked Owl, Glossy Black Cockatoo and Gang-Gang Cockatoo	Areas of suitable habitat within the pipeline corridor (being those areas mapped as native vegetation) were searched by pedestrian transect and slow-moving vehicle for the presence of suitably sized tree hollows. The location of hollow-bearing trees was recorded using GPS. 100m buffers were applied around any hollow-bearing trees, however it is unlikely that these buffers were searched for nests.
Koala	Targeted searches for Koala were carried out within suitable habitat using the Spot Assessment Technique. Although areas of sparse upper layer vegetation and paddock trees were searched thoroughly, forested areas were surveyed at random points only. Only trees on the pipeline corridor were searched, not adjoining vegetation.
Bush Stone-curlew	Pedestrian transects were carried out through PCT 1330 within the pipeline corridor, searching for this species and threatened plants.

Targeted searches by EMM comprised visiting all accessible parts of the pipeline route over five visits between 10 February and 11 June 2020. The route was driven slowly in a 4WD vehicle and stops were made wherever safe to do so. Where potential habitat occurred, the route was walked thoroughly at a spacing no greater than 10 metres apart.

Further targeted surveys were conducted by EMM (2020) across the pipeline to inform the candidate species assessment, as well as habitat assessments. Targeted searches were made of all fauna species that are surveyable in February and June. These comprised revisiting potential breeding locations for White-bellied Sea-Eagle, Little Eagle and Square-tailed Kite and assessing habitat constraints and microhabitats for the potential candidate species (Section 5.2.3).

Habitat assessments comprised interpretation of satellite imagery followed by on-ground vegetation and structural mapping. Habitat features (hollow bearing trees, dams, rocky areas, etc.) were mapped as potential fauna habitat.



KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Pipeline underbore section
- Areas not requiring offset (Northern option: 372.82 ha Southern option: 364.79 ha)

Flora survey effort

- Targeted threatened plant survey (EMM, 2020)
- Box Gum Woodland TEC (EMM, 2020)

Plant community types (PCT)

PCT 1093 | Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion

- Shrubland

PCT 1191 | Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion

- Shrubland
- Sparse
- Derived native grassland

Source: EMM (2020); Regis Resources (2020); Premise (2020); ESRI (2020); OzArk (2019); DFSI (2017)

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Flora survey effort – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.3.a

REGIS RESOURCES LTD

EMM creating opportunities

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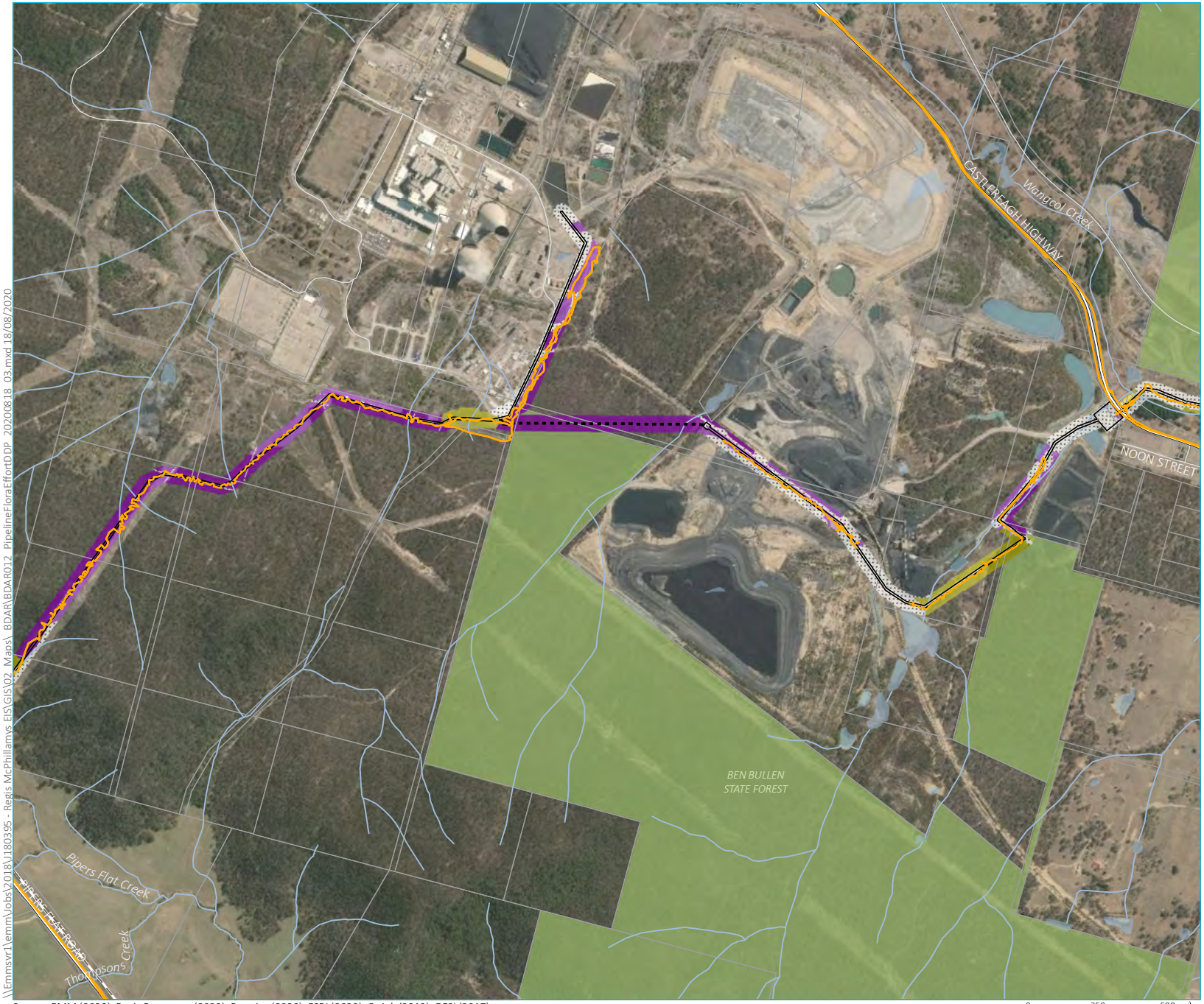

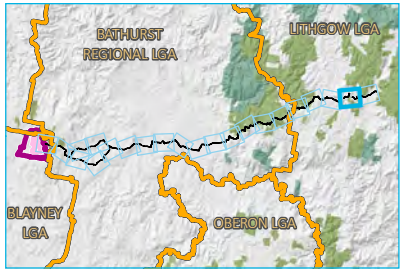

KEY

- Rail line
- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Pipeline underbore section
- Areas not requiring offset (Northern option: 372.82 ha Southern option: 364.79 ha)

Flora survey effort

- Targeted threatened plant survey (EMM, 2020)
- Box Gum Woodland TEC (EMM, 2020)

Plant community types (PCT)

PCT 1093 | Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion

- Intact
- Shrubland
- Fragments

PCT 1191 | Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion

- Intact
- Shrubland
- Derived native grassland

Source: EMM (2020); Regis Resources (2020); Premise (2020); ESRI (2020); OzArk (2019); DFSI (2017)

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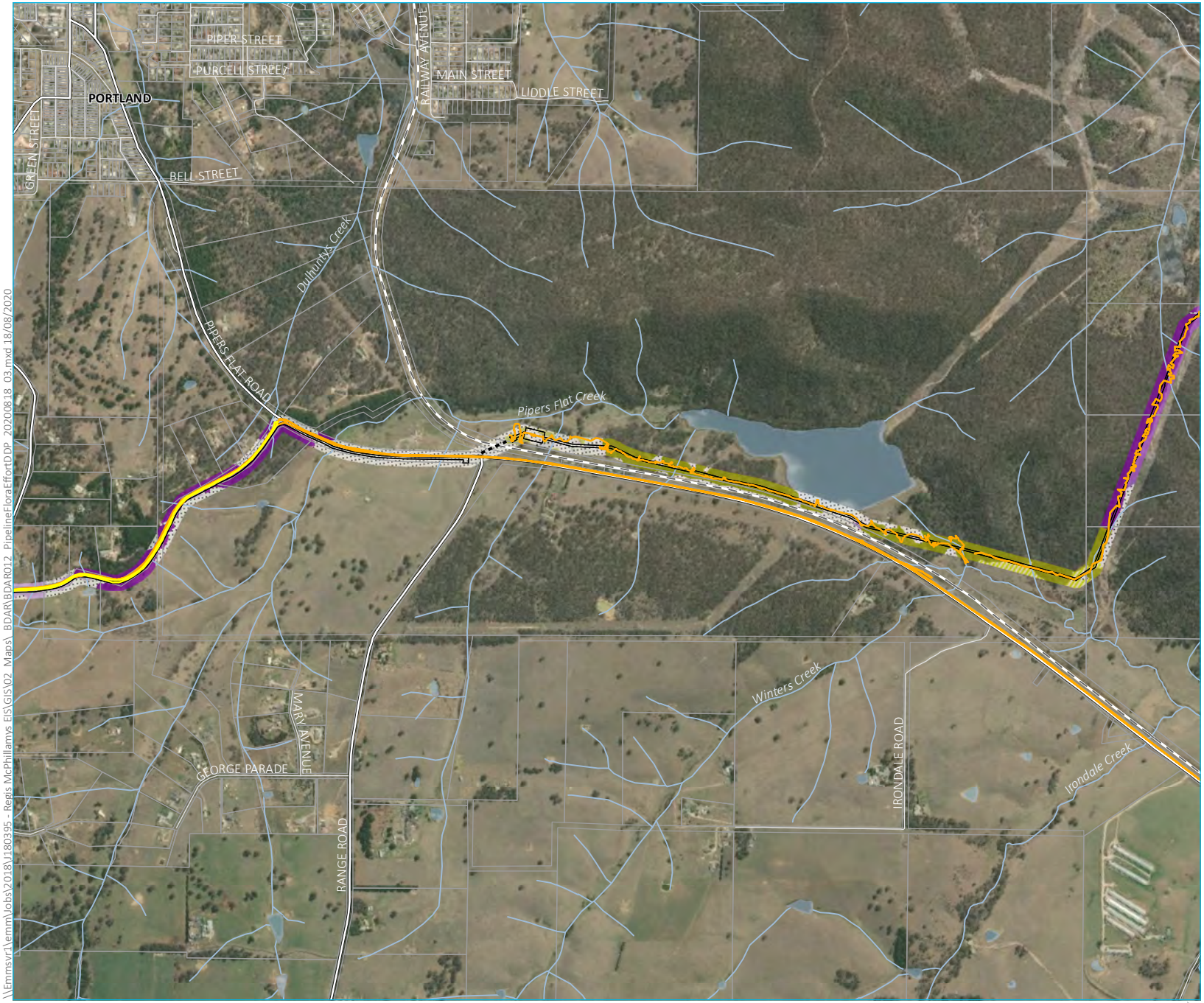
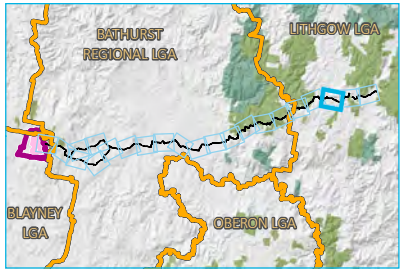
Flora survey effort – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.3.b

REGIS RESOURCES LTD

EMM creating opportunities





KEY

- Rail line
- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Pipeline underbore section
- Areas not requiring offset (Northern option: 372.82 ha Southern option: 364.79 ha)

Flora survey effort

- Targeted threatened plant survey (EMM, 2020)
- *Acacia meiantha* and *Prasophyllum petilum* survey transect (EMM/Premise, 2020)
- Box Gum Woodland TEC (EMM, 2020)

Plant community types (PCT)

PCT 1093 | Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion

- Intact
- Shrubland
- Fragments

PCT 1191 | Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion

- Intact
- Fragments
- Derived native grassland

Source: EMM (2020); Regis Resources (2020); Premise (2020); ESRI (2020); OzArk (2019); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

N

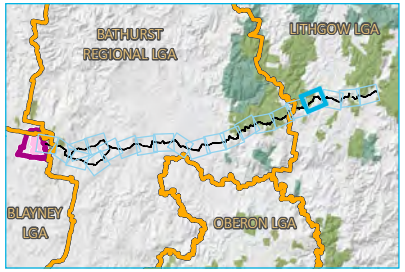
\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02 Maps\ BDAR\BDAR012 PipelineFloraEffortDDP 20200818 03.mxd 18/08/2020

Flora survey effort – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.3.c

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Areas not requiring offset (Northern option: 372.82 ha Southern option: 364.79 ha)

Flora survey effort

- Targeted threatened plant survey (EMM, 2020)
- *Acacia meiantha* and *Prasophyllum petilum* survey transect (EMM/Premise, 2020)
- Box Gum Woodland TEC (EMM, 2020)

Plant community types (PCT)

PCT 1093 | Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion

- Intact
- Shrubland
- Fragments

PCT 1191 | Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion

- Intact
- Fragments

PCT 1197 | Snow Gum - Mountain Gum tussock grass-herb forest of the South Eastern Highlands Bioregion

- Sparse
- Derived native grassland

Flora survey effort – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.3.d

Source: EMM (2020); Regis Resources (2020); Premise (2020); ESRI (2020); OzArk (2019); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

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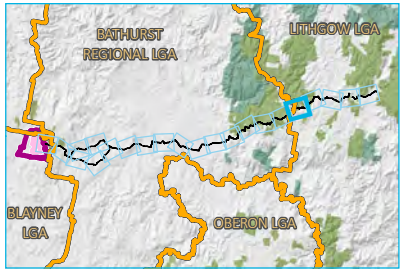

KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Areas not requiring offset (Northern option: 372.82 ha Southern option: 364.79 ha)

Flora survey effort

- Targeted threatened plant survey (EMM, 2020)
- *Acacia meiantha* and *Prasophyllum petilum* survey transect (EMM/Premise, 2020)
- Box Gum Woodland TEC (EMM, 2020)

Plant community types (PCT)

PCT 1191 | Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion

- Sparse

PCT 1197 | Snow Gum - Mountain Gum tussock grass-herb forest of the South Eastern Highlands Bioregion

- Intact
- Shrubland
- Sparse
- Derived native grassland

Source: EMM (2020); Regis Resources (2020); Premise (2020); ESRI (2020); OzArk (2019); DFSI (2017)

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GDA 1994 NSW Lambert

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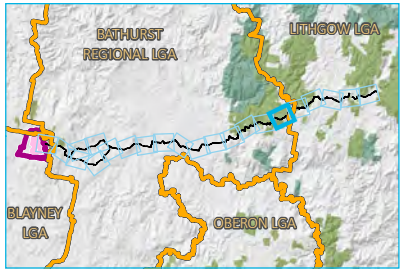
Flora survey effort – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.3.e

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Areas not requiring offset (Northern option: 372.82 ha Southern option: 364.79 ha)

Flora survey effort

- Targeted threatened plant survey (EMM, 2020)
- *Acacia meiantha* and *Prasophyllum petilum* survey transect (EMM/Premise, 2020)
- Box Gum Woodland TEC (EMM, 2020)

Plant community types (PCT)

PCT 1191 | Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion

- Intact
- Sparse

PCT 1197 | Snow Gum - Mountain Gum tussock grass-herb forest of the South Eastern Highlands Bioregion

- Intact

Source: EMM (2020); Regis Resources (2020); Premise (2020); ESRI (2020); OzArk (2019); DFSI (2017)

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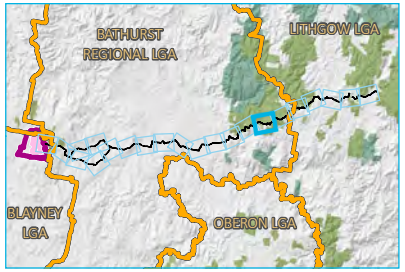
Flora survey effort – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.3.f

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Areas not requiring offset (Northern option: 372.82 ha Southern option: 364.79 ha)

Flora survey effort

- Targeted threatened plant survey (EMM, 2020)
- *Acacia meiantha* and *Prasophyllum petilum* survey transect (EMM/Premise, 2020)
- Box Gum Woodland TEC (EMM, 2020)

Plant community types (PCT)

PCT 1191 | Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion

- Intact
- Sparse

PCT 1197 | Snow Gum - Mountain Gum tussock grass-herb forest of the South Eastern Highlands Bioregion

- Intact

Source: EMM (2020); Regis Resources (2020); Premise (2020); ESRI (2020); OzArk (2019); DFSI (2017)

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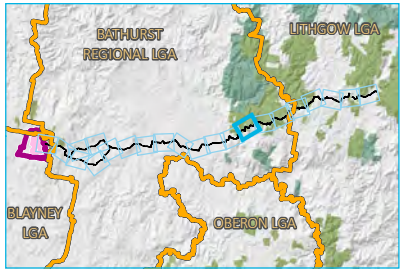
Flora survey effort – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.3.g

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Areas not requiring offset (Northern option: 372.82 ha Southern option: 364.79 ha)

Flora survey effort

- Targeted threatened plant survey (EMM, 2020)
- *Acacia meiantha* and *Prasophyllum petilum* survey transect (EMM/Premise, 2020)
- Box Gum Woodland TEC (EMM, 2020)

Plant community types (PCT)

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

- Intact
- Shrubland

PCT 1093 | Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion

- Intact

PCT 1197 | Snow Gum - Mountain Gum tussock grass-herb forest of the South Eastern Highlands Bioregion

- Intact
- Shrubland

Source: EMM (2020); Regis Resources (2020); Premise (2020); ESRI (2020); OzArk (2019); DFSI (2017)

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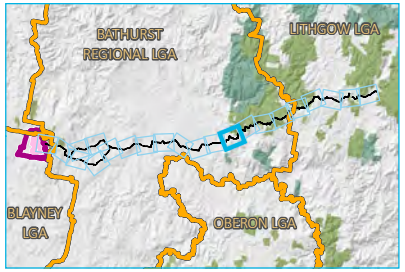
Flora survey effort – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.3.h

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Pipeline underbore section
- Areas not requiring offset (Northern option: 372.82 ha Southern option: 364.79 ha)

Flora survey effort

- Targeted threatened plant survey (EMM, 2020)
- *Acacia meiantha* and *Prasophyllum petilum* survey transect (EMM/Premise, 2020)
- Box Gum Woodland TEC (EMM, 2020)

Source: EMM (2020); Regis Resources (2020); Premise (2020); ESRI (2020); OzArk (2019); DFSI (2017)

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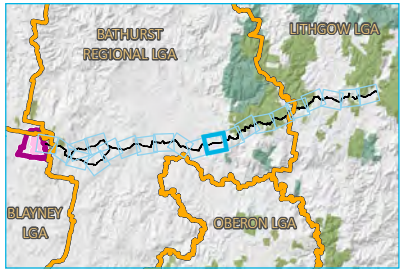
Flora survey effort – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.3.i

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Areas not requiring offset (Northern option: 372.82 ha Southern option: 364.79 ha)

Flora survey effort

- Targeted threatened plant survey (EMM, 2020)
- Box Gum Woodland TEC (EMM, 2020)

Plant community types (PCT)

PCT_1330 | Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

- Shrubland
- Sparse
- Derived native grassland

Source: EMM (2020); Regis Resources (2020); Premise (2020); ESRI (2020); OzArk (2019); DFSI (2017)

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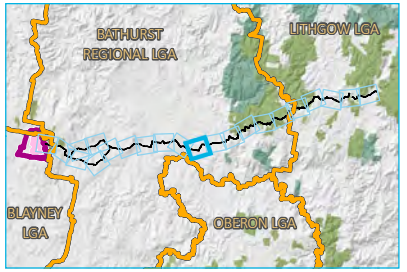
Flora survey effort – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.3.j

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Rail line
- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Pipeline underbore section
- Areas not requiring offset (Northern option: 372.82 ha Southern option: 364.79 ha)

Flora survey effort

- Targeted threatened plant survey (EMM, 2020)
- Box Gum Woodland TEC (EMM, 2020)

Plant community types (PCT)

PCT_1330 | Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

- Sparse

\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02 Maps\ BDAR\BDAR012 PipelineFloraEffortDDP 20200818 03.mxd 18/08/2020

Source: EMM (2020); Regis Resources (2020); Premise (2020); ESRI (2020); OzArk (2019); DFSI (2017)

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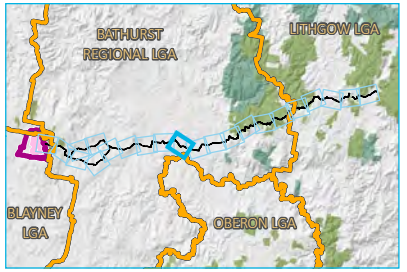
Flora survey effort – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.3.k

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area
  (Note: boundary offset for clarity)
- Direct impact management zone
- Areas not requiring offset
  (Northern option: 372.82 ha
  Southern option: 364.79 ha)

Flora survey effort

- Targeted threatened plant survey (EMM, 2020)
- Box Gum Woodland TEC (EMM, 2020)

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Source: EMM (2020); Regis Resources (2020); Premise (2020); ESRI (2020); OzArk (2019); DFSI (2017)

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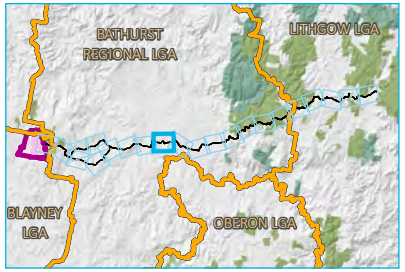
Flora survey effort – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.3.l

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Pipeline underbore section
- Areas not requiring offset (Northern option: 372.82 ha Southern option: 364.79 ha)

Flora survey effort

- Targeted threatened plant survey (EMM, 2020)
- Box Gum Woodland TEC (EMM, 2020)

Plant community types (PCT)

PCT_1330 | Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

- Sparse
- Derived native grassland

Source: EMM (2020); Regis Resources (2020); Premise (2020); ESRI (2020); OzArk (2019); DFSI (2017)

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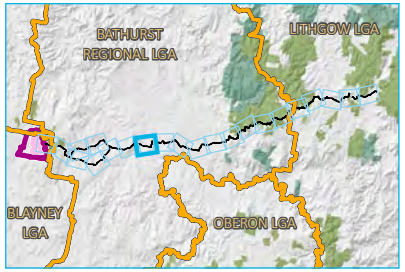
Flora survey effort – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.3.m

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Rail line
- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Pipeline underbore section
- Areas not requiring offset (Northern option: 372.82 ha Southern option: 364.79 ha)

Flora survey effort

- Targeted threatened plant survey (EMM, 2020)
- Box Gum Woodland TEC (EMM, 2020)

Plant community types (PCT)

PCT_1330 | Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

- Intact
- Sparse
- Derived native grassland

\\Emmsvr1\emm\Jobs\2018\I180395 - Regis McPhillamys EIS\GIS\02 Maps\ BDAR\BDAR012 PipelineFloraEffortDDP 20200818 03.mxd 18/08/2020

Source: EMM (2020); Regis Resources (2020); Premise (2020); ESRI (2020); OzArk (2019); DFSI (2017)

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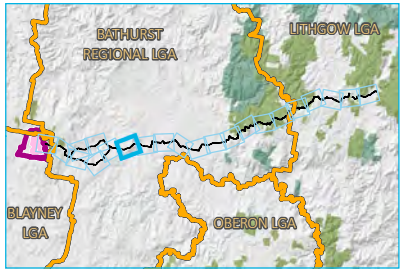
Flora survey effort – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.3.n

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Rail line
- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Areas not requiring offset (Northern option: 372.82 ha Southern option: 364.79 ha)

Flora survey effort

- Targeted threatened plant survey (EMM, 2020)
- Box Gum Woodland TEC (EMM, 2020)

Plant community types (PCT)

PCT_1330 | Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

- Intact
- Sparse
- Derived native grassland

\\Emmsvr1\emm\Jobs\2018\180395 - Regis McPhillamys EIS\GIS\02 Maps\ BDAR\BDAR012 PipelineFloraEffortDDP 20200818 03.mxd 18/08/2020

Source: EMM (2020); Regis Resources (2020); Premise (2020); ESRI (2020); OzArk (2019); DFSI (2017)

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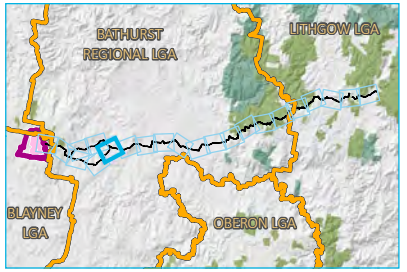
GDA 1994 NSW Lambert

Flora survey effort – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.3.o

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Major road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Areas not requiring offset (Northern option: 372.82 ha Southern option: 364.79 ha)

Flora survey effort

- Targeted threatened plant survey (EMM, 2020)
- Box Gum Woodland TEC (EMM, 2020)

Plant community types (PCT)

PCT_1330 | Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

- Intact
- Sparse
- Derived native grassland

Source: EMM (2020); Regis Resources (2020); Premise (2020); ESRI (2020); OzArk (2019); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

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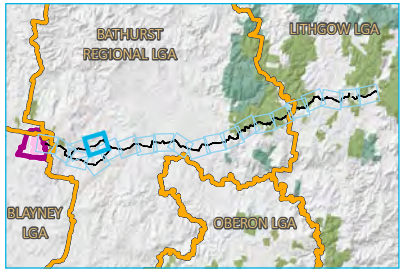
Flora survey effort – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.3.p

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Areas not requiring offset (Northern option: 372.82 ha Southern option: 364.79 ha)
- Box Gum Woodland TEC (EMM, 2020)

Plant community types (PCT)

PCT_1330 | Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

- Intact
- Fragments
- Sparse
- Derived native grassland

Source: EMM (2020); Regis Resources (2020); Premise (2020); ESRI (2020); OzArk (2019); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

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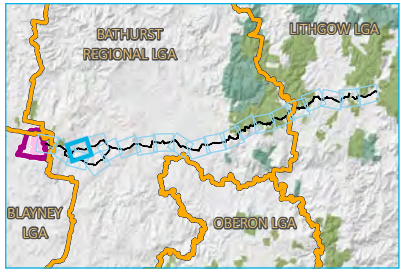
Flora survey effort – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.3.q

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Areas not requiring offset (Northern option: 372.82 ha Southern option: 364.79 ha)

Flora survey effort

- Targeted threatened plant survey (EMM, 2020)
- Box Gum Woodland TEC (EMM, 2020)

Plant community types (PCT)

PCT_1330 | Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

- Intact
- Fragments
- Sparse
- Derived native grassland

Source: EMM (2020); Regis Resources (2020); Premise (2020); ESRI (2020); OzArk (2019); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

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Flora survey effort – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.3.r

REGIS RESOURCES LTD

EMM creating opportunities

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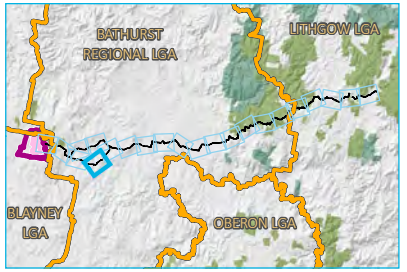

KEY

- Rail line
- Major road
- Watercourse/drainage line
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- Waterbody
- Local government area (refer to inset)

Project application area

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  (Note: boundary offset for clarity)
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  Southern option: 364.79 ha)

Flora survey effort

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- Box Gum Woodland TEC (EMM, 2020)

Plant community types (PCT)

PCT_1330 | Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

- Intact
- Sparse
- Derived native grassland

Source: EMM (2020); Regis Resources (2020); Premise (2020); ESRI (2020); OzArk (2019); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

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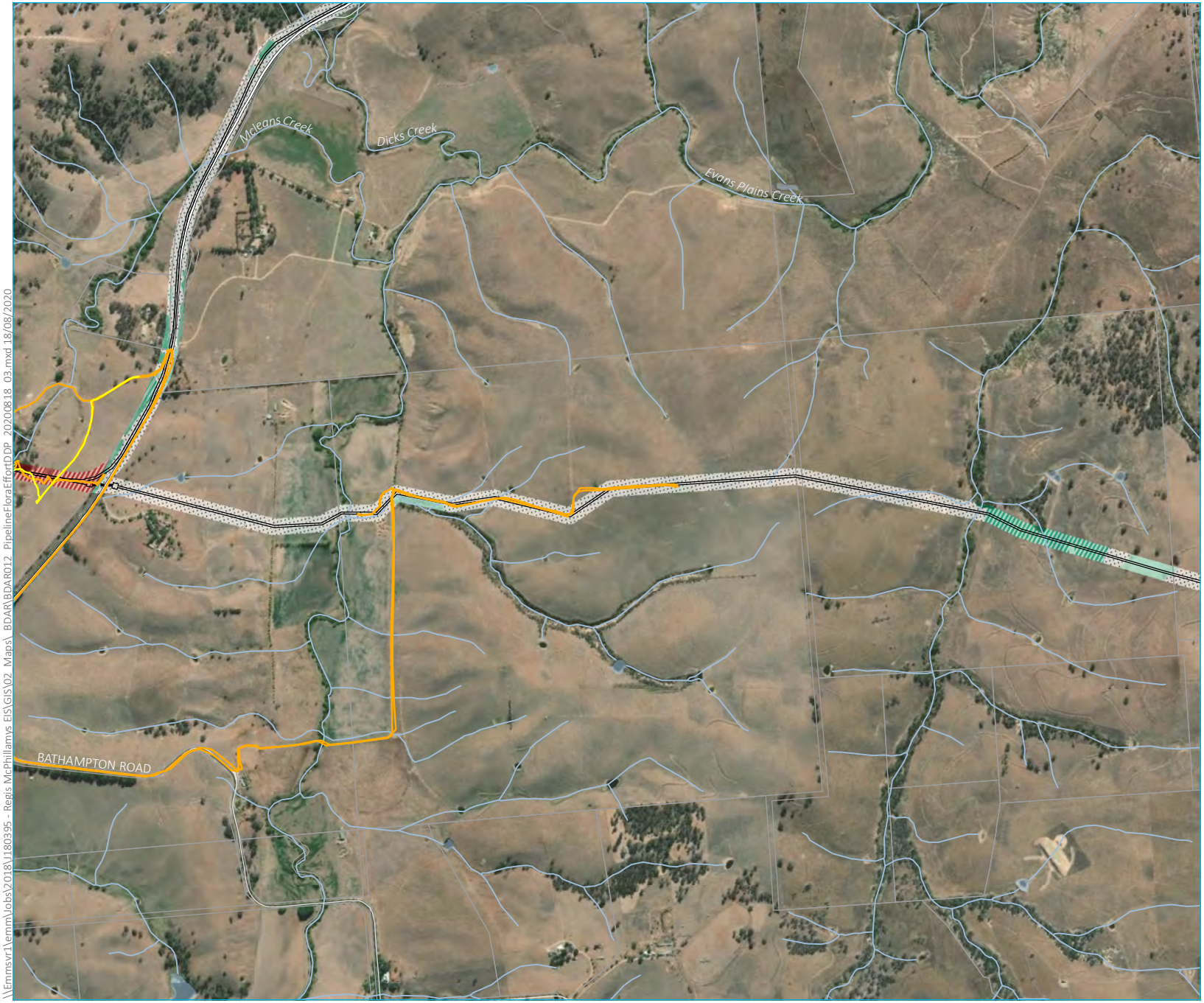
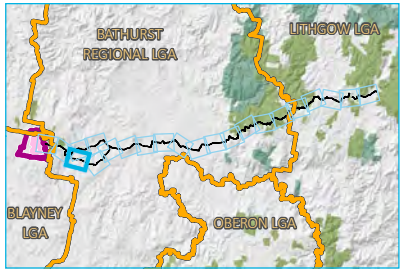
Flora survey effort – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.3.s

REGIS RESOURCES LTD

EMM creating opportunities





KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Pipeline underbore section
- Areas not requiring offset (Northern option: 372.82 ha Southern option: 364.79 ha)

Flora survey effort

- Targeted threatened plant survey (EMM, 2020)
- *Acacia meiantha* and *Prasophyllum petilum* survey transect (EMM/Premise, 2020)
- Box Gum Woodland TEC (EMM, 2020)

Plant community types (PCT)

PCT 277 | Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion

- Intact
- Moderate
- Derived native grassland

PCT_1330 | Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

- Intact
- Fragments
- Sparse
- Derived native grassland

Source: EMM (2020); Regis Resources (2020); Premise (2020); ESRI (2020); OzArk (2019); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

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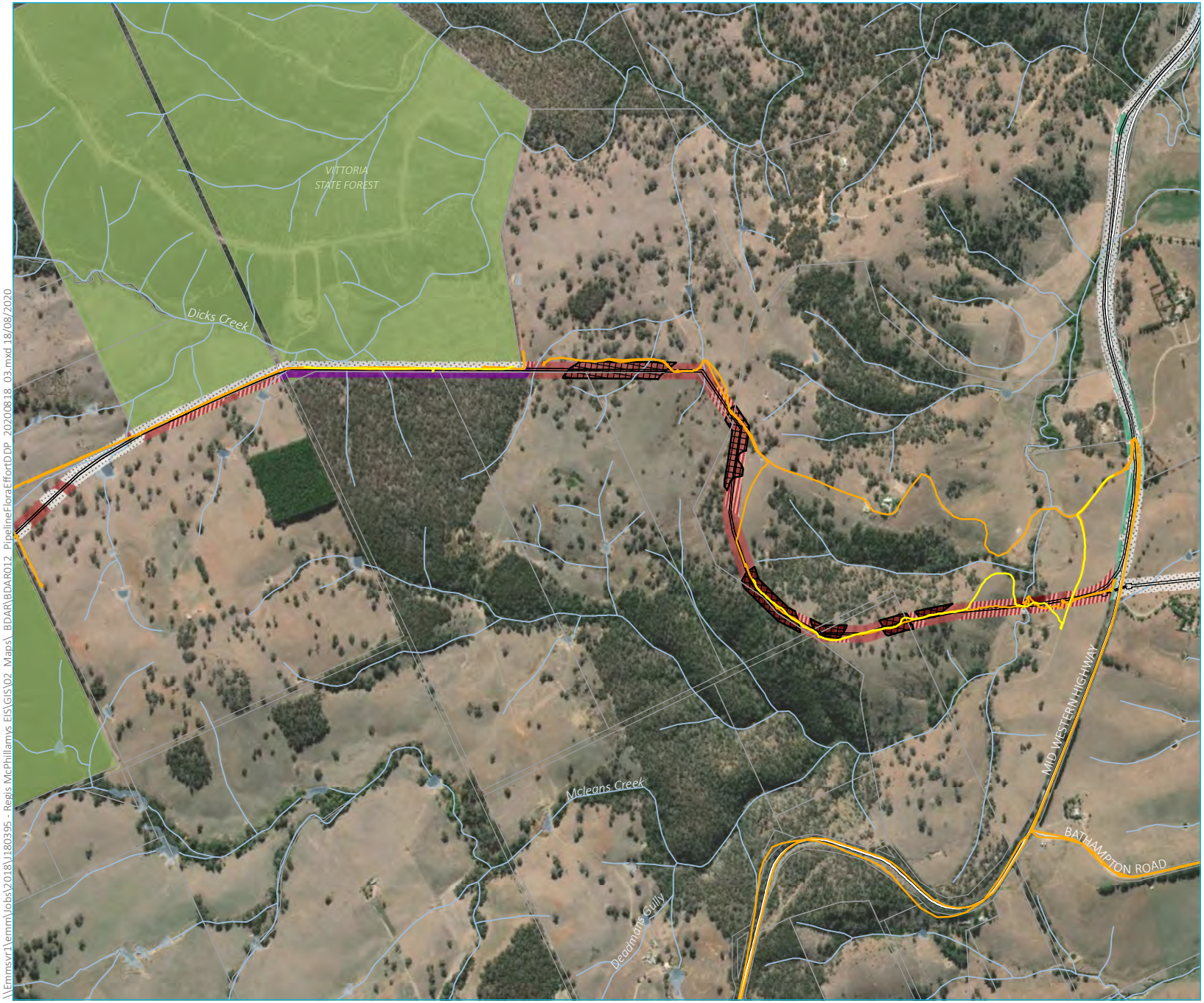
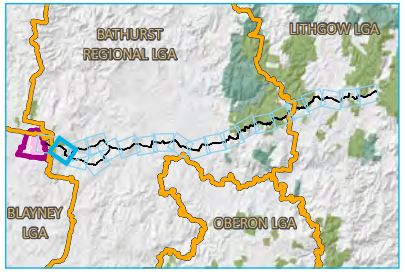
Flora survey effort – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.3.t

REGIS RESOURCES LTD

EMM creating opportunities





KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Pipeline underbore section
- Areas not requiring offset (Northern option: 372.82 ha Southern option: 364.79 ha)

Flora survey effort

- Targeted threatened plant survey (EMM, 2020)
- *Acacia meiantha* and *Prasophyllum petilum* survey transect (EMM/Premise, 2020)
- Box Gum Woodland TEC (EMM, 2020)

Plant community types (PCT)

PCT 277 | Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion

- Intact
- Moderate
- Derived native grassland

PCT 1093 | Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion

- Intact

PCT_1330 | Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

- Fragments
- Sparse
- Derived native grassland

Source: EMM (2020); Regis Resources (2020); Premise (2020); ESRI (2020); OzArk (2019); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

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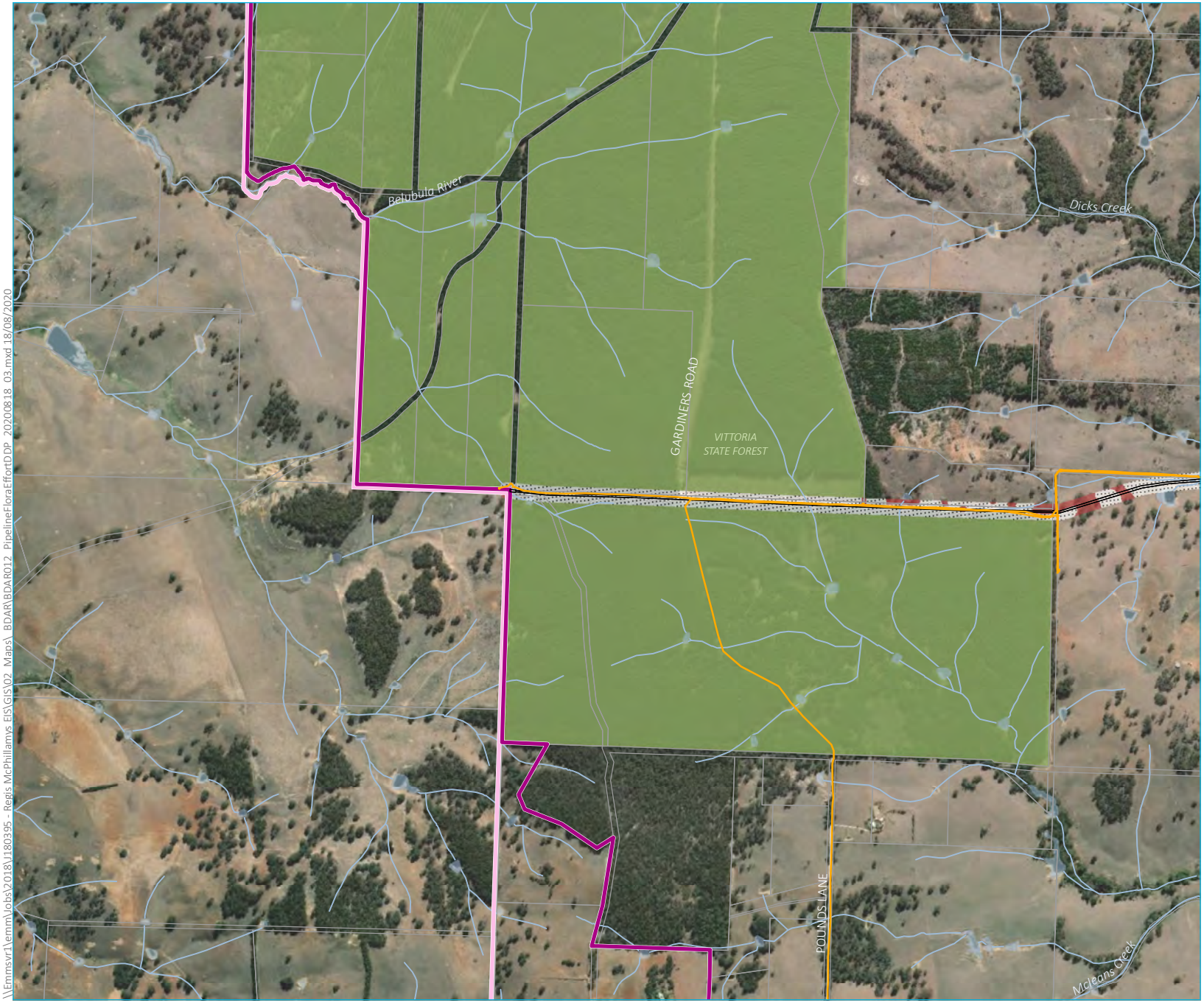
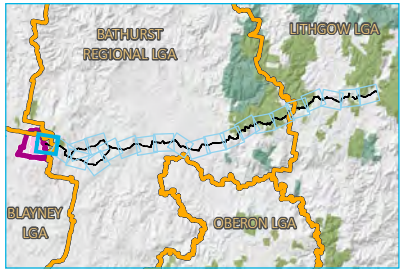
Flora survey effort – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.3.u

REGIS RESOURCES LTD

EMM creating opportunities





KEY

- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area
  (Note: boundary offset for clarity)
- Direct impact management zone
- Areas not requiring offset
  (Northern option: 372.82 ha
  Southern option: 364.79 ha)

Flora survey effort

- Targeted threatened plant survey (EMM, 2020)
- Box Gum Woodland TEC (EMM, 2020)

Plant community types (PCT)

PCT 277 | Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion

- Moderate

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Source: EMM (2020); Regis Resources (2020); Premise (2020); ESRI (2020); OzArk (2019); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

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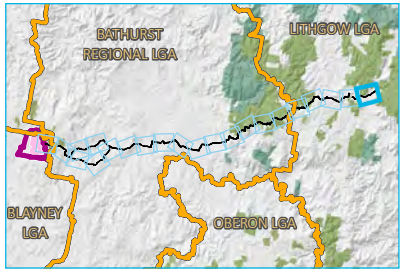
Flora survey effort – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.3.v

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Pipeline underbore section

Fauna survey effort

- Hollow-bearing tree
- *Bursaria spinosa* survey - Bathurst Copper Butterfly host plant (EMM, 2020)

Source: EMM (2020); Regis Resources (2020); Premise (2020); ESRI (2020); OzArk (2019); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

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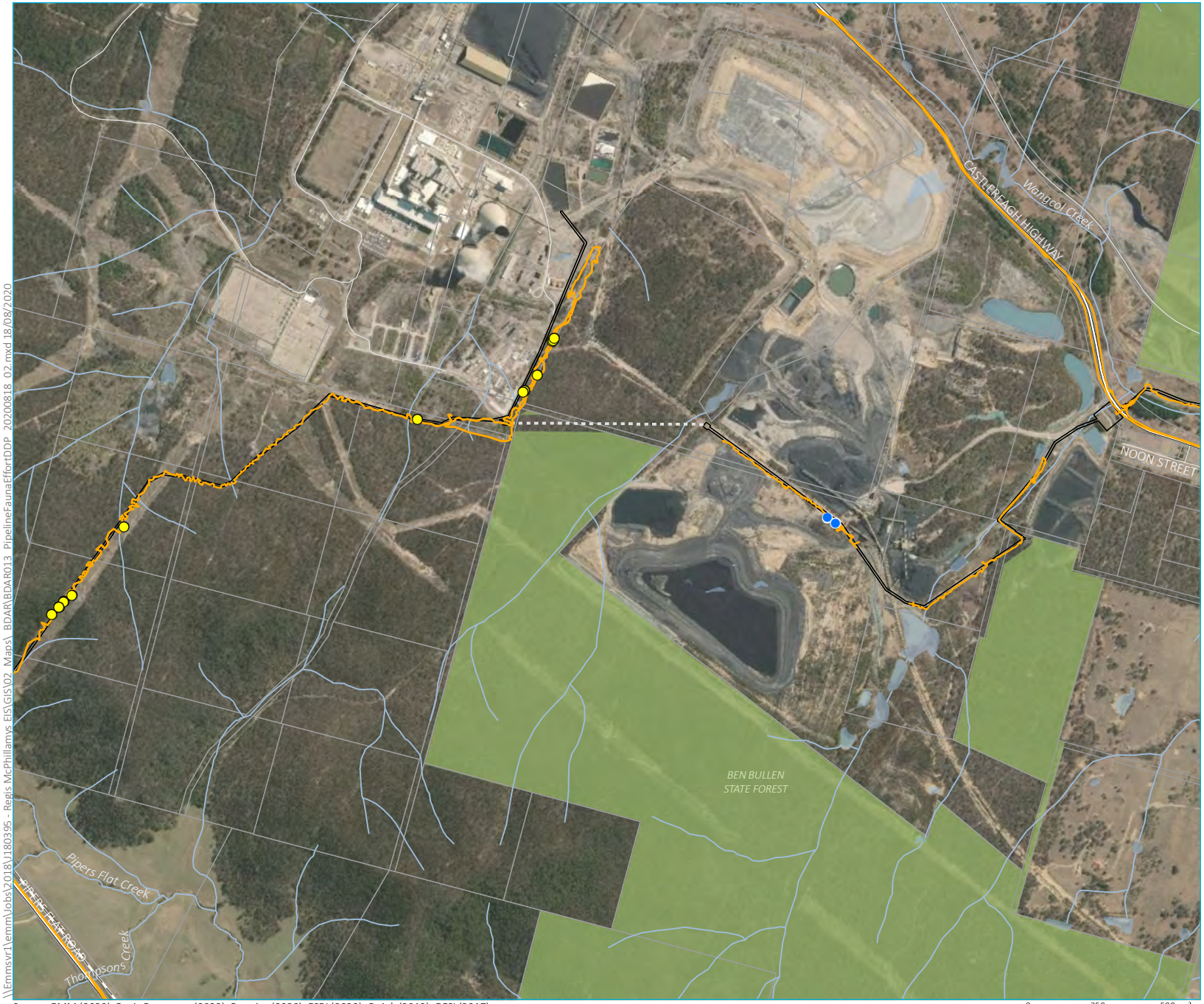
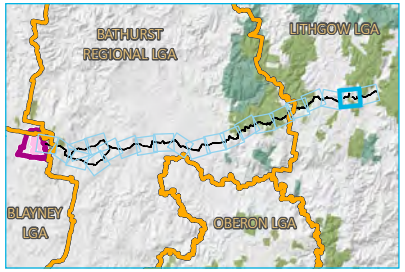
Fauna survey effort – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.4.a





KEY

- Rail line
- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Pipeline underbore section

Fauna survey effort

- Hollow-bearing tree
- Bursaria spinosa (Bathurst Copper Butterfly host plant)
- *Bursaria spinosa* survey - Bathurst Copper Butterfly host plant (EMM, 2020)

Source: EMM (2020); Regis Resources (2020); Premise (2020); ESRI (2020); OzArk (2019); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

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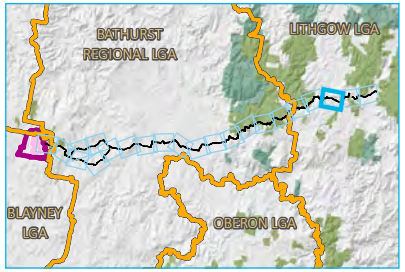
Fauna survey effort – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.4.b

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Rail line
- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Pipeline underbore section

Fauna survey effort

- Hollow-bearing tree
- Bursaria spinosa (Bathurst Copper Butterfly host plant)
- *Bursaria spinosa* survey - Bathurst Copper Butterfly host plant (EMM, 2020)

Source: EMM (2020); Regis Resources (2020); Premise (2020); ESRI (2020); OzArk (2019); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

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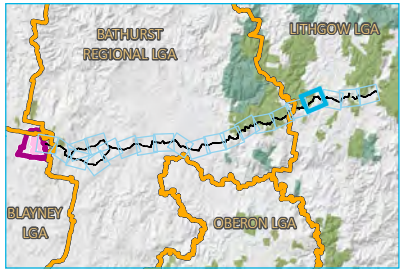
Fauna survey effort – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.4.c

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone

Fauna survey effort

- Hollow-bearing tree
- *Bursaria spinosa* survey - Bathurst Copper Butterfly host plant (EMM, 2020)

Source: EMM (2020); Regis Resources (2020); Premise (2020); ESRI (2020); OzArk (2019); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

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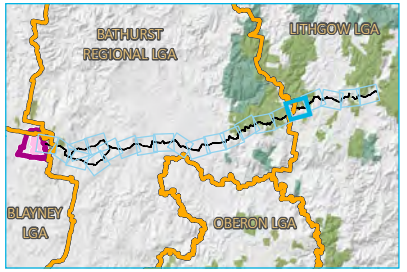
Fauna survey effort – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.4.d

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone

Fauna survey effort

- Hollow-bearing tree
- *Bursaria spinosa* survey - Bathurst Copper Butterfly host plant (EMM, 2020)

Source: EMM (2020); Regis Resources (2020); Premise (2020); ESRI (2020); OzArk (2019); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

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Fauna survey effort – pipeline development

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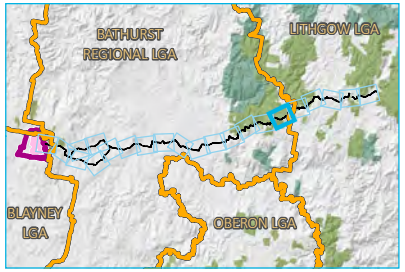
Biodiversity development assessment report
Figure 5.4.e

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone

Fauna survey effort

- Hollow-bearing tree
- *Bursaria spinosa* survey - Bathurst Copper Butterfly host plant (EMM, 2020)

Source: EMM (2020); Regis Resources (2020); Premise (2020); ESRI (2020); OzArk (2019); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

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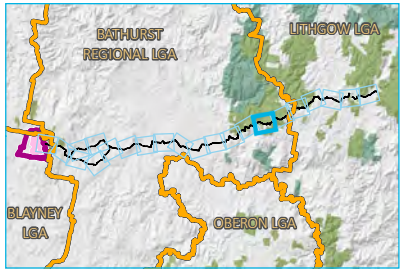
Fauna survey effort – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.4.f

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- *Bursaria spinosa* survey - Bathurst Copper Butterfly host plant (EMM, 2020)

Source: EMM (2020); Regis Resources (2020); Premise (2020); ESRI (2020); OzArk (2019); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

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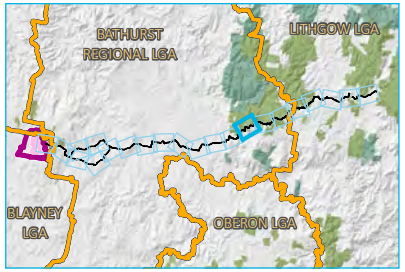
Fauna survey effort – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.4.g

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone

Fauna survey effort

- Hollow-bearing tree
- *Bursaria spinosa* survey - Bathurst Copper Butterfly host plant (EMM, 2020)

Source: EMM (2020); Regis Resources (2020); Premise (2020); ESRI (2020); OzArk (2019); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

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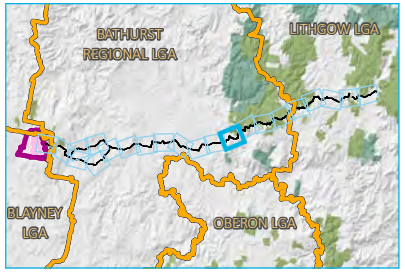
Fauna survey effort – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.4.h

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Pipeline underbore section

Fauna survey effort

- Hollow-bearing tree
- *Bursaria spinosa* survey - Bathurst Copper Butterfly host plant (EMM, 2020)

Source: EMM (2020); Regis Resources (2020); Premise (2020); ESRI (2020); OzArk (2019); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

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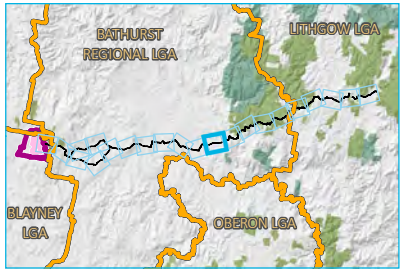
Fauna survey effort – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.4.i

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone

Fauna survey effort

- Hollow-bearing tree
- *Bursaria spinosa* survey - Bathurst Copper Butterfly host plant (EMM, 2020)

Source: EMM (2020); Regis Resources (2020); Premise (2020); ESRI (2020); OzArk (2019); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

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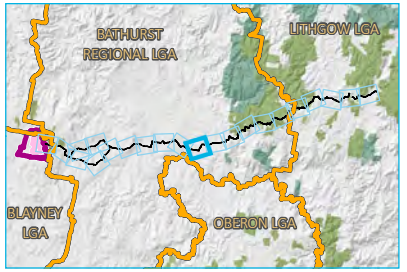
Fauna survey effort – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.4.j

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Rail line
- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Pipeline underbore section
- *Bursaria spinosa* survey - Bathurst Copper Butterfly host plant (EMM, 2020)

Source: EMM (2020); Regis Resources (2020); Premise (2020); ESRI (2020); OzArk (2019); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

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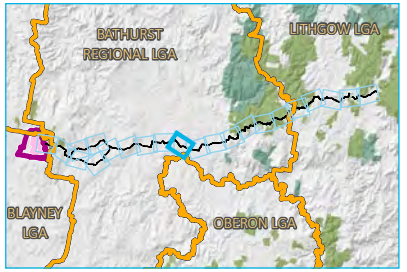
Fauna survey effort – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.4.k

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- *Bursaria spinosa* survey - Bathurst Copper Butterfly host plant (EMM, 2020)

Source: EMM (2020); Regis Resources (2020); Premise (2020); ESRI (2020); OzArk (2019); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

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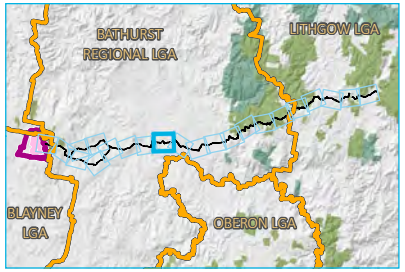
Fauna survey effort – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.4.l

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Pipeline underbore section
- *Bursaria spinosa* survey - Bathurst Copper Butterfly host plant (EMM, 2020)

Source: EMM (2020); Regis Resources (2020); Premise (2020); ESRI (2020); OzArk (2019); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

N

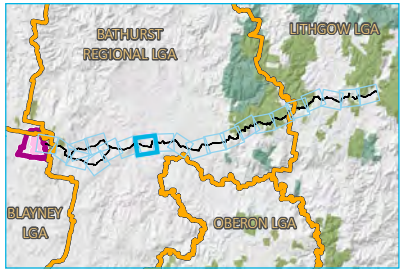
\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02 Maps\ BDAR\BDAR013 PipelineFaunaEffortDDP 20200818 02.mxd 18/08/2020

Fauna survey effort – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.4.m

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Rail line
- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Pipeline underbore section
- *Bursaria spinosa* survey - Bathurst Copper Butterfly host plant (EMM, 2020)

\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02 Maps\ BDAR\BDAR013 PipelineFaunaEffortDDP 20200818 02.mxd 18/08/2020

Source: EMM (2020); Regis Resources (2020); Premise (2020); ESRI (2020); OzArk (2019); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

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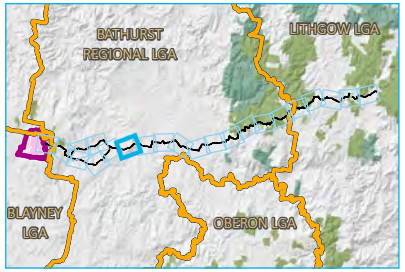
Fauna survey effort – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.4.n

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Rail line
- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone

Fauna survey effort

- Hollow-bearing tree
- *Bursaria spinosa* survey - Bathurst Copper Butterfly host plant (EMM, 2020)

Source: EMM (2020); Regis Resources (2020); Premise (2020); ESRI (2020); OzArk (2019); DFSI (2017)

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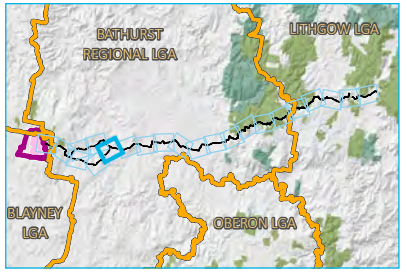
Fauna survey effort – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.4.o

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Major road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone

Fauna survey effort

- Hollow-bearing tree
- *Bursaria spinosa* survey - Bathurst Copper Butterfly host plant (EMM, 2020)

\\Emmsvr1\emm\Jobs\2018\I180395 - Regis McPhillamys EIS\GIS\02 Maps\ BDAR\BDAR013 PipelineFaunaEffortDDP 20200818 02.mxd 18/08/2020

Source: EMM (2020); Regis Resources (2020); Premise (2020); ESRI (2020); OzArk (2019); DFSI (2017)

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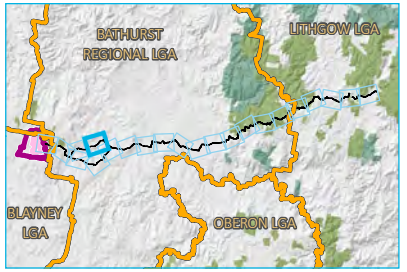
Fauna survey effort – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.4.p

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone

Source: EMM (2020); Regis Resources (2020); Premise (2020); ESRI (2020); OzArk (2019); DFSI (2017)

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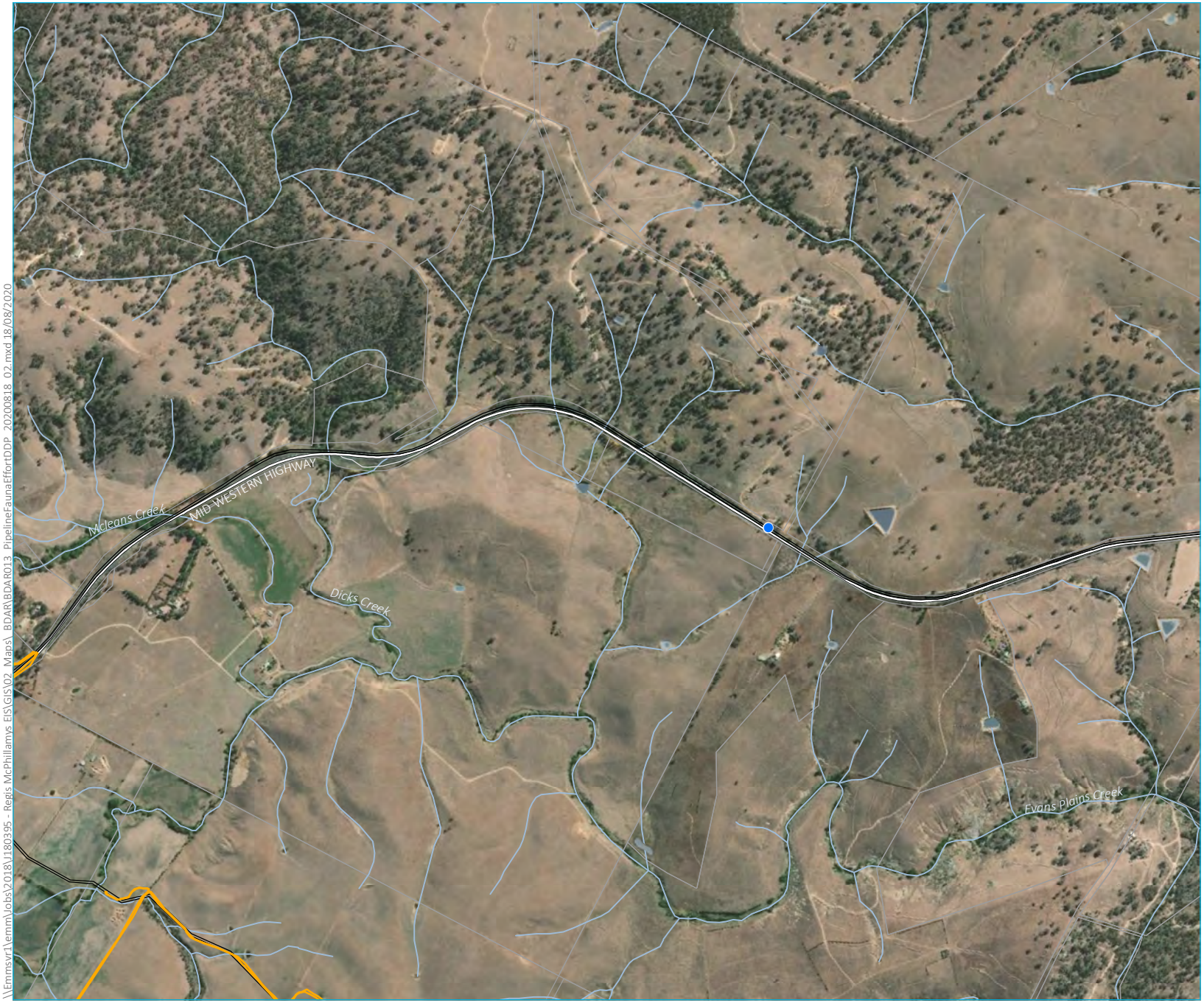
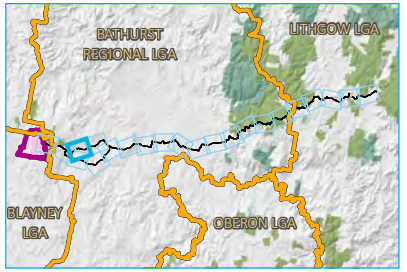
Fauna survey effort – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.4.q

REGIS RESOURCES LTD

EMM creating opportunities





KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone

Fauna survey effort

- Hollow-bearing tree
- *Bursaria spinosa* survey - Bathurst Copper Butterfly host plant (EMM, 2020)

Source: EMM (2020); Regis Resources (2020); Premise (2020); ESRI (2020); OzArk (2019); DFSI (2017)

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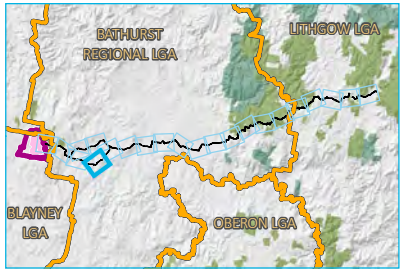
Fauna survey effort – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.4.r

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Rail line
- Major road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone

Fauna survey effort

- Hollow-bearing tree
- Raptor nest
- *Bursaria spinosa* survey - Bathurst Copper Butterfly host plant (EMM, 2020)

Source: EMM (2020); Regis Resources (2020); Premise (2020); ESRI (2020); OzArk (2019); DFSI (2017)

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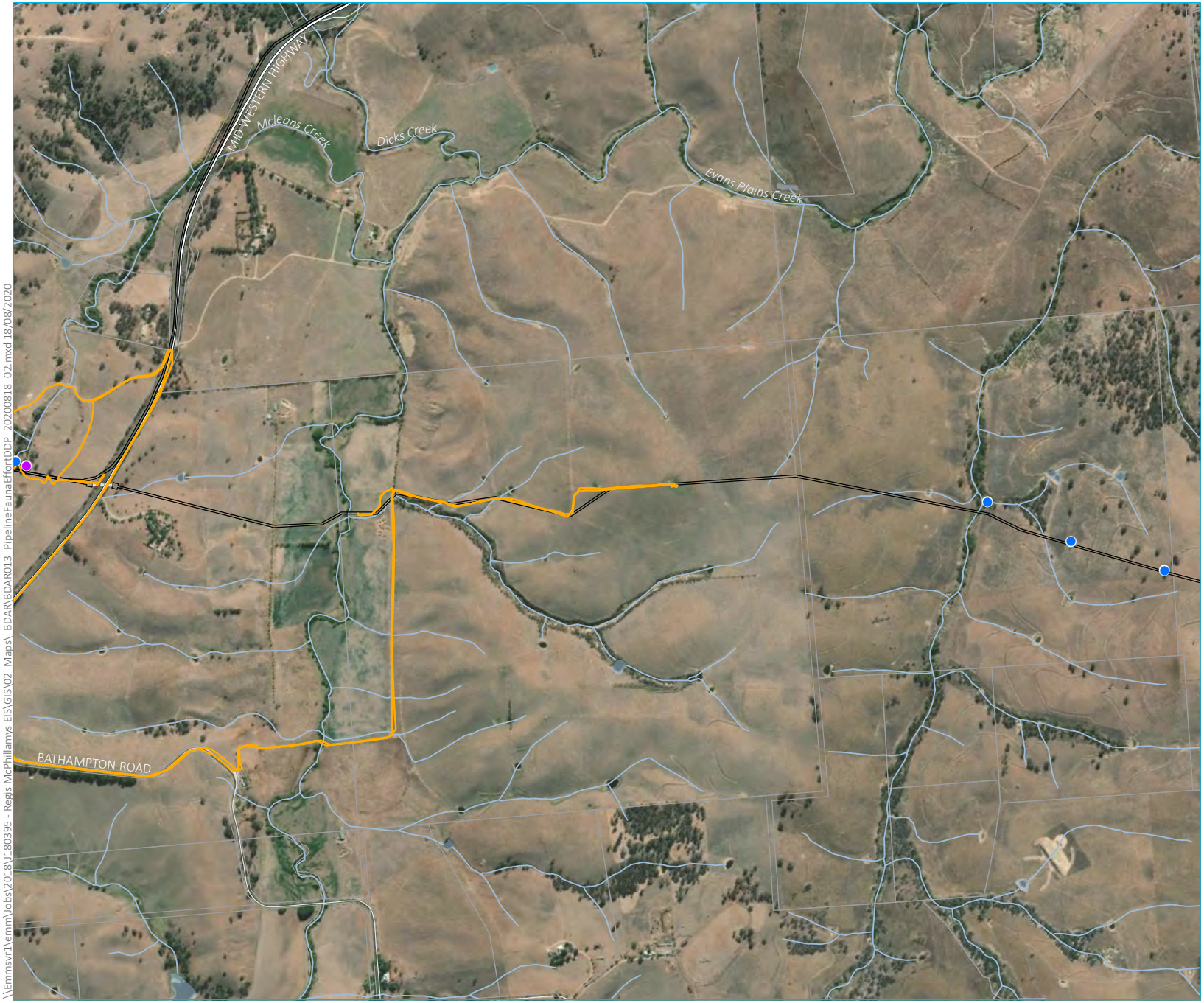
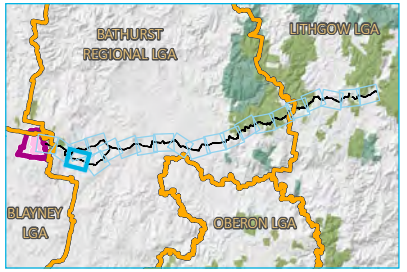
Fauna survey effort – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.4.s

REGIS RESOURCES LTD

EMM creating opportunities





KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Pipeline underbore section

Fauna survey effort

- Hollow-bearing tree
- Raptor nest
- *Bursaria spinosa* survey - Bathurst Copper Butterfly host plant (EMM, 2020)

Source: EMM (2020); Regis Resources (2020); Premise (2020); ESRI (2020); OzArk (2019); DFSI (2017)

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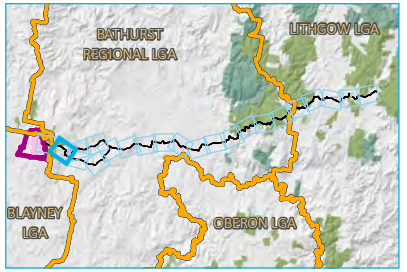
Fauna survey effort – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.4.t

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area
  (Note: boundary offset for clarity)
- Direct impact management zone
- Pipeline underbore section

Fauna survey effort

- Hollow-bearing tree
- Raptor nest
- *Bursaria spinosa* survey - Bathurst Copper Butterfly host plant (EMM, 2020)

Source: EMM (2020); Regis Resources (2020); Premise (2020); ESRI (2020); OzArk (2019); DFSI (2017)

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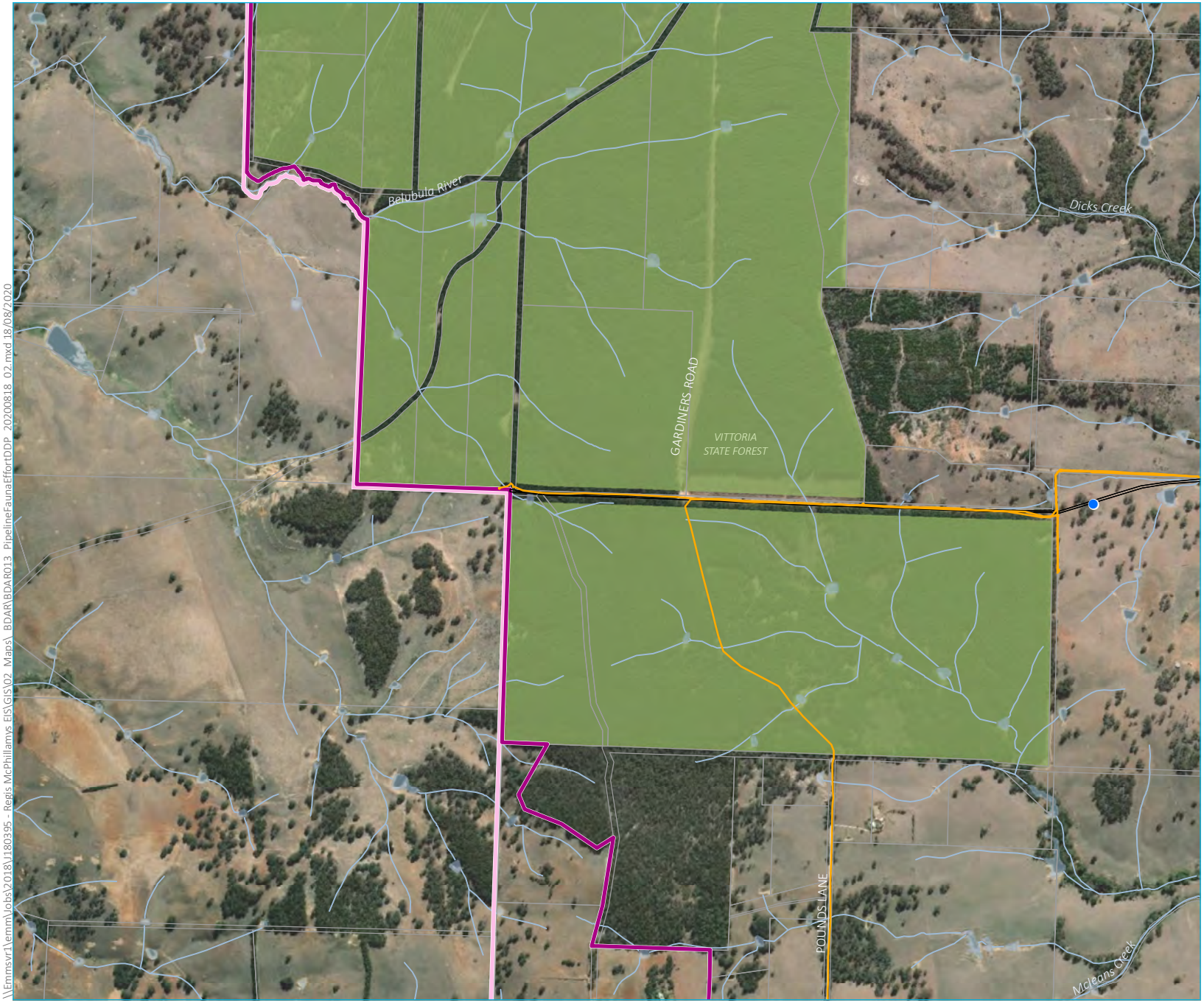
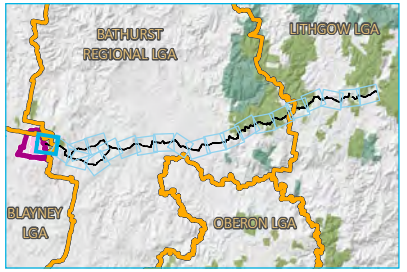
Fauna survey effort – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.4.u

REGIS RESOURCES LTD

EMM creating opportunities





KEY

- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone

Fauna survey effort

- Hollow-bearing tree
- *Bursaria spinosa* survey - Bathurst Copper Butterfly host plant (EMM, 2020)

Source: EMM (2020); Regis Resources (2020); Premise (2020); ESRI (2020); OzArk (2019); DFSI (2017)

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Fauna survey effort – pipeline development

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Biodiversity development assessment report
Figure 5.4.v

REGIS RESOURCES LTD

EMM creating opportunities

5.2 Results

5.2.1 Habitat assessment

i Mine development

The mine project area has an extensive history of use for agricultural purposes, particularly for grazing. As a result, the mine 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 mine 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.

ii Pipeline development

Much of the pipeline corridor, particularly within the Bathurst IBRA subregion, comprises of cleared agricultural land used for grazing and cropping and plantations of *Pinus radiata* within state forests. Native vegetation consists of areas of paddock trees over exotic pasture and open woodlands in the western part of the pipeline corridor, to forests in the higher altitudes in the eastern part of the pipeline corridor.

The pipeline corridor crosses watercourses mapped as key fish habitat (KFH) with five identified as Highly Sensitive fish habitat. Five major streams in the pipeline corridor contain potential habitat for Platypus and turtles.

5.2.2 Predicted species assessment

i Mine development

Ecosystem credit species predicted by the BAMC for the mine development are provided in Table 5.9. A justification has been provided where predicted species have been excluded.

Table 5.9 Predicted species assessment – mine development

Scientific name	Common name	Associated PCTs	Justification for exclusion
Anthochaera phrygia	Regent Honeyeater	1330	Excluded from poor vegetation zones due to general absence of canopy and shrub species
Artamus cyanopterus cyanopterus	Dusky Woodswallow	1330, 727	Excluded from poor vegetation zones due to general absence of canopy and shrub species
Callocephalon fimbriatum	Gang-gang Cockatoo	1330, 727	Excluded from poor vegetation zones due to general absence of canopy and shrub species
Calyptorhynchus lathami	Glossy Black-Cockatoo	1330	Excluded from poor vegetation zones due to general absence of canopy and shrub species
Chthonicola sagittata	Speckled Warbler	1330, 727	Excluded from poor vegetation zones due to general absence of canopy and shrub species
Circus assimilis	Spotted Harrier	766	Not excluded.
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	1330, 727	Excluded from poor vegetation zones due to general absence of canopy and shrub species
Daphoenositta chrysoptera	Varied Sittella	1330, 727	Excluded from poor vegetation zones due to general absence of canopy and shrub species
Dasyurus maculatus	Spotted-tailed Quoll	951, 1330, 727	Not excluded
Epthianura albifrons	White-fronted Chat	N/A	Excluded from poor vegetation zones due to general absence of canopy and shrub species
Glossopsitta pusilla	Little Lorikeet	1330	Excluded from poor vegetation zones due to general absence of canopy and shrub species
Grantiella picta	Painted Honeyeater	1330, 727	Excluded from poor vegetation zones due to general absence of canopy and shrub species
Haliaeetus leucogaster	White-bellied Sea-Eagle	1330	Excluded from poor vegetation zones due to general absence of canopy and shrub species
Hieraaetus morphnoides	Little Eagle	1330, 727	Excluded from poor vegetation zones due to general absence of canopy and shrub species
Lathamus discolor	Swift Parrot	1330	Excluded from poor vegetation zones due to general absence of canopy and shrub species

Table 5.9 Predicted species assessment – mine development

Scientific name	Common name	Associated PCTs	Justification for exclusion
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	1330	Excluded from poor vegetation zones due to general absence of canopy and shrub species
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	1330	Excluded from poor vegetation zones due to general absence of canopy and shrub species
Miniopterus orianae oceanensis	Large Bent-winged Bat	1330, 727	Excluded from poor vegetation zones due to general absence of canopy and shrub species
Neophema pulchella	Turquoise Parrot	1330	Excluded from poor vegetation zones due to general absence of canopy and shrub species
Ninox connivens	Barking Owl	1330, 727	Excluded from poor vegetation zones due to general absence of canopy and shrub species
Ninox strenua	Powerful Owl	1330, 727	Excluded from poor vegetation zones due to general absence of canopy and shrub species
Petroica boodang	Scarlet Robin	1330, 727	Excluded from poor vegetation zones due to general absence of canopy and shrub species
Petroica phoenicea	Flame Robin	1330, 727	Excluded from poor vegetation zones due to general absence of canopy and shrub species
Phascolarctos cinereus	Koala	951, 1330, 727	Excluded from poor vegetation zones (excepting PCT 951) due to general absence of canopy and shrub species
Polytelis swainsonii	Superb Parrot	1330	Excluded from poor vegetation zones due to general absence of canopy and shrub species
Pteropus poliocephalus	Grey-headed Flying-fox	1330	Excluded from poor vegetation zones due to general absence of canopy and shrub species
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	951, 1330, 766	Not excluded
Stagonopleura guttata	Diamond Firetail	1330, 727	Excluded from poor vegetation zones due to general absence of canopy and shrub species
Varanus rosenbergi	Rosenberg's Goanna	1330, 727	Not excluded

ii Pipeline development

Ecosystem credit species predicted by the BAMC for the pipeline development (southern option) are provided in Table 5.10. A justification has been provided where predicted species have been excluded.

Table 5.10 Predicted species assessment- pipeline development

Scientific name	Common name	Associated PCTs					Justification for exclusion
		Orange IBRA subregion	Bathurst IBRA subregion (southern option)	Bathurst IBRA subregion (northern option)	Hill End IBRA subregion	Capertee Uplands IBRA subregion	
Anthochaera phrygia	Regent Honeyeater	1093, 277	277, 1330	277, 1330	1093, 1191, 1330	1093, 1191	Excluded from DNG and Shrubland zones due to general absence of canopy species
Artamus cyanopterus cyanopterus	Dusky Woodswallow	1093, 277	277, 1330	277, 1330	727, 1093, 1191, 1197, 1330	1093, 1191	Not excluded
Callocephalon fimbriatum fimbriatum	Gang-gang Cockatoo	1093, 277	277, 1330	277, 1330	727, 1093, 1191, 1197, 1330	1093, 1191	Excluded from DNG and Shrubland zones due to general absence of canopy species
Calyptorhynchus lathami	Glossy Black-Cockatoo	1093	1330	1330	1093, 1191, 1330	1093, 1191	Excluded from all zones due to absence of habitat constraint
Chthonicola sagittata	Speckled Warbler	1093, 277	277, 1330	277, 1330	727, 1093, 1191, 1330	1093, 1191	Not excluded
Circus assimilis	Spotted Harrier	277	277	277	1191	1191	Not excluded
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	1093, 277	277, 1330	277, 1330	727, 1093, 1191, 1330	1093, 1191	Excluded from DNG and Shrubland zones due to general absence of canopy species
Daphoenositta chrysoptera	Varied Sittella	1093, 277	277, 1330	277, 1330	727, 1093, 1191, 1197, 1330	1093, 1191	Excluded from DNG and Shrubland zones due to general absence of canopy species
Dasyurus maculatus	Spotted-tailed Quoll	1093, 277	277, 1330	277, 1330	727, 1093, 1191, 1197, 1330	1093, 1191	Not excluded
Falsistrellus tasmaniensis	Eastern False Pipistrelle	N/A	277, 1330	277, 1330	1093, 1191, 1197, 1330	1093, 1191	Excluded from DNG and Shrubland zones due to general absence of canopy species

Table 5.10 Predicted species assessment- pipeline development

Scientific name	Common name	Associated PCTs					Justification for exclusion
		Orange IBRA subregion	Bathurst IBRA subregion (southern option)	Bathurst IBRA subregion (northern option)	Hill End IBRA subregion	Capertee Uplands IBRA subregion	
Glossopsitta pusilla	Little Lorikeet	1093, 277	277, 1330	277, 1330	1093, 1191, 1330	1093, 1191	Excluded from DNG and Shrubland zones due to general absence of canopy species
Grantiella picta	Painted Honeyeater	1093, 277	277, 1330	277, 1330	727, 1093, 1330	1093	Excluded from DNG and Shrubland zones due to general absence of canopy species
Haliaeetus leucogaster	White-bellied Sea-Eagle	277	277, 1330	277, 1330	1191, 1330	1191	Excluded from DNG and Shrubland zones due to general absence of canopy species
Hieraaetus morphnoides	Little Eagle	1093, 277	277, 1330	277, 1330	727, 1093, 1191, 1197, 1330	1093, 1191	Excluded from DNG and Shrubland zones due to general absence of canopy species
Lathamus discolor	Swift Parrot	277	277, 1330	277, 1330	1330	NA	Excluded from DNG and Shrubland zones due to general absence of canopy species
Lophoictinia isura	Square-tailed Kite	1093, 277	277	277	1093	1093	Excluded from DNG and Shrubland zones due to general absence of canopy species
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	1093, 277	277, 1330	277, 1330	1093, 1191, 1197, 1330	1093, 1191	Not excluded
Melithreptus gularis gularis	Black-chinned Honeyeater (easternsubspecies)	277	277, 1330	277, 1330	1330	NA	Excluded from DNG and Shrubland zones due to general absence of canopy species
Miniopterus orianae oceanensis	Large Bent-winged Bat	1093, 277	277, 1330	277, 1330	727, 1093, 1191, 1197, 1330	1093, 1191	Excluded from DNG and Shrubland zones due to general absence of canopy species
Neophema pulchella	Turquoise Parrot	1093, 277	NA	NA	1093, 1191, 1330	1093, 1191	Excluded from DNG and Shrubland zones due to general absence of canopy species

Table 5.10 Predicted species assessment- pipeline development

Scientific name	Common name	Associated PCTs					Justification for exclusion
		Orange IBRA subregion	Bathurst IBRA subregion (southern option)	Bathurst IBRA subregion (northern option)	Hill End IBRA subregion	Capertee Uplands IBRA subregion	
Ninox connivens	Barking Owl	1093, 277	277, 1330	277, 1330	727, 1093, 1191, 1330	1093, 1191	Excluded from DNG and Shrubland zones due to general absence of canopy species
Ninox strenua	Powerful Owl	1093	1330	1330	727, 1093, 1191, 1197, 1330	1093, 1191	Excluded from DNG and Shrubland zones due to general absence of canopy species
Petaurus australis	Yellow-bellied Glider	1093	1330	1330	1093, 1191, 1197, 1330	1093, 1191	Excluded from DNG and Shrubland zones due to general absence of canopy species
Petroica boodang	Scarlet Robin	1093, 277	277, 1330	277, 1330	727, 1093, 1191, 1197, 1330	1093, 1191	Not excluded
Petroica phoenicea	Flame Robin	1093, 277	277, 1330	277, 1330	727, 1093, 1191, 1197, 1330	1093, 1191	Not excluded
Phascolarctos cinereus	Koala	1093, 277	277, 1330	277, 1330	727, 1093, 1191, 1197, 1330	1093, 1191	Excluded from DNG and Shrubland zones due to general absence of canopy species
Polytelis swainsonii	Superb Parrot	277	277, 1330	277, 1330	1330	NA	Excluded from DNG and Shrubland zones due to general absence of canopy species
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	277	NA	NA	NA	NA	Excluded from DNG and Shrubland zones due to general absence of canopy species
Pteropus poliocephalus	Grey-headed Flying-fox	1093, 277	277, 1330	277, 1330	NA	1093	Excluded from DNG and Shrubland zones due to general absence of canopy species
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	1093, 277	277, 1330	277, 1330	1093, 1197, 1330	1093	Not excluded

Table 5.10 Predicted species assessment- pipeline development

Scientific name	Common name	Associated PCTs					Justification for exclusion
		Orange IBRA subregion	Bathurst IBRA subregion (southern option)	Bathurst IBRA subregion (northern option)	Hill End IBRA subregion	Capertee Uplands IBRA subregion	
Scoteanax rueppellii	Greater Broad-nosed Bat	N/A	1330	1330	1093, 1191, 1197, 1330	1093, 1191	Excluded from DNG and Shrubland zones due to general absence of canopy species
Stagonopleura guttata	Diamond Firetail	1093, 277	277, 1330	277, 1330	727, 1093, 1191, 1197, 1330	1093, 1191	Not excluded
Tyto novaehollandiae	Masked Owl	N/A	277, 1330	277, 1330	727, 1093, 1191, 1197, 1330	1093, 1191	Excluded from DNG and Shrubland zones due to general absence of canopy species
Varanus rosenbergi	Rosenberg's Goanna	1093	1330	1330	727, 1093, 1191, 1330	1093, 1191	Not excluded

5.2.3 Candidate species assessment

i Mine development

Candidate species predicted by the BAMC relevant to the mine development are shown in Table 5.11. An assessment of the geographic and landscape constraints has been provided for each species, with a justification provided where species have been excluded, in accordance with steps 1 and 2 in the BAM.

Species polygons are shown on Figure 5.5.

Table 5.11 Candidate threatened species assessment – mine development

Step 1 – Identify threatened species for assessment		Step 2 – Assessment of habitat constraints and vagrant species			Step 3 – Identify candidate species for further assessment	Step 4 – Determine presence/absence of candidate species	Step 5 – Determine the area or count and location of suitable habitat for a species credit species
Scientific name	**Common name**	**Habitat/geographic constraints**	**Constraint present in mine disturbance footprint?**	**Vagrant species?**	**Candidate species (yes/no) and rationale**	**Species recorded during targeted surveys?**	**Species polygon calculation method**
Flora							
Eucalyptus aggregata	Black Gum	N/A	N/A	N/A	Yes. 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.	No	-
Eucalyptus robertsonii subsp. hemisphaerica	Robertson's Peppermint	N/A	N/A	N/A	No. Habitat degraded. The site does not contain required microhabitats including quartzite ridges, upper slopes and a slight rise of shallow clay over volcanics.	-	-
Eucalyptus canobolensis	Silver-Leaf Candlebark	N/A	N/A	N/A	No. Habitat degraded. Known only from Mt Canobolas near Orange. Mine project area is outside species range.	-	-
Swainsona recta	Small Purple-pea	N/A	N/A	N/A	Yes. Species occurs in a variety of woodlands, including Box Gum Woodland, generally with an understorey dominated by Kangaroo Grass (*Themeda triandra*), Poa tussocks (*Poa* spp.) and Spear-grasses (*Austrostipa* spp.). There are records south of the mine project area, near Carcoar. Such woodlands occur on site.	No	-
Swainsona sericea	Silky Swainson-pea	N/A	N/A	N/A	Yes. Species is associated with Box Gum Woodland, which occurs on site.	No	-
Acacia meiantha	-	N/A	N/A	N/A	Yes. Habitat is degraded. Although PCT 727 contains Brittle Gum (an associated species). An expert report was prepared Premise 2020b). This report concluded that *Acacia meiantha* is unlikely to occur as the site is lower than 900 m in elevation.	No (expert report)	-
Prostanthera gilesii	-	N/A	N/A	N/A	No. Habitat is degraded. The site does not contain the required habitat association of wet sclerophyll forest containing tall *Eucalyptus dalrympleana* subsp. *dalrympleana*, with scattered *E. canobolensis* and *E. dives* or the required soil association of a deep basaltic clay-loam with alluvial deposits on the lower slopes.	-	-
Fauna							
Anthochaera phrygia	Regent Honeyeater	Important mapped areas (breeding).[1]	No	N/A	No. The site is not a mapped important area.	-	-
Aprasia parapulchella	Pink-tailed Legless Lizard	Rocky areas, or within 50m of rocky areas.	Yes	No	Yes. The site contains some well-drained areas of Box Gum Woodland with partially buried rocks.	No	-
Burhinus grallarius	Bush Stone-curlew	Fallen/standing dead timber including logs.	Yes	No	Yes. The site contains some open areas of Box Gum Woodland with fallen timber.	No	-
Callocephalon fimbriatum	Gang-gang Cockatoo	Eucalypt tree species with hollows greater than 9 cm diameter	Yes	No	Yes. The site contains eucalypts with hollows greater than 9cm diameter.	No	-

Table 5.11 Candidate threatened species assessment – mine development

Step 1 – Identify threatened species for assessment		Step 2 – Assessment of habitat constraints and vagrant species			Step 3 – Identify candidate species for further assessment	Step 4 – Determine presence/absence of candidate species	Step 5 – Determine the area or count and location of suitable habitat for a species credit species
Scientific name	**Common name**	**Habitat/geographic constraints**	**Constraint present in mine disturbance footprint?**	**Vagrant species?**	**Candidate species (yes/no) and rationale**	**Species recorded during targeted surveys?**	**Species polygon calculation method**
Calyptorhynchus lathami	Glossy Black-Cockatoo	Living or dead tree with hollows greater than 15cm diameter and greater than 5m above ground.	Yes	No	No. Habitat degraded. While the site contains the habitat constraints of this species, their preferred foraging habitat is absent from the site.	-	-
Cercartetus nanus	Eastern Pygmy-possum	N/A	N/A	No	Yes. Found in a broad range of habitats, usually with a complex midstorey. The habitat in the mine project area is considered marginal and the mine project area is outside of the species range, with no recent records within proximity to the mine project area. All habitat within the site considered marginal to suboptimal 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.	No	-
Chalinolobus dwyeri	Large-eared Pied Bat	Cliffs; Within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels.[1]	No	No	No. The required habitat constraints are absent from the site.	-	-
Haliaeetus leucogaster	White-bellied Sea-Eagle	Living or dead mature trees within suitable vegetation within 1km of a rivers, lakes, large dams or creeks, wetlands and coastlines	Yes	No	Yes. Potential breeding habitat is present at the site, including live large old trees within 1km of a rivers.	No	-
Hieraaetus morphnoides	Little Eagle	Nest trees - live (occasionally dead) large old trees within vegetation.	No	Yes	Yes. The site contains potentially suitable habitat for the species including open eucalypt forest, woodland and open woodland.	No	-
Lathamus discolor	Swift Parrot	Important mapped areas[1]	No	No	No. The site is not a mapped important area.	-	-
Litoria booroolongensis	Booroolong Frog	N/A	N/A	No	No. Habitat degraded. The mine project area does not support permanent streams, with all waterways declining to disconnected ponds during low flow. Further, waterways within the mine project area do not support cobble banks or other rock substrate along stream margins that would provide breeding habitat for this species. The mine project area does not provide suitable habitat for this species.	-	-
Litoria castanea	Yellow-spotted Tree Frog	N/A	Yes	No	No. Habitat degraded. The species requires large permanent ponds or slow flowing 'chain-of-ponds' streams with abundant emergent vegetation such as bulrushes and aquatic vegetation. Emergent and aquatic vegetation is largely absent from the site and creek condition is degraded.	-	-

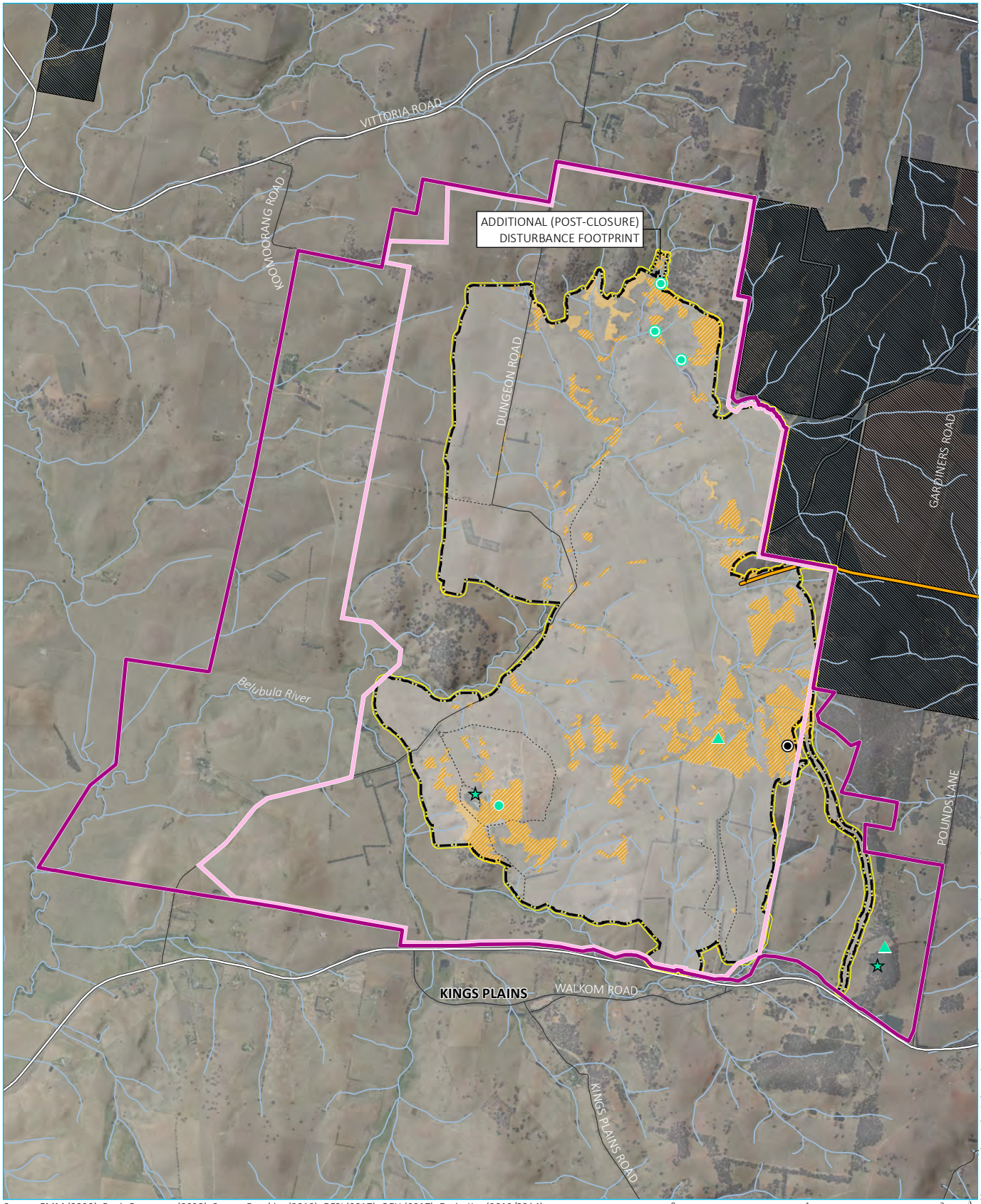
Table 5.11 Candidate threatened species assessment – mine development

Step 1 – Identify threatened species for assessment		Step 2 – Assessment of habitat constraints and vagrant species			Step 3 – Identify candidate species for further assessment	Step 4 – Determine presence/absence of candidate species	Step 5 – Determine the area or count and location of suitable habitat for a species credit species
Scientific name	**Common name**	**Habitat/geographic constraints**	**Constraint present in mine disturbance footprint?**	**Vagrant species?**	**Candidate species (yes/no) and rationale**	**Species recorded during targeted surveys?**	**Species polygon calculation method**
Miniopterus orianae oceanensis	Large Bent-winged Bat	Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records with microhabitat code "IC - in cave;" observation type code "E nest-roost;" with numbers of individuals >500.[1]	No	No	No. The required habitat constraints are absent from the site.	-	-
Myotis macropus	Southern Myotis	Hollow-bearing trees; Within 200 m of riparian zone; Bridges, caves or artificial structures within 200 m of riparian zone; Waterbodies, including rivers, creeks, billabongs, lagoons, dams and other waterbodies on or within 200m of the site.	Yes	No	Yes. The mine project area supports hollow-bearing trees, bridges and artificial structures.	No	-
Ninox connivens	Barking Owl	Living or dead trees with hollows greater than 20 cm diameter and greater than 4m above the ground.	Yes	No	Yes. The site contains living or dead trees with hollows greater than 20 cm diameter and greater than 4m above the ground.	No	-
Ninox strenua	Powerful Owl	Living or dead trees with hollow greater than 20cm diameter	Yes	No	Yes. The site contains living or dead trees with hollow greater than 20cm diameter	No	-
Petaurus norfolcensis	Squirrel Glider	N/A	N/A	No	Yes. The mine project area supports forests and woodlands dominated by Box species, although a shrubby or *Acacia* 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.	Yes	The species polygon for Squirrel Glider is the sum of all PCTs that contain woodlands (PCT 727, 951 and 1330).
Phascogale tapoatafa	Brush-tailed Phascogale	N/A	N/A	No	Yes. PCT 727 contains dry sclerophyll open forest with sparse groundcover of herbs, grasses, shrubs or leaf litter, which the species prefers.	No	-
Phascolarctos cinereus	Koala	Important' habitat (however this is not a mapped important habitat area), defined by the density of koalas and quality of habitat determined by on-site survey	Yes	No	Yes. The Koala occurs in a wide variety of forests and woodlands. Five species listed under Koala SEPP as feed trees in the central and southern koala management area, namely Apple Box, Broad-leaved Peppermint, Bundy, Yellow Box and Ribbon Gum are present. There are records in proximity to the project area.	Yes	The species polygon for the Koala is the sum of PCT 727_High, 727_Moderate, 727_Intact, 1330_High, 1330_Moderate and 951_poor, which contain the key feed tree species listed under SEPP (Koala Habitat Protection) 2019 for the central and southern tablelands koala management area.

Table 5.11 Candidate threatened species assessment – mine development

Step 1 – Identify threatened species for assessment		Step 2 – Assessment of habitat constraints and vagrant species			Step 3 – Identify candidate species for further assessment	Step 4 – Determine presence/absence of candidate species	Step 5 – Determine the area or count and location of suitable habitat for a species credit species
Scientific name	**Common name**	**Habitat/geographic constraints**	**Constraint present in mine disturbance footprint?**	**Vagrant species?**	**Candidate species (yes/no) and rationale**	**Species recorded during targeted surveys?**	**Species polygon calculation method**
Polytelis swainsonii	Superb Parrot	Living or dead *E. blakelyi, E. melliodora, E. albens, E. camaldulensis, E. microcarpa, E. polyanthemos, E. mannifera, E. intertexta* with hollows greater than 5cm diameter; greater than 4m above ground or trees with a DBH of greater than 30cm.	Yes	Yes	No. Species is vagrant. The Superb Parrot breeds in 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. polyanthemos). 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.	-	-
Pteropus poliocephalus	Grey-headed Flying-fox	Breeding camps	No	No	No. The Grey-headed Flying-fox is not a candidate species as it required habitat constraint is absent.	-	-

1. This habitat constraint is not appearing in the BAMC, and therefore "habitat degraded" has been selected to remove the species from the candidate species list.



Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); OEH (2017); EnviroKey (2013/2014)

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KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Additional (post-closure) disturbance footprint
- Pipeline

Existing environment
- Major road
- Minor road
- Vehicular track
- Watercourse/drainage line
- Vittoria State Forest
- Weed impact management zone (WIMZ)
- Koala species polygon
- Squirrel Glider species polygon

Threatened fauna species (EMM, 2019)
- Squirrel Glider (3)
- Koala (1)

Threatened fauna species (EnviroKey)

May 2013 sightings
- Squirrel Glider (3)

November 2013 sightings
- Squirrel Glider (4)

March 2014 sightings
- Squirrel Glider (2)

Species polygons - mine development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.5

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EMM creating opportunities

ii Pipeline development

Candidate species predicted by the BAMC relevant to the pipeline development are shown in Table 5.12. An assessment of the geographic and landscape constraints has been provided for each species, with a justification provided where species have been excluded, in accordance with steps 1 and 2 in the BAM.

Species polygons are shown on Figure 5.6.

Table 5.12 Candidate threatened species assessment – pipeline development

Step 1 - Identify candidate spp for assessment		Predicted subregions	Step 2 - assessment of habitat constraints and vagrant spp										Step 3 - Identify candidate spp for further assessment					Step 4 - Determine presence/absence of candidate spp	Step 5 - Determine area or count and location of suitable habitat for candidate spp
Scientific name	Common name		Habitat/geographic constraints	Constraint present in pipeline disturbance footprint?					Habitat degraded or vagrant species?					Rationale					
				OR	BA (sth)	BA (nth)	HE	CU	OR	BA (sth)	BA (nth)	HE	CU	OR	BA (sth)	BA (nth)	HE	CU	
Flora																			
Acacia flocktoniae	Flockton Wattle	BA (sth), BA (nth)	-	N/A	-	-	N/A	N/A	N/A	-	-	N/A	N/A	N/A	Yes. Potentially suitable habitat present.	Yes. Potentially suitable habitat present.	N/A	N/A	Not recorded during targeted surveys by OzArk or EMM.	-
Lepidium hyssopifolium	Basalt Peppercress	BA (sth), BA (nth)	-	N/A	N/A	N/A	N/A	N/A	N/A	-	-	N/A	N/A	N/A	Yes. Potentially suitable habitat present.	Yes. Potentially suitable habitat present.	N/A	N/A	Not recorded targeted during surveys. Presence assumed in BA (sth) and BA (north).	In higher quality Box Gum Woodland that is ungrazed, in BA sth and nth (PCT 1330_Intact, 1330_DNG, 1330_Shrubland, 277_Intact and 277 Moderate).
Swainsona recta	Small Purple-pea	OR	-	N/A	N/A	N/A	N/A	N/A	-	N/A	N/A	N/A	N/A	Yes. Potentially suitable habitat present.	N/A	N/A	N/A	N/A	Not recorded targeted during surveys. Assumed present in OR.	In higher quality Box Gum Woodland that is ungrazed, in OR (PCT 277_Intact, 277_Moderate).
Swainsona sericea	Silky Swainson-pea	All	-	N/A	N/A	N/A	N/A	N/A	-	-	-	-	Habitat degraded. Too far east from species known distribution.	Yes. Potentially suitable habitat present.	Yes. Potentially suitable habitat present.	Yes. Potentially suitable habitat present.	Yes. Potentially suitable habitat present.	No. Habitat degraded.	Not targeted during surveys. Assumed present in OR, BA (sth), BA (north) and HE.	In higher quality Box Gum Woodland that is ungrazed, in OR (PCT 277_Intact, 277_Moderate), BA sth and nth (PCT 1330_Intact, 1330_DNG, 1330_Shrubland) and HE (PCT 1191_Intact and 1330_Intact).

Table 5.12 Candidate threatened species assessment – pipeline development

Step 1 - Identify candidate spp for assessment		Predicted subregions	Step 2 - assessment of habitat constraints and vagrant spp										Step 3 - Identify candidate spp for further assessment					Step 4 - Determine presence/absence of candidate spp	Step 5 - Determine area or count and location of suitable habitat for candidate spp
Scientific name	Common name		Habitat/geographic constraints	Constraint present in pipeline disturbance footprint?					Habitat degraded or vagrant species?				Rationale						
				OR	BA (sth)	BA (nth)	HE	CU	OR	BA (sth)	BA (nth)	HE	CU	OR	BA (sth)	BA (nth)	HE	CU		
Thesium australe	Austral Toadflax	BA (sth), BA (nth), CU	-	N/A	N/A	N/A	N/A	N/A	N/A	-	-	N/A	Habitat degraded. The understorey of woodlands is degraded and does not contain suitable patches of Kangaroo Grass.	N/A	Yes. Potentially suitable habitat present.	Yes. Potentially suitable habitat present.	No. Habitat degraded.	N/A	Not targeted during surveys. Assumed present in BA (sth) and BA (nth).	In higher quality Box Gum Woodland that is ungrazed, in BA sth and nth (PCT 1330_Intact, 1330_DNG and 1330_Shrubland).
Eucalyptus cannonii	Capertee Stringybark	HE, CU	-	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-	-	N/A	N/A	N/A	Yes. Suitable habitat present.	Yes. Suitable habitat present.	Recorded by OzArk during targeted survey. EMM revisited these areas to collect samples to send to the National Herbarium. It was confirmed that the trees were a hybrid between Red Stringybark and Capertee Stringybark, and not the threatened species.	-
Eucalyptus pulverulenta	Silver-leaved Stringybark	HE, CU	-	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-	-	N/A	N/A	N/A	Yes. Potentially suitable habitat present.	Yes. Potentially suitable habitat present.	Not recorded during targeted survey.	-

Table 5.12 Candidate threatened species assessment – pipeline development

Step 1 - Identify candidate spp for assessment		Predicted subregions	Step 2 - assessment of habitat constraints and vagrant spp										Step 3 - Identify candidate spp for further assessment					Step 4 - Determine presence/absence of candidate spp	Step 5 - Determine area or count and location of suitable habitat for candidate spp
Scientific name	Common name		Habitat/geographic constraints	Constraint present in pipeline disturbance footprint?					Habitat degraded or vagrant species?					Rationale					
				OR	BA (sth)	BA (nth)	HE	CU	OR	BA (sth)	BA (nth)	HE	CU	OR	BA (sth)	BA (nth)	HE	CU	
Prasophyllum petilum	Tarengo Leek Orchid	CU	-	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-	N/A	N/A	N/A	N/A	Yes. Potentially suitable habitat present.	Expert report completed. Potentially present in CU (expert report).	This species has been excluded. Expert report has identified 0.62 ha potential habitat. Targeted surveys will be completed in November 2020 and if found, direct impacts will be avoided.
Persoonia marginata	Clandulla Geebung	HE and CU	-	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-	-	N/A	N/A	N/A	Yes. Potentially suitable habitat present.	Yes. Potentially suitable habitat present.	Absent from HE. Four individuals recorded in CU.	30 m buffer placed around each plant to be disturbed in CU in PCT 1093_Intact and 1093_Shrubland.
Acacia meiantha	-	OR, HE, CU	-	-	-	-	-	-	-	-	-	-	-	Y	N/A	N/A	Yes. Potentially suitable habitat present.	Yes. Potentially suitable habitat present.	Expert report has determined that the species is largely absent from the BA, OR and CU IBRA sub-regions where it was predicted to occur.	-
Eucalyptus aggregata	Black Gum	HE, CU	-	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-	-	N/A	N/A	N/A	Yes. Suitable habitat present.	Yes. Suitable habitat present.	Four individuals recorded in CU during targeted surveys by EMM. Not recorded during targeted surveys in HE.	One individual of this count-based species will be impacted in CU in PCT 1191_Sparse.
Acacia bynoeana	Bynoe's Wattle	HE	-	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-	N/A	N/A	N/A	N/A	N/A	Yes. Suitable habitat present.	N/A	Not recorded during targeted surveys by OzArk or EMM.	-

Table 5.12 Candidate threatened species assessment – pipeline development

Step 1 - Identify candidate spp for assessment		Predicted subregions	Step 2 - assessment of habitat constraints and vagrant spp										Step 3 - Identify candidate spp for further assessment					Step 4 - Determine presence/absence of candidate spp	Step 5 - Determine area or count and location of suitable habitat for candidate spp
Scientific name	Common name		Habitat/geographic constraints	Constraint present in pipeline disturbance footprint?					Habitat degraded or vagrant species?				Rationale						
				OR	BA (sth)	BA (nth)	HE	CU	OR	BA (sth)	BA (nth)	HE	CU	OR	BA (sth)	BA (nth)	HE	CU		
Grevillea divaricata	-	HE, CU	-	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Yes, potentially suitable habitat occurs.	Yes, potentially suitable habitat occurs.	N/A	N/A	N/A	No. Species not recorded during targeted surveys by OzArk.	No. Species not recorded during targeted surveys by OzArk.	-	-
Veronica blakelyi	-	HE	-	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-	N/A	N/A	N/A	N/A	Yes. Potentially suitable habitat present.	N/A	Assumed present in HE in suitable habitat.	Assumed present in PCT 1197_Intact in HE.
Eucalyptus robertsonii subsp. *hemispherica*	Robertson's Peppermint	CU	-	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-	N/A	N/A	N/A	N/A	Yes. Potentially suitable habitat present.	Not found during targeted survey.	-
Fauna																				
Aprasia parapulchella	Pink-tailed Worm Lizard	OR, BA (sth), BA (nth), CU	Rocky areas; Or within 50m of rocky areas	Yes	Yes	No	No	No	-	-	-	-	-	Yes. Habitat constraint present.	Yes. Habitat constraint present.	No. Habitat constraint absent.	No. Habitat constraint absent.	No. Habitat constraint absent.	Presence assumed in OR and BA (sth).	Areas containing granite outcropping in OR (PCT 277_Intact) and BA sth (PCT 1330_DNG, 1330_Intact and 1330_Sparse).

Table 5.12 Candidate threatened species assessment – pipeline development

Step 1 - Identify candidate spp for assessment		Predicted subregions	Step 2 - assessment of habitat constraints and vagrant spp										Step 3 - Identify candidate spp for further assessment					Step 4 - Determine presence/absence of candidate spp	Step 5 - Determine area or count and location of suitable habitat for candidate spp
Scientific name	Common name		Habitat/geographic constraints	Constraint present in pipeline disturbance footprint?					Habitat degraded or vagrant species?					Rationale					
				OR	BA (sth)	BA (nth)	HE	CU	OR	BA (sth)	BA (nth)	HE	CU	OR	BA (sth)	BA (nth)	HE	CU	
Litoria booroolongensis	Booroolong Frog	All	-	N/A	N/A	N/A	N/A	N/A	Habitat degraded. No cobble-lined streams suitable for breeding are present.	-	Habitat degraded. No cobble-lined streams suitable for breeding are present.	Habitat degraded. No cobble-lined streams suitable for breeding are present.	-	No. Habitat degraded.	Yes. Potentially suitable habitat present.	No. Habitat degraded.	No. Habitat degraded.	Yes. Potentially suitable habitat present.	Assumed present in BA (sth) and CU.	In creek crossings with rock or cobble banks. Instream area buffered by 50 m to estimate foraging habitats in BA sth (PCT 1330_Sparse), BA nth (non-native vegetation), CU (non-native vegetation, PCT 1191_Intact and 1191_Sparse).
Paralucia spinifera	Bathurst Copper Butterfly	BA (sth), BA (nth), HE, CU	Other; Bursaria spinosa or within 40m of Bursaria spinosa; Above 800 m altitude (CU only)	N/A	Yes. Habitat constraint present	No. Habitat constraint absent.	Yes. Habitat constraint present	Yes. Habitat and geographic constraints present	N/A	N/A	N/A	N/A	N/A	N/A	Yes. Habitat constraint present	No. Habitat constraint absent.	Yes. Habitat constraint present	Yes. Habitat and geographic constraints present	Absent from BA (sth). Host plants recorded in HE and CU. Pipeline disturbance footprint minimised to avoid direct impacts.	The pipeline disturbance footprint has been narrowed to avoid direct impacts. Indirect impacts calculated within 40 m buffer area of host plants.
Petaurus norfolcensis	Squirrel Glider	All	-	N/A	N/A	N/A	N/A	N/A	-	-	-	-	-	Yes. Potentially suitable habitat present.					Assumed present in all IBRA subregions.	In woodland areas with a minimum distance of approximately 60 m between trees in OR (PCT 1093_Intact and 277_Intact), BA sth and nth (PCT 1330_Intact, 1330_Shrubland and 1330_Sparse).

Table 5.12 Candidate threatened species assessment – pipeline development

Step 1 - Identify candidate spp for assessment		Predicted subregions	Step 2 - assessment of habitat constraints and vagrant spp										Step 3 - Identify candidate spp for further assessment					Step 4 - Determine presence/absence of candidate spp	Step 5 - Determine area or count and location of suitable habitat for candidate spp
Scientific name	Common name		Habitat/geographic constraints	Constraint present in pipeline disturbance footprint?					Habitat degraded or vagrant species?					Rationale					
				OR	BA (sth)	BA (nth)	HE	CU	OR	BA (sth)	BA (nth)	HE	CU	OR	BA (sth)	BA (nth)	HE	CU	
Phascolarctos cinereus	Koala	All	Other; Areas identified via survey as important habitat	Yes	Yes	Yes	Yes	Yes	-	-	-	-	-	Yes. Important habitat present in large vegetated corridors that contain key feed tree species for the southern and central tablelands koala management area in SEPP (Koala Habitat Protection) 2019 (Brittle Gum, Red Stringybark, Inland Scribbly Gum and Snow Gum).					Assumed present in all zones.	Vegetation zones selected in these connected areas comprise OR (PCT 277_Intact and 1093_Intact), BA sth and nth (PCT 1330_Intact and 1330_Sparse), HE (PCT 1093_Intact, 1191_Intact, 1197_Intact, 1330_Intact and 727_Intact) and CU (PCT 1093_Intact and 1191_Intact).
Burhinus grallarius	Bush Stone-curlew	OR, BA (sth), BA (nth)	Fallen/standing dead timber including logs	Yes	Yes	Yes	N/A	N/A	-	-	-	-	-	No. Species not recorded during OzArk's targeted surveys.	No. Species not recorded during OzArk's targeted surveys.	No. Species not recorded during OzArk's targeted surveys.	N/A	N/A	-	-
Calyptorhynchus lathami	Glossy Black-cockatoo	All	Hollow-bearing trees; living or dead tree with hollows greater than 15cm diameter and greater than 5m above ground	Yes	Yes	Yes	Yes	Yes	Habitat degraded. Suitable foraging habitat (eg Allocasuarina spp.) is absent.					No. Habitat degraded.	No. Habitat degraded.	No. Habitat degraded.	No. Habitat degraded.	No. Habitat degraded.	-	-

Table 5.12 Candidate threatened species assessment – pipeline development

Step 1 - Identify candidate spp for assessment		Predicted subregions	Step 2 - assessment of habitat constraints and vagrant spp										Step 3 - Identify candidate spp for further assessment					Step 4 - Determine presence/absence of candidate spp	Step 5 - Determine area or count and location of suitable habitat for candidate spp
Scientific name	Common name		Habitat/geographic constraints	Constraint present in pipeline disturbance footprint?					Habitat degraded or vagrant species?					Rationale					
				OR	BA (sth)	BA (nth)	HE	CU	OR	BA (sth)	BA (nth)	HE	CU	OR	BA (sth)	BA (nth)	HE	CU	
Cercartetus nanus	Eastern Pygmy Possum	All	-	N/A	N/A	N/A	N/A	N/A	Habitat degraded. Vegetation is typically an open woodland structure without the required shrub layers for cover.	Habitat degraded. Vegetation is typically an open woodland structure without the required shrub layers for cover.	Habitat degraded. Vegetation is typically an open woodland structure without the required shrub layers for cover.	-	-	No. Habitat degraded.	No. Habitat degraded.	No. Habitat degraded.	Yes. Suitable habitat present.	Yes. Suitable habitat present.	Assumed present in HE and CU.	In vegetation zones with a complex midstorey structure. These areas comprise HE (PCT 1191_Intact, 1191_Shrubland, 1093_Intact and 1093_Shrubland, 727_Intact and 727_Shrubland) and CU (PCT 1093_Fragments, 1093_Shrubland, 1093_Intact, 1191_Intact, 1191_Sparse and 1191_Shrubland).
Polytelis swainsonii (breeding)	Superb Parrot	OR, BA (sth), BA (nth), HE	Hollow bearing trees; Living or dead *E. blakelyi, E. melliodora, E. albens, E. camaldulensis, E. microcarpa, E. polyanthemos, E. mannifera, E. intertexta* with hollows greater than 5cm diameter; greater than 4m above ground or trees with a DBH of greater than 30cm	Yes	Yes	Yes	Yes	N/A	Species is vagrant. The pipeline occurs east of the species known breeding range (Baker-Gabb 2011)			N/A		No. Species is vagrant.			N/A	-	-

Table 5.12 Candidate threatened species assessment – pipeline development

Step 1 - Identify candidate spp for assessment		Predicted subregions	Step 2 - assessment of habitat constraints and vagrant spp										Step 3 - Identify candidate spp for further assessment					Step 4 - Determine presence/absence of candidate spp	Step 5 - Determine area or count and location of suitable habitat for candidate spp
Scientific name	Common name		Habitat/geographic constraints	Constraint present in pipeline disturbance footprint?					Habitat degraded or vagrant species?					Rationale						
				OR	BA (sth)	BA (nth)	HE	CU	OR	BA (sth)	BA (nth)	HE	CU	OR	BA (sth)	BA (nth)	HE	CU		
Chalinolobus dwyeri	Large-eared Pied Bat	All	Cliffs; within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels	No	No	No	No	Yes	-	-	-	-	-	No. Habitat constraint absent.	No. Habitat constraint absent.	No. Habitat constraint absent.	No. Habitat constraint absent.	Yes. Habitat constraint present.	Assumed present in CU.	Cliffs and rocky areas less than 2km east of the pipeline disturbance footprint in CU. There will be no direct disturbance to these areas. A 2 km buffer has been applied to determine native vegetation that would represent potential foraging habitat for the species. The species polygon comprises this native vegetation which includes PCT 1191_Shrubland and 1191_Sparse.
Delma impar	Striped Legless Lizard	BA (sth), BA (nth)	-	-	-	-	-	-	N/A	Habitat degraded. Suitable habitat (ie natural grasslands or undisturbed grassy woodlands) are absent).	Habitat degraded. Suitable habitat (ie natural grasslands or undisturbed grassy woodlands) are absent).	N/A	N/A	N/A	No. Habitat degraded.	No. Habitat degraded.	N/A	N/A	-	-

Table 5.12 Candidate threatened species assessment – pipeline development

Step 1 - Identify candidate spp for assessment		Predicted subregions	Step 2 - assessment of habitat constraints and vagrant spp										Step 3 - Identify candidate spp for further assessment					Step 4 - Determine presence/absence of candidate spp	Step 5 - Determine area or count and location of suitable habitat for candidate spp
Scientific name	**Common name**		**Habitat/geographic constraints**	**Constraint present in pipeline disturbance footprint?**					**Habitat degraded or vagrant species?**				**Rationale**						
				OR	**BA (sth)**	**BA (nth)**	**HE**	**CU**	**OR**	**BA (sth)**	**BA (nth)**	**HE**	**CU**	**OR**	**BA (sth)**	**BA (nth)**	**HE**	**CU**		
Lathamus discolor (breeding)	Swift Parrot	OR, BA (sth), BA (nth)	Mapped important areas	No. The pipeline does not traverse important areas.	No. The pipeline does not traverse important areas.	N/A	N/A	N/A	-	-	N/A	N/A	N/A	No. Habitat constraint absent.	No. Habitat constraint absent.	N/A	N/A	N/A	-	-
Tyto novaehollandiae (breeding)	Masked Owl	BA (sth), BA (nth), HE, CU	Hollow-bearing trees; Living or dead trees with hollows greater than 20cm diameter	N/A	Yes	No	Yes	Yes	N/A	Habitat degraded. Large forested areas are absent.	-	-	-	N/A	No. Habitat degraded.	No. Habitat constraint absent.	Yes. Habitat constraint present		Assumed present in HE and CU.	100 m buffer placed around hollow-bearing trees in forested areas where hollows >20 cm diameter. Excluded in fragmented vegetation zones. Suitable hollow-bearing trees are found in HE (PCT 1191_Intact, 1191_Shrubland, 1093_Intact and 1093_Shrubland, 727_Intact and 727_Shrubland) and CU (PCT 1093_Intact, 1093_Shrubland and 1191_Intact).
Anthochaera phrygia	Regent Honeyeater	All	Mapped important areas	No. The pipeline does not traverse important areas.	No. The pipeline does not traverse important areas.	No. The pipeline does not traverse important areas.	No. The pipeline does not traverse important areas.	No. The pipeline does not traverse important areas.	-	-	-	-	-	No. Habitat constraint absent.	No. Habitat constraint absent.	No. Habitat constraint absent.	No. Habitat constraint absent.	No. Habitat constraint absent.	-	-

Table 5.12 Candidate threatened species assessment – pipeline development

Step 1 - Identify candidate spp for assessment		Predicted subregions	Step 2 - assessment of habitat constraints and vagrant spp										Step 3 - Identify candidate spp for further assessment					Step 4 - Determine presence/absence of candidate spp	Step 5 - Determine area or count and location of suitable habitat for candidate spp
Scientific name	Common name		Habitat/geographic constraints	Constraint present in pipeline disturbance footprint?					Habitat degraded or vagrant species?					Rationale					
				OR	BA (sth)	BA (nth)	HE	CU	OR	BA (sth)	BA (nth)	HE	CU	OR	BA (sth)	BA (nth)	HE	CU	
Callocephalon fimbriatum (breeding)	Gang-gang Cockatoo	All	Hollow bearing trees; eucalypt tree species with hollows greater than 9 cm diameter	Yes	Yes	Yes	Yes	Yes	Habitat degraded. Tall moist forests (breeding habitat) is absent.	Habitat degraded. Tall moist forests (breeding habitat) is absent.	Habitat degraded. Tall moist forests (breeding habitat) is absent.	Habitat degraded. Tall moist forests (breeding habitat) is absent.	-	No. Habitat degraded.	No. Habitat degraded.	No. Habitat degraded.	No. Habitat degraded.	Yes. Suitable breeding habitat present.	Assumed present in CU.	200 m buffer placed around hollow-bearing trees in tall moist forest areas (PCT 1197) where hollows >9 cm diameter.
Hieraeetus morphnoides	Little Eagle	All	Other; nest trees - live (occassionally dead) large old trees within vegetation)	No. Suitable nest trees were absent.					-	-	-	-	-	No. Suitable nest trees absent.					-	-
Lophoictinia isura (breeding)	Square-tailed Kite	All	Other; nest trees.	No. Suitable nest trees were absent.					-	-	-	-	-	No. Suitable nest trees absent.					-	-
Miniopterus orianae oceanensis	Large Bentwing Bat	All	Caves; cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records with microhabitat code "IC - in cave; observation type code "E nest-roost with numbers of individuals >500	No. Caves, tunnels and culverts are absent. Mines are present in CU but they are active.					-	-	-	-	-	No. Habitat constraints absent.					-	-

Table 5.12 Candidate threatened species assessment – pipeline development

Step 1 - Identify candidate spp for assessment		Predicted subregions	Step 2 - assessment of habitat constraints and vagrant spp										Step 3 - Identify candidate spp for further assessment					Step 4 - Determine presence/absence of candidate spp	Step 5 - Determine area or count and location of suitable habitat for candidate spp
Scientific name	Common name		Habitat/geographic constraints	Constraint present in pipeline disturbance footprint?				Habitat degraded or vagrant species?					Rationale						
				OR	BA (sth)	BA (nth)	HE	CU	OR	BA (sth)	BA (nth)	HE	CU	OR	BA (sth)	BA (nth)	HE	CU		
Myotis macropus	Southern Myotis	BA (sth), BA (nth)	Hollow-bearing trees within 200 m of riparian zone|Other Bridges, caves or artificial structures within 200 m of riparian zone|Waterbodies. This include rivers, creeks, billabongs, lagoons, dams and other waterbodies on or within 200m of the site	N/A	No. Habitat constraint absent.		N/A	N/A	N/A	-	-	N/A	N/A	N/A	No. Habitat constraint absent.		N/A	N/A	-	-
Ninox connivens (breeding)	Barking Owl	All	Hollow-bearing trees; Living or dead trees with hollows greater than 20 cm diameter and greater than 4m above the ground	Yes. Potentially suitable habitat present.	No. Habitat constraint absent.		Yes. Potentially suitable habitat present.	-	Habitat degraded. Suitable breeding habitat along vegetated creek corridors is absent.	N/A	Habitat degraded. Suitable breeding habitat along vegetated creek corridors is absent.	-	Yes. Habitat constraint present.	No. Habitat degraded.	N/A	No. Habitat degraded.	Yes. Habitat constraint present.	Assumed present in OR and CU.	100 m buffer placed around hollow-bearing trees along vegetated creeks and waterways where hollows are > 20 cm diameter. Such hollows occur in OR (PCT 277_Intact and 277_Moderate) and CU (PCT 1191_Intact).

Table 5.12 Candidate threatened species assessment – pipeline development

Step 1 - Identify candidate spp for assessment		Predicted subregions	Step 2 - assessment of habitat constraints and vagrant spp										Step 3 - Identify candidate spp for further assessment					Step 4 - Determine presence/absence of candidate spp	Step 5 - Determine area or count and location of suitable habitat for candidate spp
Scientific name	Common name		Habitat/geographic constraints	Constraint present in pipeline disturbance footprint?				Habitat degraded or vagrant species?					Rationale						
				OR	BA (sth)	BA (nth)	HE	CU	OR	BA (sth)	BA (nth)	HE	CU	OR	BA (sth)	BA (nth)	HE	CU		
Ninox strenua (breeding)	Powerful Owl	All	Hollow-bearing trees; Living or dead trees with hollow greater than 20cm diameter	Yes. Habitat constraint present.		No. Habitat constraint absent.	Yes. Habitat constraint present.		-	Habitat degraded. Suitable habitat (ie large tracts of connected forest) are absent.	N/A	Habitat degraded. Suitable habitat (ie large tracts of connected forest) are absent.	-	Yes. Habitat constraint present.	No. Habitat degraded.	N/A	No. Habitat degraded.	Yes. Habitat constraint present.	Assumed present in OR and CU.	100 m buffer placed around hollow-bearing trees in forested areas where hollows >20 cm diameter. Excluded in fragmented vegetation zones. Suitable hollow-bearing trees are found in HE (PCT 1191_Intact, 1191_Shrubland, 1093_Intact and 1093_Shrubland, 727_Intact and 727_Shrubland) and CU (PCT 1093_Intact, 1093_Shrubland and 1191_Intact).
Petrogale penicillata	Brush-tailed Rock Wallaby	BA (sth), BA (nth), CU	Other; Land within 1 km of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or clifflines	N/A		No. Habitat constraint absent.	Yes. Habitat constraint present in buffer area.		N/A	-	-	-	-	N/A	No. Habitat constraint absent.		Yes. Habitat constraint present in buffer area.	Assumed present in CU given presence of rocky outcrops and ridgelines north and east of the pipeline route. No direct disturbance to these areas.	No direct impacts to Brush-tailed Rock Wallaby habitat which occurs east of the pipeline disturbance footprint. 1 km buffer placed on ridgelines with each native PCT (1191_Shrubland and 1191_Sparse) included in the species polygon as potential foraging habitat.

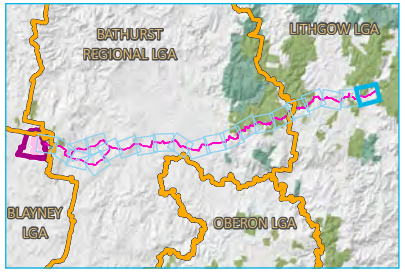
Table 5.12 Candidate threatened species assessment – pipeline development

Step 1 - Identify candidate spp for assessment		Predicted subregions	Step 2 - assessment of habitat constraints and vagrant spp										Step 3 - Identify candidate spp for further assessment					Step 4 - Determine presence/absence of candidate spp	Step 5 - Determine area or count and location of suitable habitat for candidate spp
Scientific name	Common name		Habitat/geographic constraints	Constraint present in pipeline disturbance footprint?					Habitat degraded or vagrant species?					Rationale					
				OR	BA (sth)	BA (nth)	HE	CU	OR	BA (sth)	BA (nth)	HE	CU	OR	BA (sth)	BA (nth)	HE	CU	
Phascogale tapoatafa	Brush-tailed Phascogale	All	-	N/A	N/A	N/A	N/A	N/A	-	-	-	-	-	Yes. Potentially suitable habitat present.	No. Dry scleophyll forests (preferred habitat) are absent.	No. Dry scleophyll forests (preferred habitat) are absent.	Yes. Potentially suitable habitat present.	Yes. Potentially suitable habitat present.	Assumed present in OR, HE and CU.	In intact forested areas of OR (PCT 1093_Intact and 277_Intact), HE (PCT 1093_Intact) and CU (PCT 1093_Intact).
Pteropus poliocephalus	Grey-headed Flying-fox	All	Other; breeding camps	No	No	No	No	No	-	-	-	-	-	No. Habitat constraint absent.					-	-
Haliaeetus leucogaster (breeding)	White-bellied Sea Eagle	All	Other; living or dead mature trees within suitable vegetation within 1km of rivers, lakes, large dams or creeks, wetlands and coastlines	Yes	Yes	Yes	Yes	Yes	-					No. Species not recorded during targeted surveys.					-	-
Helioporus australiacus	Giant Burrowing Frog	CU	-	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Habitat degraded. Suitable breeding habitat (soaks or pools in small streams) are absent given high degree of waterway modification.	N/A	N/A	N/A	N/A	No. Habitat degraded.	-	-

Table 5.12 Candidate threatened species assessment – pipeline development

Step 1 - Identify candidate spp for assessment		Predicted subregions	Step 2 - assessment of habitat constraints and vagrant spp										Step 3 - Identify candidate spp for further assessment					Step 4 - Determine presence/absence of candidate spp	Step 5 - Determine area or count and location of suitable habitat for candidate spp
Scientific name	**Common name**		**Habitat/geographic constraints**	**Constraint present in pipeline disturbance footprint?**					**Habitat degraded or vagrant species?**				**Rationale**						
				OR	**BA (sth)**	**BA (nth)**	**HE**	**CU**	**OR**	**BA (sth)**	**BA (nth)**	**HE**	**CU**	**OR**	**BA (sth)**	**BA (nth)**	**HE**	**CU**		
Litoria aurea	Green and Golden Bell Frog	HE	Semi-permanent/ephemeral wet areas within 1km of wet areas, swamps and waterbodies	N/A	N/A	N/A	Yes	N/A	N/A	N/A	N/A	Habitat degraded. Small ponds are located within a large tract of pine forest, over 1 km away from native vegetation.	N/A	N/A	N/A	N/A	No. Habitat degraded.	N/A	-	-

Notes: OR = Orange IBRA subregion, BA (sth) = Bathurst IBRA subregion (southern option), BA (nth) = Bathurst IBRA subregion (northern option), HE = Hill End IBRA subregion, CU = Capertee Uplands IBRA subregion



KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)
- Cliff line
- *Eucalyptus aggregata* (count of individuals)

Candidate species *

- Booroolong Frog
- Brush-tailed Rock Wallaby
- Eastern Pygmy Possum
- Large-eared Pied Bat
- *Persoonia marginata* (Clandulla Geebung)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Pipeline underbore section

* Where species that appear in the legend are not visible in the map frame, they are concealed by another species polygon. The area of species polygons is provided in Section 6.7.2.

Source: EMM (2020); Regis Resources (2020); ESRI (2020); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

N

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Candidate species polygons – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.6.a

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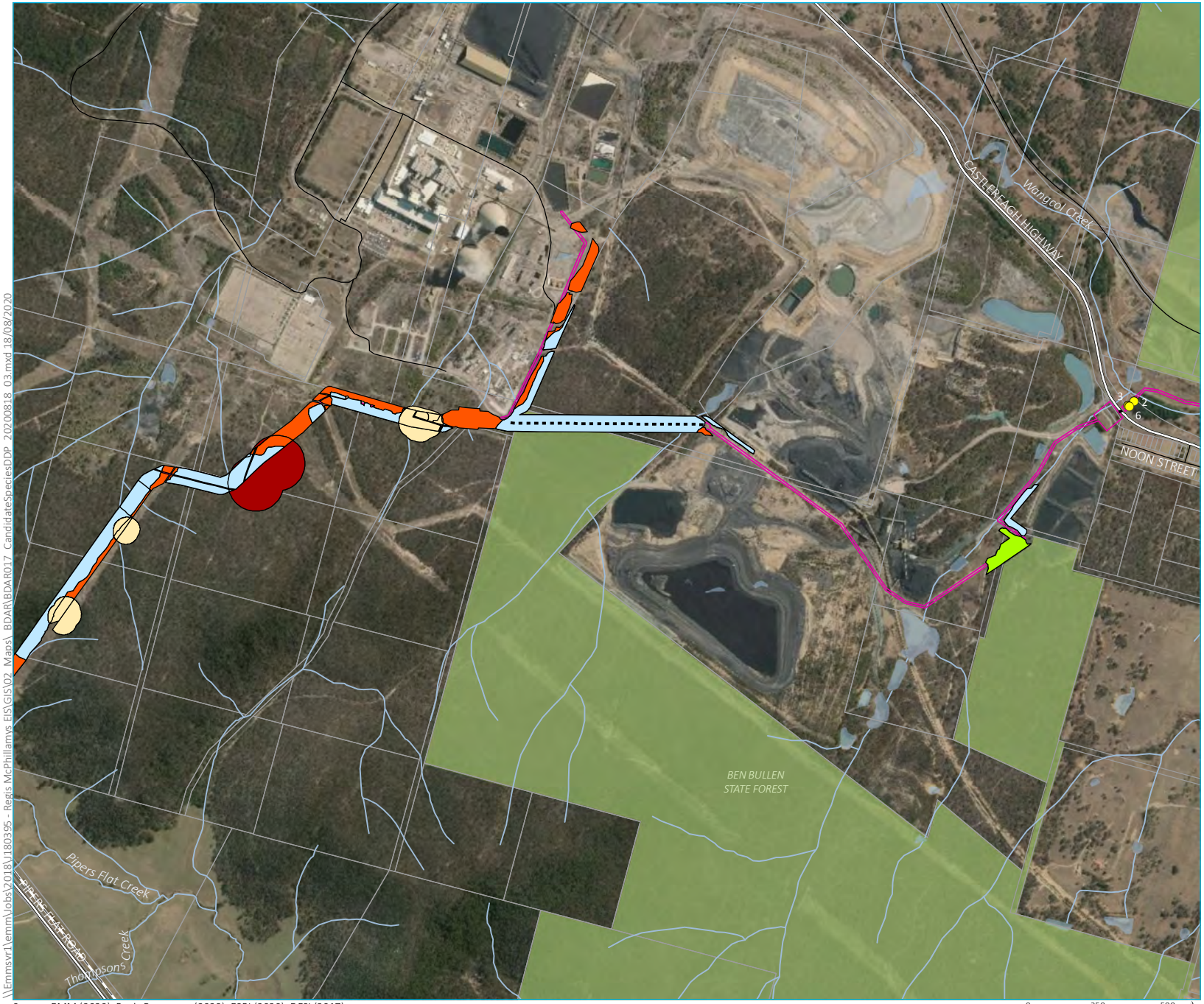
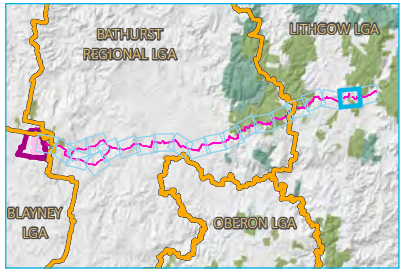
EMM creating opportunities





KEY

- Rail line
- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)
- *Eucalyptus aggregata* (count of individuals)

Candidate species *

- Bathurst Copper Butterfly
- Brush-tailed Phascogale
- Eastern Pygmy Possum
- Koala
- Masked Owl
- Powerful Owl
- Squirrel Glider

Project application area

- Mine development project area
- Mining lease application area
  (Note: boundary offset for clarity)
- Direct impact management zone
- Pipeline underbore section

* Where species that appear in the legend are not visible in the map frame, they are concealed by another species polygon. The area of species polygons is provided in Section 6.7.2.

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Source: EMM (2020); Regis Resources (2020); ESRI (2020); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

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Candidate species polygons – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.6.b

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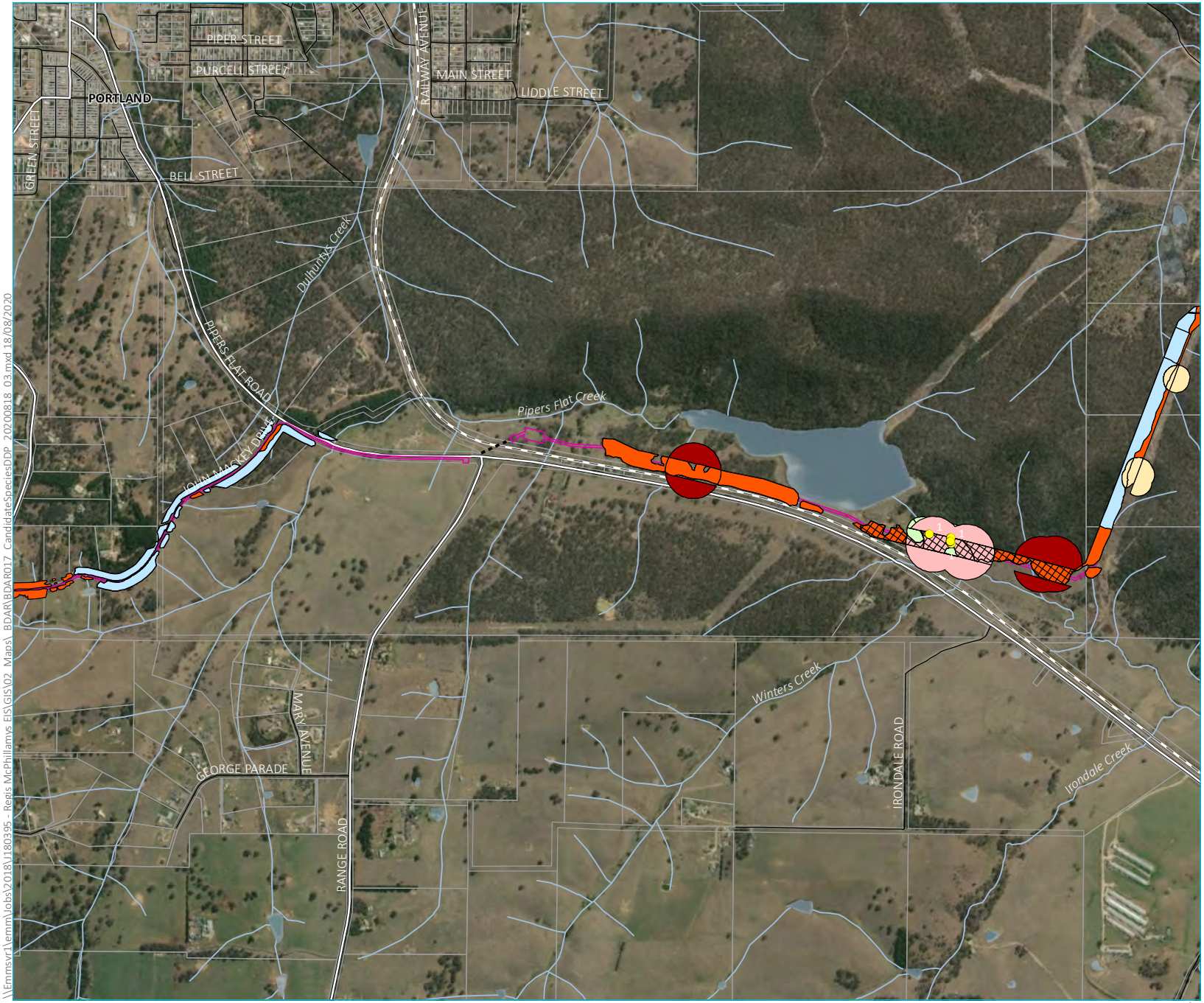

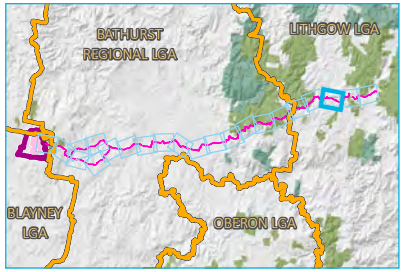

KEY

- Rail line
- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)
- *Eucalyptus aggregata* (count of individuals)
- Impacts to be avoided (*Prasophyllum petilum*)

Candidate species *

- Barking Owl
- Bathurst Copper Butterfly
- Booroolong Frog
- Brush-tailed Phascogale
- Eastern Pygmy Possum
- Koala
- Masked Owl
- Powerful Owl
- *Prasophyllum petilum*
- Squirrel Glider

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Pipeline underbore section

* Where species that appear in the legend are not visible in the map frame, they are concealed by another species polygon. The area of species polygons is provided in Section 6.7.2.

Source: EMM (2020); Regis Resources (2020); ESRI (2020); DFSI (2017)

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GDA 1994 NSW Lambert

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Candidate species polygons – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.6.c

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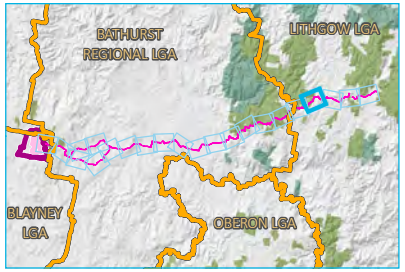
EMM creating opportunities



KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Candidate species *

- Brush-tailed Phascogale
- Eastern Pygmy Possum
- Koala
- Masked Owl
- *Persoonia marginata* (Clandulla Geebung)
- Powerful Owl
- Squirrel Glider
- *Swainsona sericea*

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone

* Where species that appear in the legend are not visible in the map frame, they are concealed by another species polygon. The area of species polygons is provided in Section 6.7.2.

Source: EMM (2020); Regis Resources (2020); ESRI (2020); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

N

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Candidate species polygons – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.6.d

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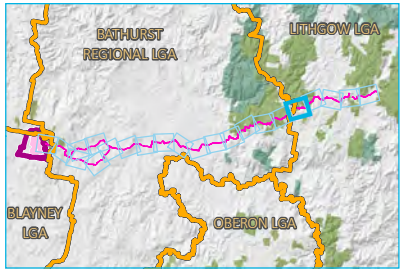
EMM creating opportunities



KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Candidate species *

- Bathurst Copper Butterfly
- Eastern Pygmy Possum
- Gang-gang Cockatoo
- Koala
- Masked Owl
- Powerful Owl
- Squirrel Glider
- *Veronica blakelyi*

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone

* Where species that appear in the legend are not visible in the map frame, they are concealed by another species polygon. The area of species polygons is provided in Section 6.7.2.

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Source: EMM (2020); Regis Resources (2020); ESRI (2020); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

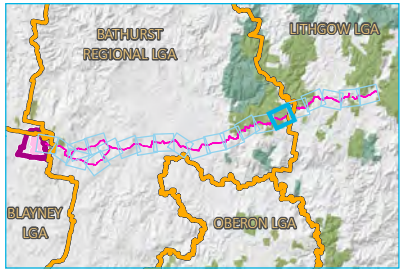
N

Candidate species polygons – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.6.e

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Candidate species *

- Eastern Pygmy Possum
- Gang-gang Cockatoo
- Koala
- Squirrel Glider
- *Swainsona sericea*
- *Veronica blakelyi*

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone

* Where species that appear in the legend are not visible in the map frame, they are concealed by another species polygon. The area of species polygons is provided in Section 6.7.2.

\\Emmsvr1\emm\Jobs\2018\I180395 - Regis McPhillamys EIS\GIS\02 Maps\ BDAR\BDAR017 CandidateSpeciesDDP 20200818 03.mxd 18/08/2020

Source: EMM (2020); Regis Resources (2020); ESRI (2020); DFSI (2017)

0 250 500 m

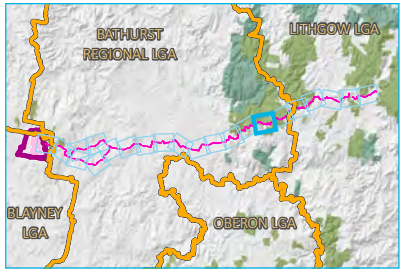
GDA 1994 NSW Lambert

Candidate species polygons – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.6.f

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Candidate species *

- Eastern Pygmy Possum
- Koala
- *Swainsona sericea*
- *Veronica blakelyi*

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone

* Where species that appear in the legend are not visible in the map frame, they are concealed by another species polygon. The area of species polygons is provided in Section 6.7.2.

\\Emmsvr1\emm\Jobs\2018\I180395 - Regis McPhillamys EIS\GIS\02 Maps\ BDAR\BDAR017 CandidateSpeciesDDP 20200818 03.mxd 18/08/2020

Source: EMM (2020); Regis Resources (2020); ESRI (2020); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

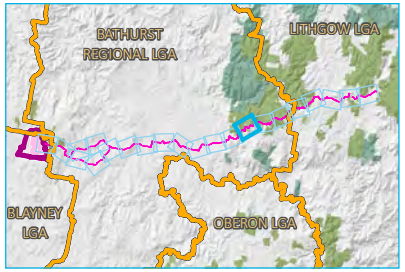
N

Candidate species polygons – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.6.g

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Candidate species *

- Brush-tailed Phascogale
- Eastern Pygmy Possum
- Gang-gang Cockatoo
- Koala
- Masked Owl
- Powerful Owl
- *Veronica blakelyi*

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone

* Where species that appear in the legend are not visible in the map frame, they are concealed by another species polygon. The area of species polygons is provided in Section 6.7.2.

Source: EMM (2020); Regis Resources (2020); ESRI (2020); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

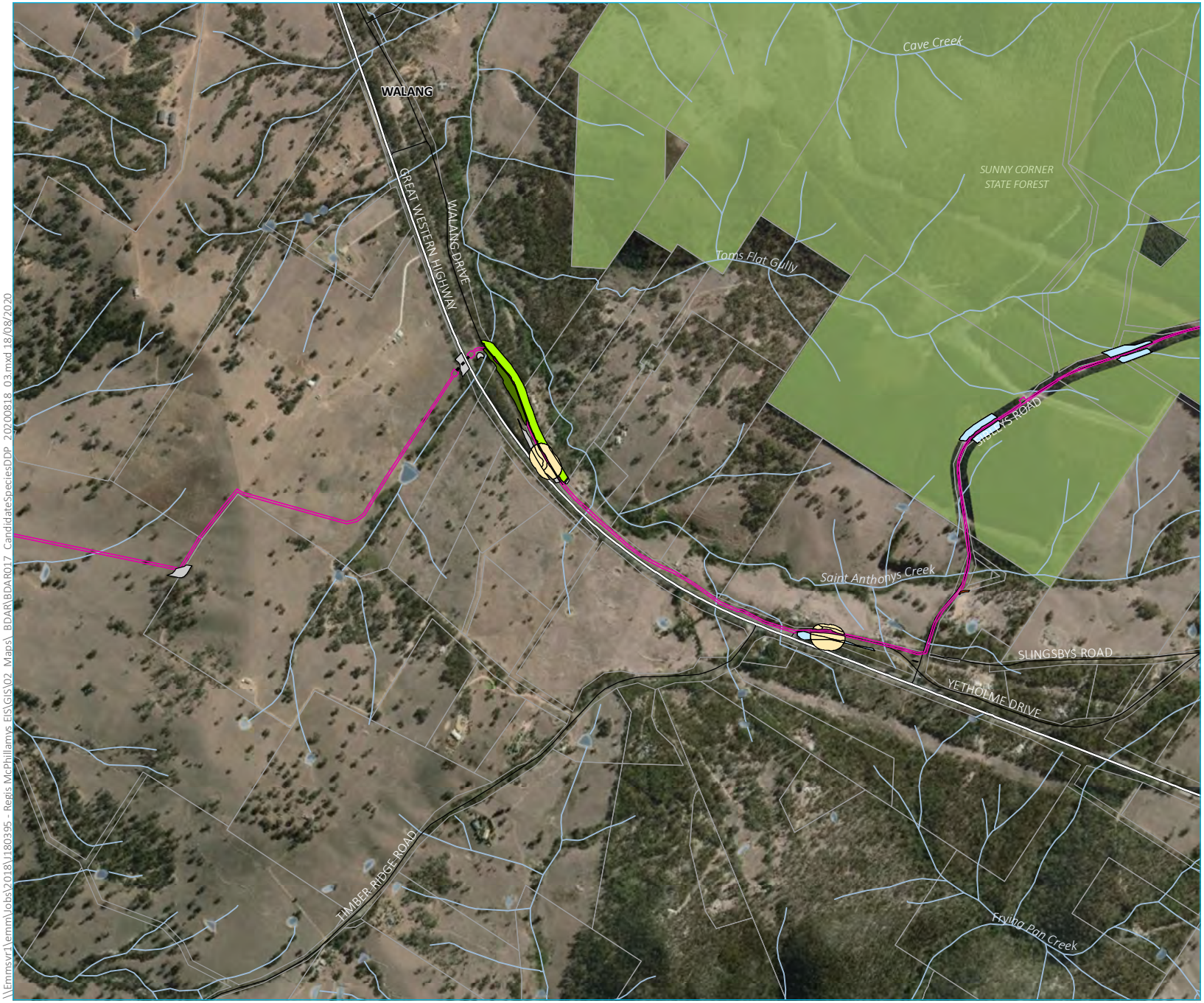
\\Emmsvr1\emm\Jobs\2018\I180395 - Regis McPhillamys EIS\GIS\02 Maps\ BDAR\BDAR017 CandidateSpeciesDDP 20200818 03.mxd 18/08/2020

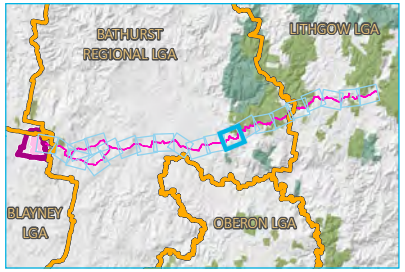
Candidate species polygons – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.6.h

REGIS RESOURCES LTD

EMM creating opportunities





KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Candidate species *

- Bathurst Copper Butterfly
- Brush-tailed Phascogale
- Eastern Pygmy Possum
- Koala
- Squirrel Glider
- *Swainsona sericea*

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Pipeline underbore section

* Where species that appear in the legend are not visible in the map frame, they are concealed by another species polygon. The area of species polygons is provided in Section 6.7.2.

Source: EMM (2020); Regis Resources (2020); ESRI (2020); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

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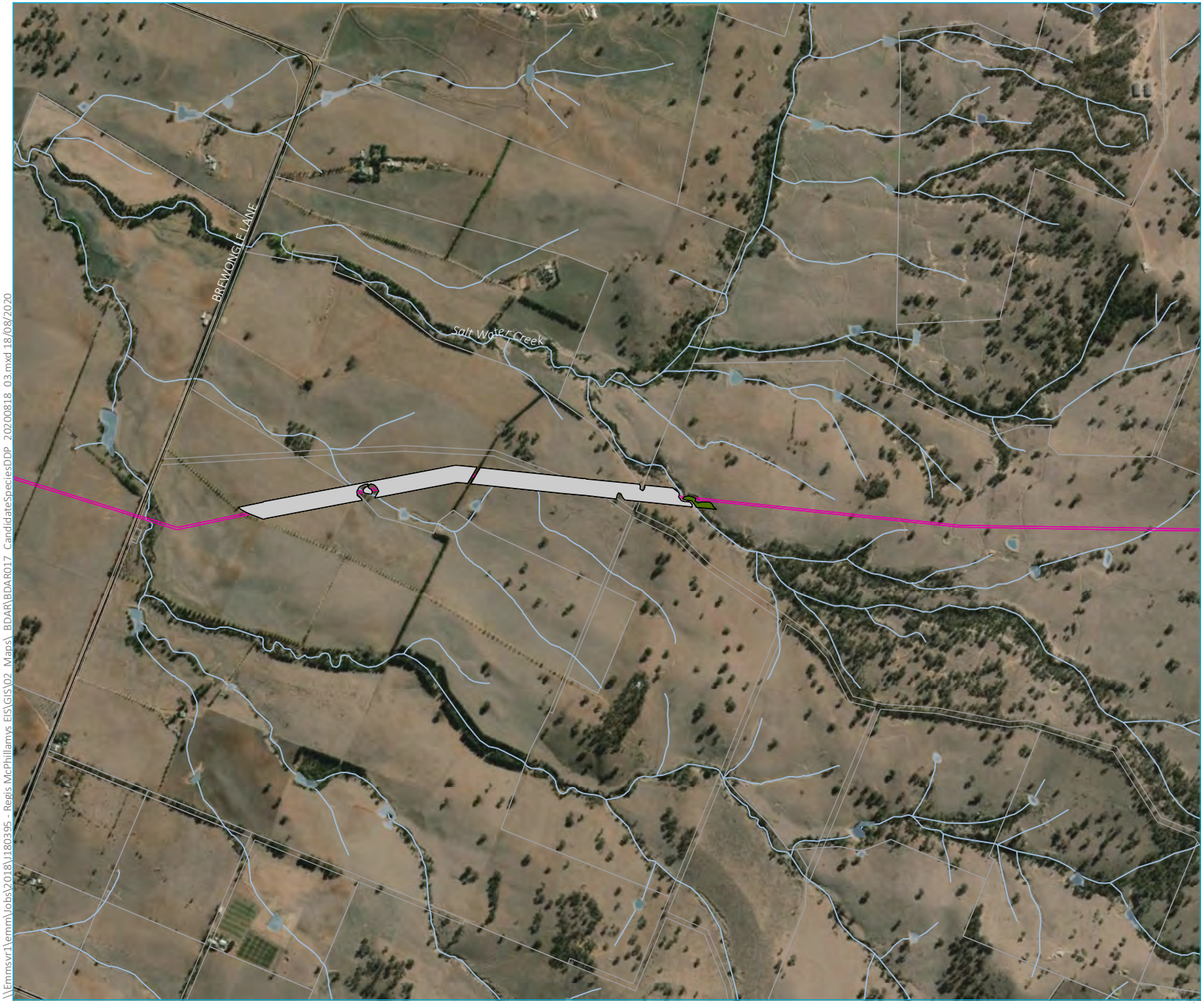
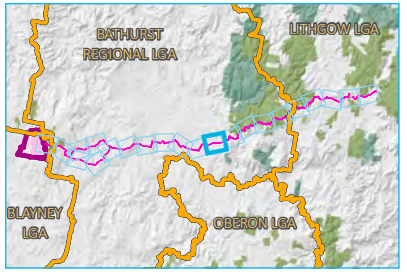
Candidate species polygons – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.6.i

REGIS RESOURCES LTD

EMM creating opportunities





KEY

- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Candidate species *

- *Lepidium hyssopifolium*
- Squirrel Glider
- *Swainsona sericea*
- *Thesium australe*

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone

* Where species that appear in the legend are not visible in the map frame, they are concealed by another species polygon. The area of species polygons is provided in Section 6.7.2.

Source: EMM (2020); Regis Resources (2020); ESRI (2020); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

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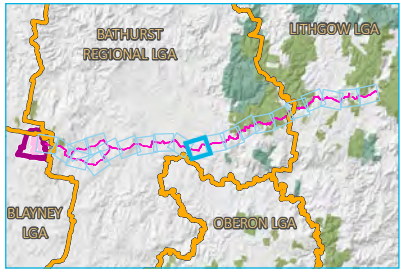
Candidate species polygons – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.6.j

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Rail line
- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Pipeline underbore section

* Where species that appear in the legend are not visible in the map frame, they are concealed by another species polygon. The area of species polygons is provided in Section 6.7.2.

Source: EMM (2020); Regis Resources (2020); ESRI (2020); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

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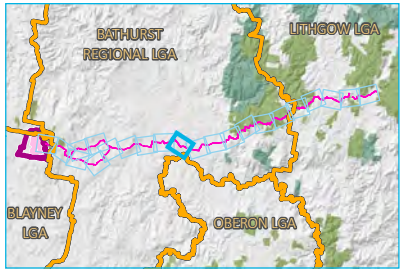
Candidate species polygons – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.6.k

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone

* Where species that appear in the legend are not visible in the map frame, they are concealed by another species polygon. The area of species polygons is provided in Section 6.7.2.

Source: EMM (2020); Regis Resources (2020); ESRI (2020); DFSI (2017)

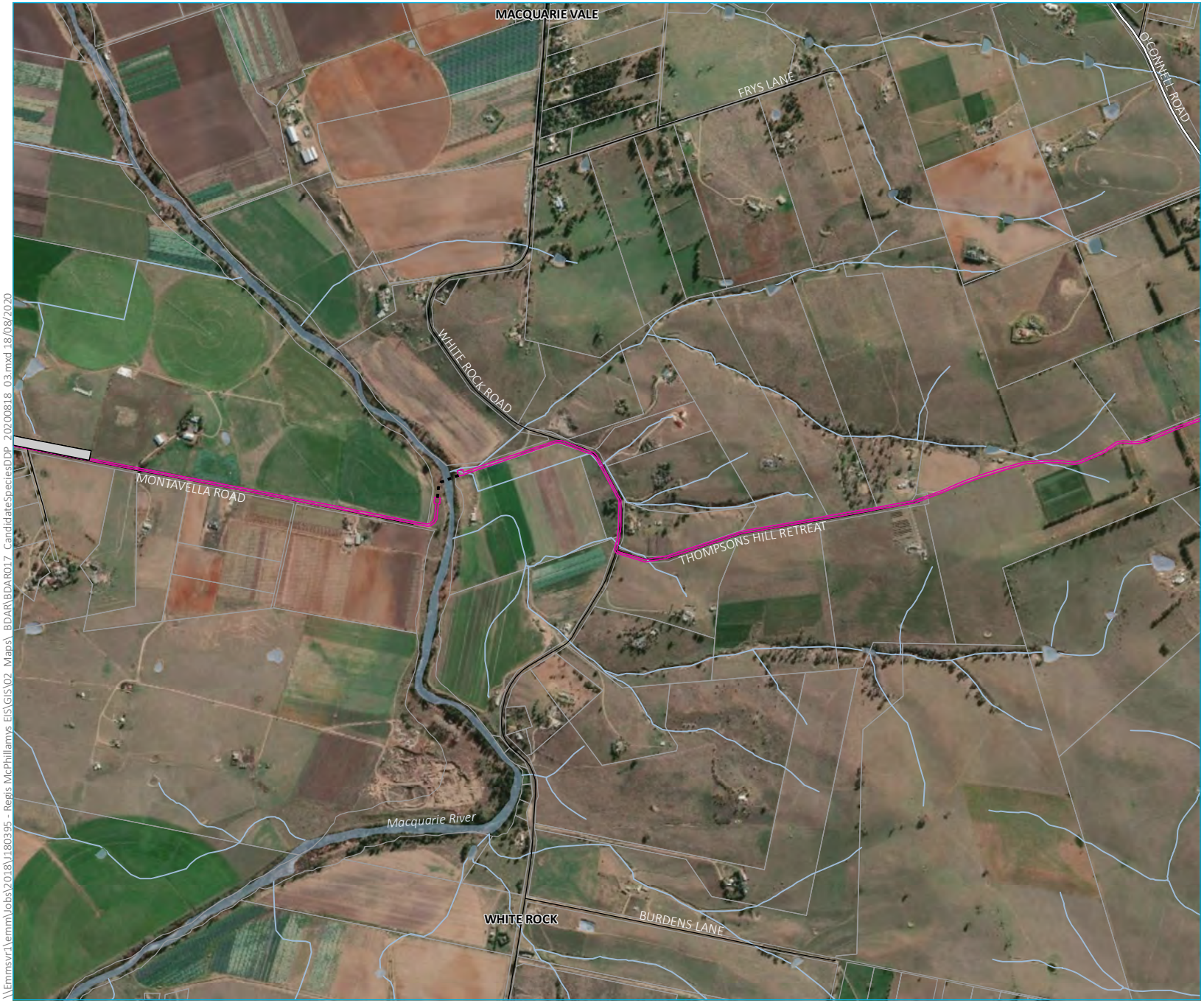
0 250 500 m

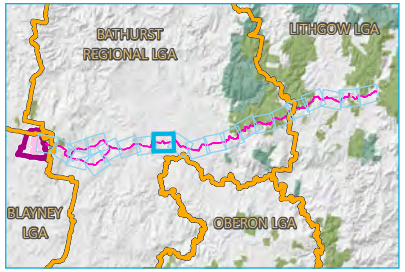
GDA 1994 NSW Lambert

\\Emmsvr1\emm\Jobs\2018\I180395 - Regis McPhillamys EIS\GIS\02 Maps\ BDAR\BDAR017 CandidateSpeciesDDP 20200818 03.mxd 18/08/2020

Candidate species polygons – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.6.l





KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Candidate species *

- *Lepidium hyssopifolium*
- *Swainsona sericea*
- *Thesium australe*

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Pipeline underbore section

* Where species that appear in the legend are not visible in the map frame, they are concealed by another species polygon. The area of species polygons is provided in Section 6.7.2.

Source: EMM (2020); Regis Resources (2020); ESRI (2020); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

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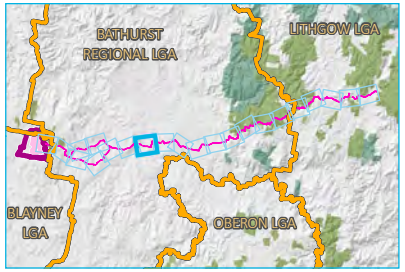
Candidate species polygons – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.6.m

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Rail line
- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Candidate species *

- *Lepidium hyssopifolium*
- *Swainsona sericea*
- *Thesium australe*

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Pipeline underbore section

* Where species that appear in the legend are not visible in the map frame, they are concealed by another species polygon. The area of species polygons is provided in Section 6.7.2.

Source: EMM (2020); Regis Resources (2020); ESRI (2020); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

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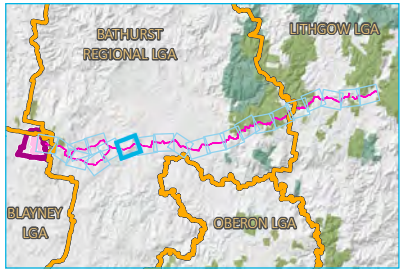
Candidate species polygons – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.6.n

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Rail line
- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Candidate species *

- Koala
- *Lepidium hyssopifolium*
- Squirrel Glider
- *Swainsona sericea*
- *Thesium australe*

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone

* Where species that appear in the legend are not visible in the map frame, they are concealed by another species polygon. The area of species polygons is provided in Section 6.7.2.

Source: EMM (2020); Regis Resources (2020); ESRI (2020); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

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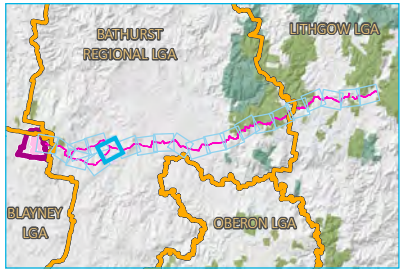
Candidate species polygons – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.6.o

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Major road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Candidate species *

- Koala
- *Lepidium hyssopifolium*
- Pink-tailed Worm Lizard
- Squirrel Glider
- *Swainsona sericea*
- *Thesium australe*

Project application area

- Mine development project area
- Mining lease application area
(Note: boundary offset for clarity)
- Direct impact management zone

* Where species that appear in the legend are not visible in the map frame, they are concealed by another species polygon. The area of species polygons is provided in Section 6.7.2.

\\Emmsvr1\emm\Jobs\2018\I180395 - Regis McPhillamys EIS\GIS\02 Maps\ BDAR\BDAR017 CandidateSpeciesDDP 20200818 03.mxd 18/08/2020

Source: EMM (2020); Regis Resources (2020); ESRI (2020); DFSI (2017)

0 250 500 m

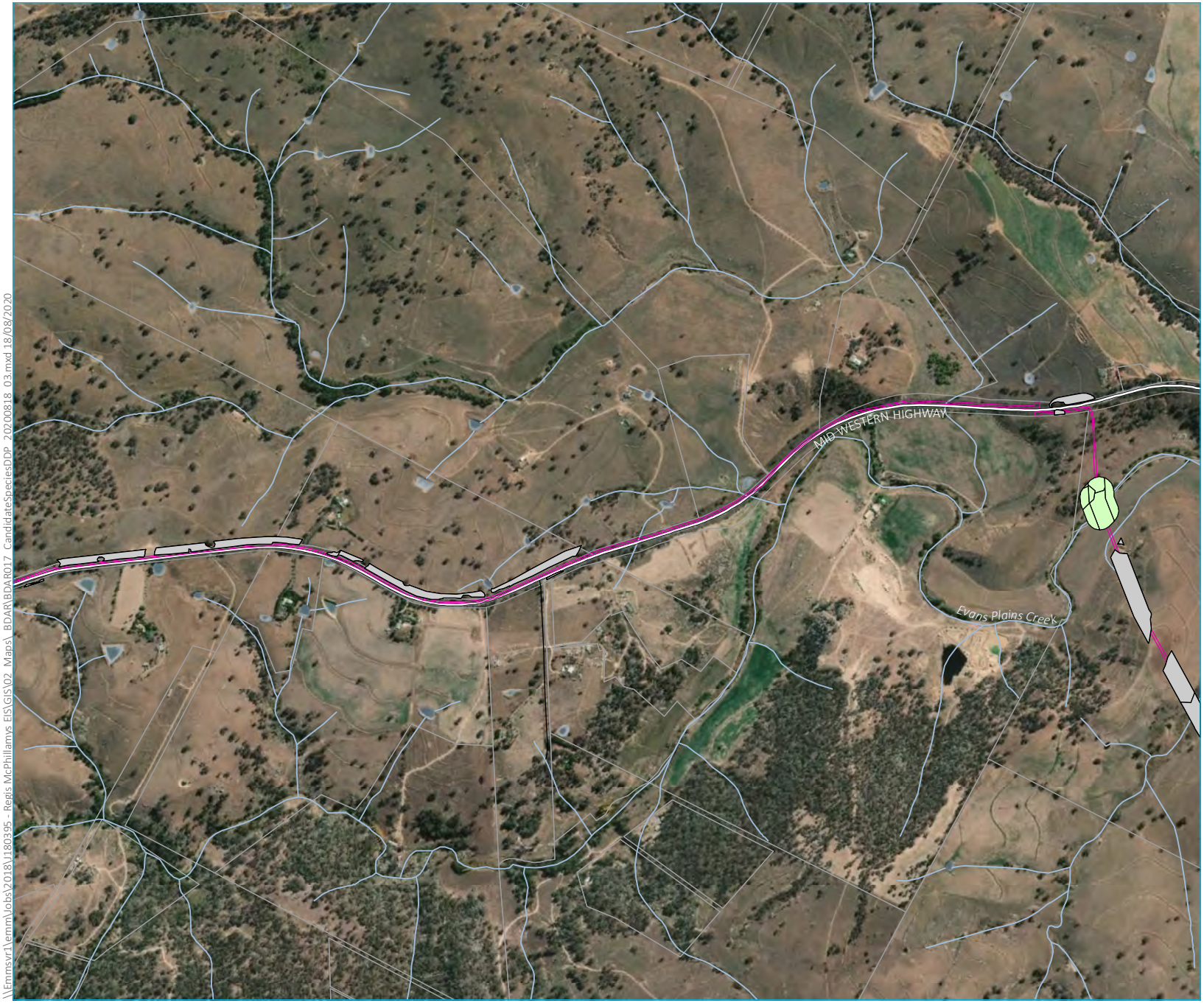
GDA 1994 NSW Lambert

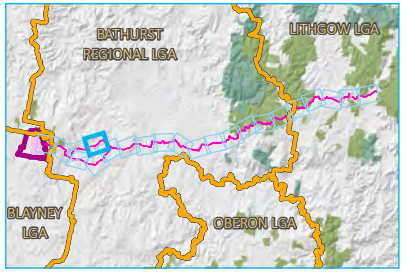
Candidate species polygons – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.6.p

REGIS RESOURCES LTD

EMM creating opportunities





KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Candidate species *

- Booroolong Frog
- *Lepidium hyssopifolium*
- *Swainsona sericea*
- *Thesium australe*

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone

* Where species that appear in the legend are not visible in the map frame, they are concealed by another species polygon. The area of species polygons is provided in Section 6.7.2.

Source: EMM (2020); Regis Resources (2020); ESRI (2020); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

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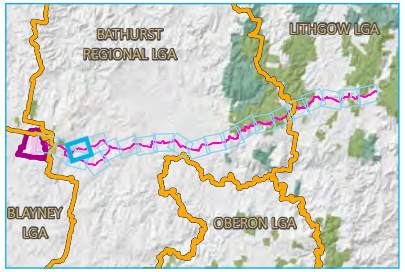
Candidate species polygons – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.6.q

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Candidate species *

- *Lepidium hyssopifolium*
- *Swainsona sericea*
- *Thesium australe*

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone

* Where species that appear in the legend are not visible in the map frame, they are concealed by another species polygon. The area of species polygons is provided in Section 6.7.2.

Source: EMM (2020); Regis Resources (2020); ESRI (2020); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

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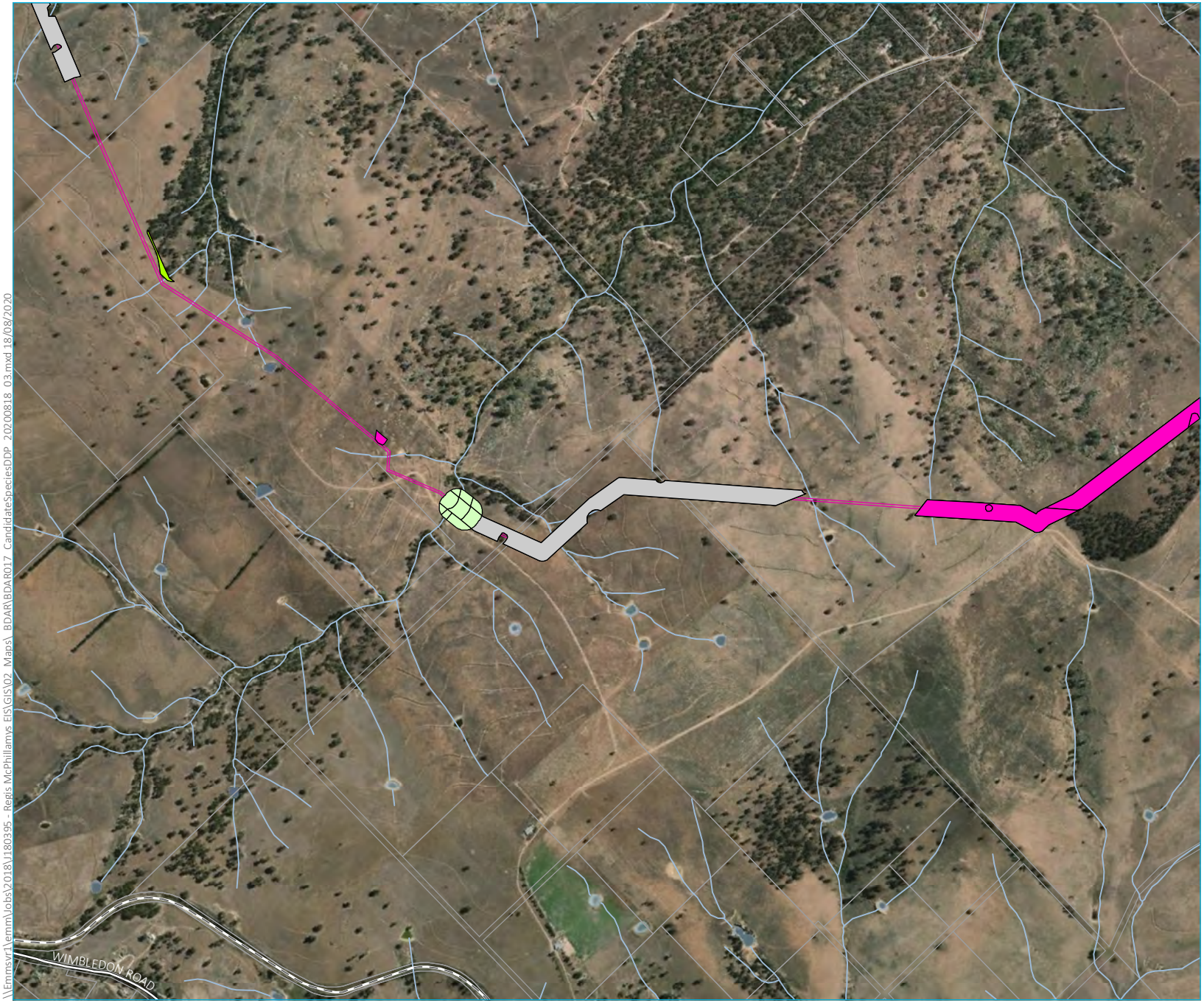
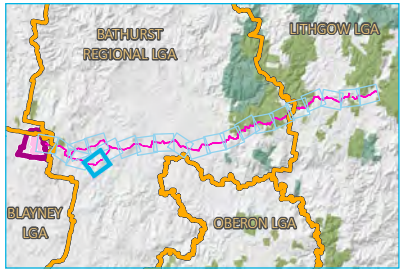
Candidate species polygons – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.6.r

REGIS RESOURCES LTD

EMM creating opportunities





KEY

- Rail line
- Major road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Candidate species *

- Booroolong Frog
- Koala
- *Lepidium hyssopifolium*
- Pink-tailed Worm Lizard
- Squirrel Glider
- *Swainsona sericea*
- *Thesium australe*

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone

* Where species that appear in the legend are not visible in the map frame, they are concealed by another species polygon. The area of species polygons is provided in Section 6.7.2.

Source: EMM (2020); Regis Resources (2020); ESRI (2020); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

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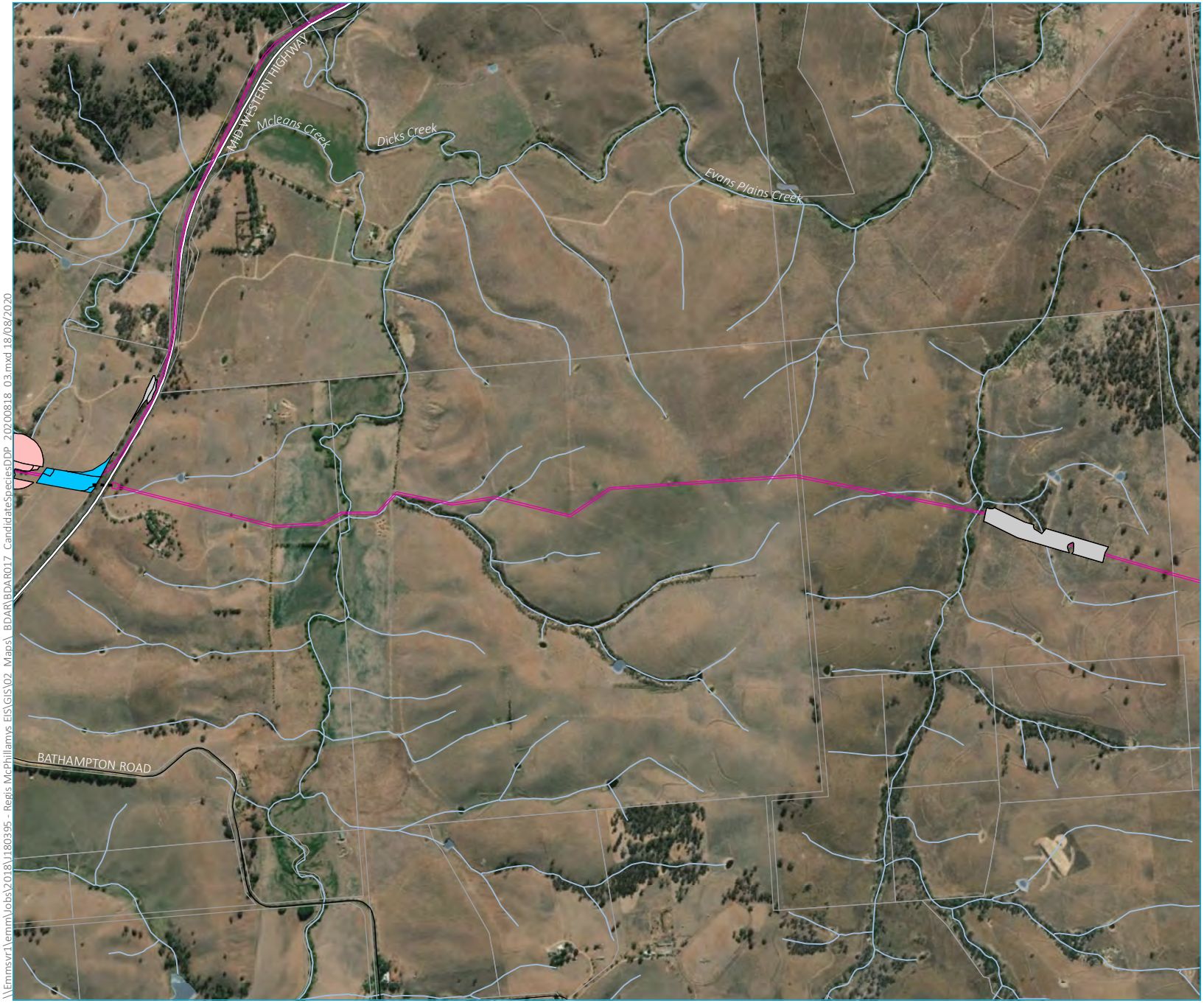
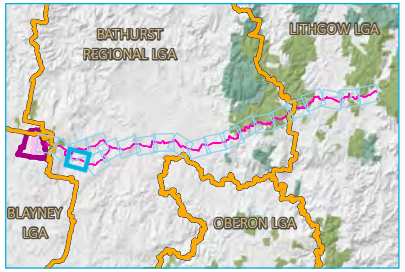
Candidate species polygons – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.6.s

REGIS RESOURCES LTD

EMM creating opportunities





KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Candidate species *

- Barking Owl
- Brush-tailed Phascogale
- *Lepidium hyssopifolium*
- Powerful Owl
- Squirrel Glider
- *Swainsona recta*
- *Swainsona sericea*
- *Thesium australe*

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Pipeline underbore section

* Where species that appear in the legend are not visible in the map frame, they are concealed by another species polygon. The area of species polygons is provided in Section 6.7.2.

Source: EMM (2020); Regis Resources (2020); ESRI (2020); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

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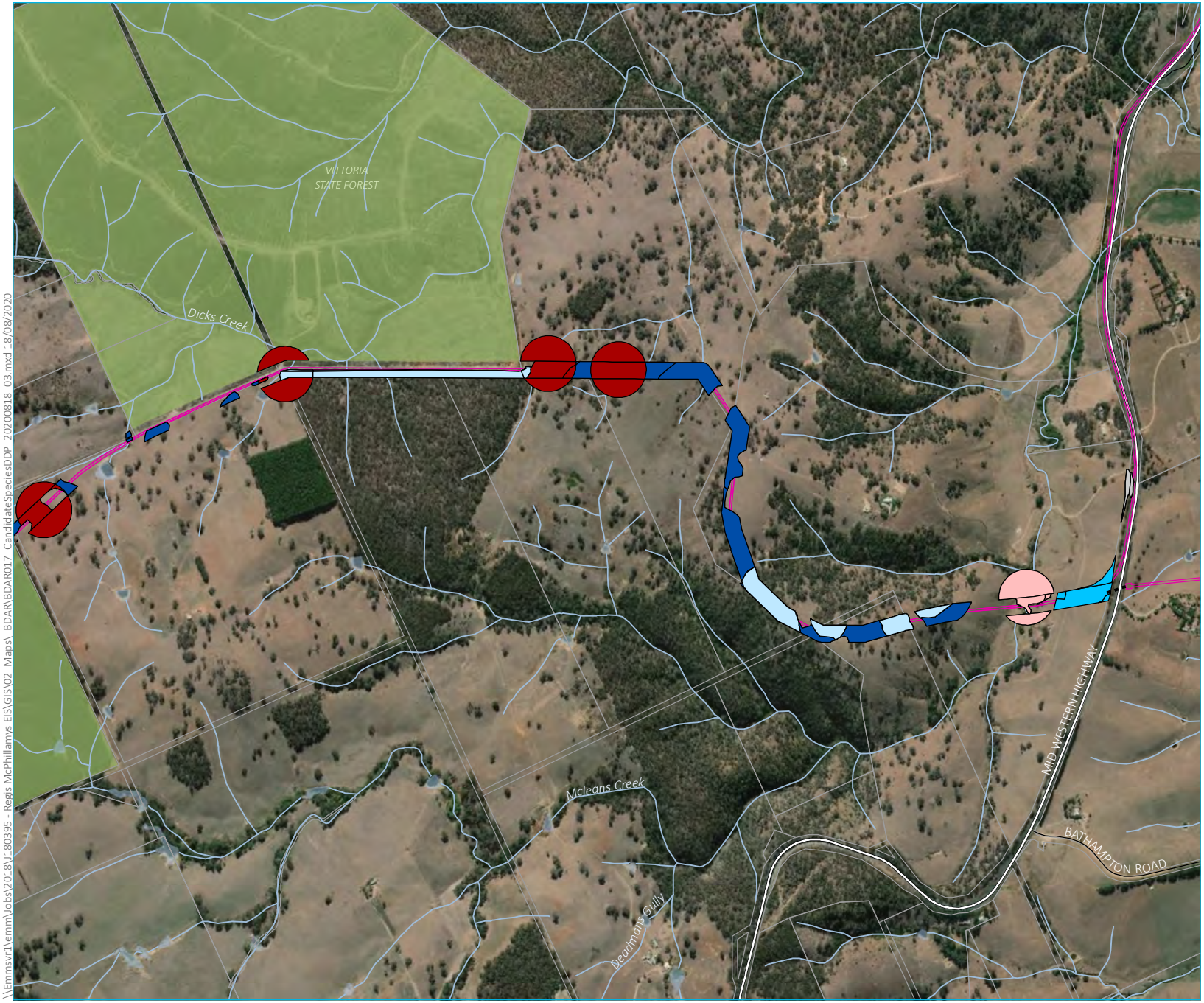
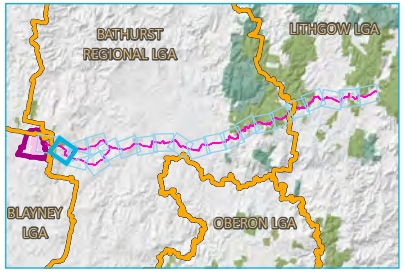
Candidate species polygons – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.6.t

REGIS RESOURCES LTD

EMM creating opportunities





KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Candidate species *

- Barking Owl
- Brush-tailed Phascogale
- Koala
- *Lepidium hyssopifolium*
- Pink-tailed Worm Lizard
- Powerful Owl
- Squirrel Glider
- *Swainsona recta*
- *Swainsona sericea*
- *Thesium australe*

Project application area

- Mine development project area
- Mining lease application area
  (Note: boundary offset for clarity)
- Direct impact management zone
- Pipeline underbore section

* Where species that appear in the legend are not visible in the map frame, they are concealed by another species polygon. The area of species polygons is provided in Section 6.7.2.

\\Emmsvr1\emm\Jobs\2018\I180395 - Regis McPhillamys EIS\GIS\02 Maps\ BDAR\BDAR017 CandidateSpeciesDDP 20200818 03.mxd 18/08/2020

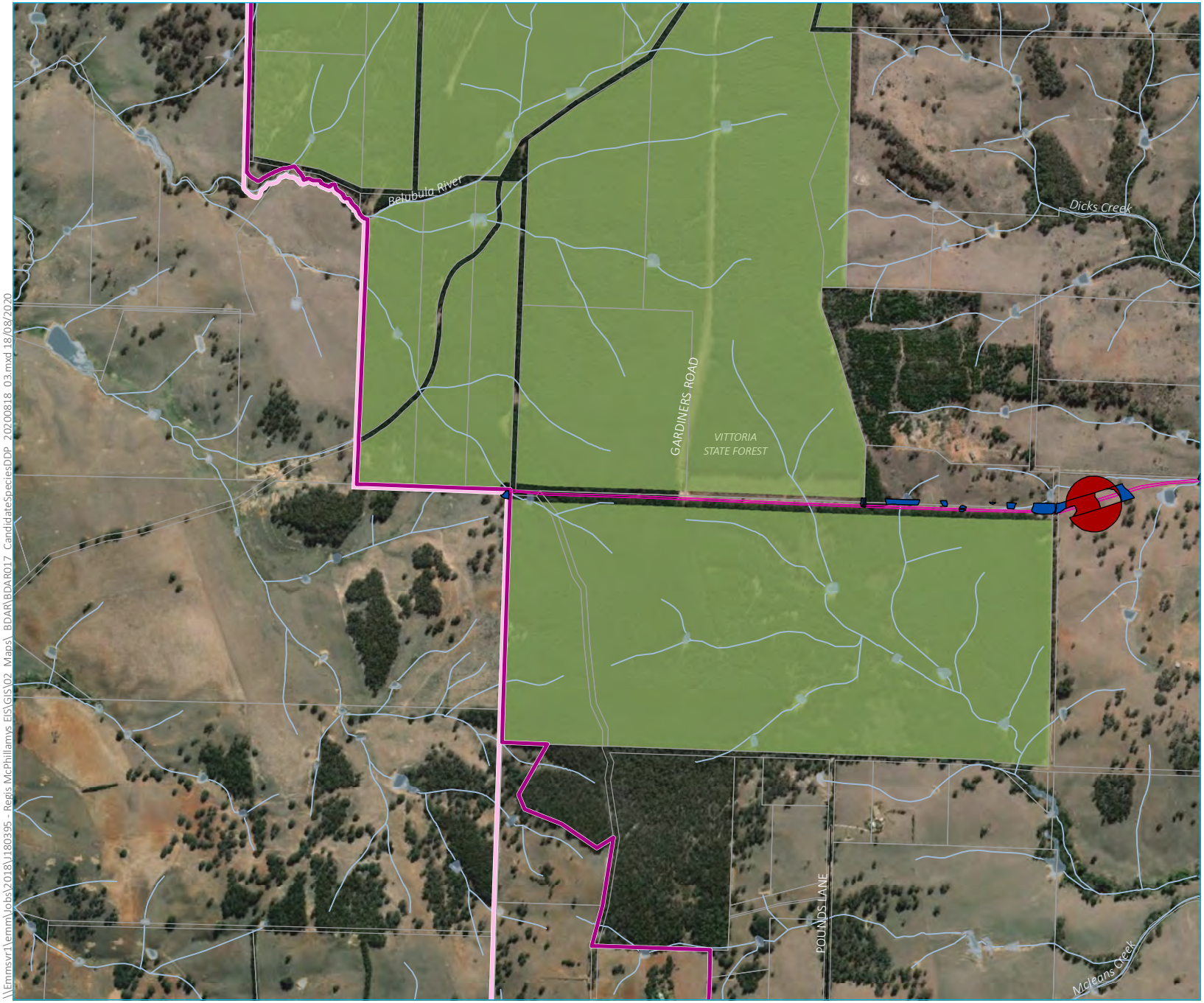
Source: EMM (2020); Regis Resources (2020); ESRI (2020); DFSI (2017)

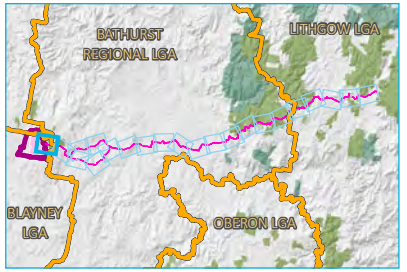
0 250 500 m

GDA 1994 NSW Lambert

Candidate species polygons – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.6.u





KEY

- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Candidate species *

- Powerful Owl
- *Swainsona recta*
- *Swainsona sericea*

Project application area

- Mine development project area
- Mining lease application area
(Note: boundary offset for clarity)
- Direct impact management zone

* Where species that appear in the legend are not visible in the map frame, they are concealed by another species polygon. The area of species polygons is provided in Section 6.7.2.

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Source: EMM (2020); Regis Resources (2020); ESRI (2020); DFSI (2017)

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GDA 1994 NSW Lambert

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Candidate species polygons – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 5.6.v

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EMM creating opportunities

Stage 2 – Impact assessment

6 Impact assessment

This chapter identifies the potential impacts of amended project on the identified biodiversity values associated with the mine and pipeline developments. Measures taken to date to avoid and minimise impacts through the project design are summarised in the below sections. Recommendations to assist in design development that further avoids, minimises and mitigates impacts are also provided.

6.1 Potential direct and indirect impacts – mine and pipeline developments

Without any measures to avoid, minimise or mitigate impacts, the mine and pipeline developments associated with the amended project 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 (mine development only);
  - 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;
  - removal of hollow-bearing trees;
  - increased noise, vibration and dust levels resulting in disturbance of fauna species, and consequent abandonment of habitat, or changes in behaviour (including breeding behaviour); and
  - lighting for night works, resulting in disturbance to fauna species and changes in occupancy or behaviour.

Wherever possible, direct impacts have been avoided and/or minimised through the design of the mine and pipeline disturbance footprints. Impacts will be further managed and mitigated through the development of a biodiversity management plan, using the measures recommended in the below sections. Any residual impacts would be compensated through implementation of the biodiversity offset framework (Section 6.7).

6.2 Prescribed and uncertain impacts

An assessment of prescribed and uncertain impacts relevant to the mine and pipeline developments associated with the amended project are provided in Table 6.1.

Table 6.1 Assessment of prescribed and uncertain impacts

Prescribed/uncertain impact	Mine development	Pipeline development
Impacts of development on the habitat of threatened species or ecological communities associated with:		
• karst, caves, crevices, cliffs and other geological features of significance; • rocks; or • human-made structures; or • non-native vegetation.	The mine development does not contain geologically significant features, rocky areas, human-made structures or non-native vegetation that represent habitat for threatened species or ecological communities.	The pipeline development does not intersect geologically significant features or human-made structures that would represent habitat for threatened species or ecological communities. The pipeline corridor intersects areas of granite outcropping that represent potential habitat for Pink-tailed Worm Lizard in the Bathurst IBRA subregion. The pipeline disturbance footprint has minimised impacts on this area of granite outcropping, and a species polygon has been created (Figure 5.6) for Pink-tailed Worm Lizard in PCT 1330, encompassing these rocky areas to compensate for direct impacts. Additional measures will be implemented to manage this prescribed impact during construction (Table 6.6). No operational impacts are expected. A species polygon has also been created for Booroolong Frog in the Bathurst IBRA subregion (northern and southern options) and Capertee Uplands IBRA subregion. These species polygons intersect areas of non-native vegetation and therefore will not generate species credits under the BAM. Strategies to manage this potential prescribed impact during construction are discussed in Table 6.6 and Table 6.7. No operational impacts are expected. Five Black Gum trees occur in areas of non-native vegetation. Three of these individuals would be directly impacted, while two would be potentially indirectly impacted by tree root damage (ie are present in the TRWIMZ). Strategies to manage this prescribed impact are described in Table 6.7.

Table 6.1 Assessment of prescribed and uncertain impacts

Prescribed/uncertain impact	Mine development	Pipeline development
Impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range	Native vegetation and fauna habitats are highly fragmented in the mine disturbance footprint. Ecosystem and species credit species predicted to occur in the mine project area predominantly comprise highly mobile birds and bats, and therefore most species will not be impacted by fragmentation. However, species dependent on the retention of vegetated corridors recorded in the mine footprint (Koala and Squirrel Glider) and predicted to occur in the mine footprint (Brown Treecreeper and Spotted-tail Quoll) may be impacted by fragmentation. Management of this prescribed impact on the aforementioned species is discussed in Table 6.6 and Table 6.7.	The pipeline predominantly traverses non-native vegetation but intersects four large and contiguous areas of native vegetation. In these areas of contiguous native vegetation, the pipeline corridor has been placed on existing roads and tracks to minimise fragmentation impacts. As the pipeline will be buried, fragmentation impacts will be temporary and mainly limited to the construction period. There is potential for nocturnal animals (eg Koala) to become trapped in the trench if sections are left open overnight. Management of this prescribed impact on threatened species during construction is discussed in Table 6.6 and Table 6.7. Minor operational impacts may occur if pipeline maintenance is required.
Impacts of development on movement of threatened species that maintains their life cycle	Species dependent on the retention of vegetated corridors recorded in the mine footprint (Koala and Squirrel Glider) and predicted to occur in the mine footprint (Brown Treecreeper and Spotted-tail Quoll) may be impacted by fragmentation. These species would depend upon maintenance of connectivity during the breeding season to find mates. Management of this prescribed impact on the aforementioned species is discussed in Table 6.6.	The main impact to threatened species life cycles is fragmentation, as species like Koalas and Squirrel Gliders need some level of connectivity in vegetation to access mates during the breeding season. As fragmentation impacts are temporary and restricted to the construction period, potential life-cycle impacts will be managed through managing connectivity. Management of this prescribed impact on threatened species during construction is discussed in Table 6.6 and Table 6.7. No operational impacts are expected.
Impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including from subsidence or upsidence resulting from underground mining)	Impacts on groundwater dependent ecosystems that represent threatened ecological communities and threatened species habitats are discussed in Section 8, with management measures provided in	The trench for the pipeline is not expected to intersect groundwater given its shallow depth, therefore impacts on groundwater dependent ecosystems are not expected. Additionally, large waterways like the Macquarie River are being underbored. Therefore, impacts on threatened species and ecological communities as a result of changes in water quality, water bodies and hydrological processes are not expected during construction or operation. Accordingly, management of this prescribed impact is not required.
Impacts of wind turbine strikes on protected animals	The mine development does not include wind turbines; therefore this prescribed impact is not relevant to the project. Accordingly, management of this prescribed impact is not required.	The pipeline development does not include wind turbines; therefore this prescribed impact is not relevant to the project. Accordingly, management of this prescribed impact is not required.

Table 6.1 Assessment of prescribed and uncertain impacts

Prescribed/uncertain impact	Mine development	Pipeline development
Impacts of vehicle strikes or on animals that are part of a threatened ecological community	The mine development traffic impact assessment (Constructive Solutions 2019) and Traffic and Transport Addendum (Constructive Solutions 2020) predicted a minor increase in traffic on the local road network as a result of the project, with a 15% increase noted for the Mid-Western Highway.	The pipeline development traffic impact assessment (Ason Group 2019) and Chapter 6 of the McPhillamys Gold Project Amendment Report (EMM 2020a) concluded that the pipeline would result in minor increases of approximately 30 vehicle movements in the morning and afternoon peak periods from existing traffic levels during the construction period and no material impacts during the operational period. Therefore, the pipeline development is not predicted to significantly increase animal vehicle strikes above existing levels. Accordingly, management of this prescribed impact is not required.
Indirect impacts on Black Gum in native vegetation	-	Three Black Gum individuals may be potentially impacted by tree root damage (ie are present in the TRWIMZ) and 11 by weeds (ie present in the WIMZ). Strategies to manage this uncertain impact are described in Table 6.7.
Indirect impacts on Tarengo Leek Orchid	-	Regis have committed to avoiding all direct impacts on Tarengo Leek Orchid (Table 6.6) and implementing a 5 m buffer around any recorded individuals to minimise indirect impacts. Strategies to manage this uncertain impact are described in Table 6.6 and Table 6.7.

6.3 Comparison of predicted EIS impacts with amended project

6.3.1 Mine development

Impacts on biodiversity have changed for the mine development, primarily relating to a change in the mine disturbance footprint. Table 6.2 compares the PCT predicted impacts as presented in the EIS with those associated with the amended project. Overall, the amended project will reduce direct impacts on PCTs by 1.97 ha.

Table 6.2 Comparison of mine development PCT impacts

Plant community type/species credit species	Residual direct impact - EIS (ha)	Residual direct impact - Amended project (ha)	Change
727 - Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion – Moderate/Good (High)	4.75	2.84	-1.91
727 - Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion – Moderate/Good (Medium)	34.55	35.54	0.99
727 - Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion – Moderate/Good (Poor)	14.25	10.40	-3.85
951 - Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion – Moderate/Good (Poor)	31.55	32.73	1.18
766 - Carex sedgeland of the slopes and tablelands – Moderate/Good (Poor)	3.04	3.04	0.00
1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion– Moderate/Good (High)	1.47	1.47	0.00
1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion – Moderate/Good (Medium)	17.03	18.96	1.93
1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion – Moderate/Good (Other)	0.76	0.76	0.00
1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion – Moderate/Good (Poor)	24.96	24.65	-0.31
Total	**132.36**	**130.39**	**-1.97**

Table 6.3 compares the species impacts as presented in the EIS with the amended project. As the method of Koala habitat mapping has changed with the introduction of SEPP (Koala Habitat Protection) 2019, the direct residual impacts of the EIS and amended project are provided for the Koala in Table 6.3, using both methods for calculating Koala habitat, comprising:

- Koala habitat as presented in the EIS, calculated based on SEPP 44 and the feed tree species for the central and southern tablelands koala management area in the Koala Recovery Plan (DECC 2008); and
- Koala habitat as presented in this BDAR, calculated based on the feed tree species for the central and southern tablelands koala management area in SEPP (Koala Habitat Protection) 2019.

Accordingly, the amended project would increase direct Koala impacts by 2.8 ha using the Koala species polygon as presented in the EIS and increase by 1.89 ha using the Koala species polygon as presented in this BDAR.

In the EIS, direct impacts on the Squirrel Glider were 129.32 ha. The amended project would reduce direct Squirrel Glider impacts by 1.97 ha to 127.35 ha.

Table 6.3 Comparison of direct mine development species impacts

Candidate species	Residual direct impact - EIS (ha)	Residual direct impact - Amended project (ha)	Change
Koala - SEPP 44 and Koala recovery plan mapping method presented in EIS	75.77	78.57	2.80
Koala - SEPP (Koala Habitat Protection) 2019) mapping method presented in this BDAR	115.06	116.95	1.89
Squirrel Glider	129.32	127.35	-1.97

6.3.2 Pipeline development

Impacts on biodiversity have changed for the pipeline development, partly relating to a change in the pipeline disturbance footprint and the addition of two pipeline options in the Bathurst IBRA subregion. The impacts on biodiversity have mainly changed due to the revision of PCT mapping, additional targeted survey and habitat assessment results.

Table 6.4 compares the impacts on PCTs as presented in the EIS with the amended project and changes to the biodiversity assessment results. As vegetation zones have been revised the total area of the PCT has been combined to provide a comparison of the changes. Overall, the impact on PCTs have increased by 10.22 ha for the southern option and 7.54 ha for the northern option.

Table 6.5 compares the impacts on candidate species as presented in the EIS with the amended project and changes to the biodiversity assessment results. The number of candidate species assessed has greatly increased when compared with the EIS; however, this is due mainly to a change in how candidate species have been assessed.

In the EIS, the candidate species assessment was only completed in the dominant IBRA subregion, namely Bathurst, while separate candidate species have been completed for each IBRA subregion the pipeline intersects, in response to BCD's submission. In addition, the increase in native PCTs mapped within the project footprint has increased the area of habitat impacted for threatened species when comparing the amended project to the EIS. Overall, species impacts have increased by 13.57 ha for the southern option and 12.5 ha for the northern option. It should be noted that some of these impacts are combined, as multiple species in some cases can occupy the same area of habitat.

Table 6.4 Comparison of pipeline development PCT impacts

Plant community type	Residual impact EIS (ha)	Residual impact - Amended project: southern option (ha)	Residual impact - Amended project: northern option (ha)	Change (southern option)	Change (northern option)
85 - River Oak forest and woodland wetland of the NSW South Western Slopes and South Eastern Highlands Bioregion	0.10	0.00	0.00	-0.10	-0.10
277 - Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	0.00	2.37	2.37	2.37	2.37
287 - Long-leaved Box - Red Box - Red Stringybark mixed open forest on hills and hillslopes in the NSW South Western Slopes Bioregion	0.70	0.00	0.00	-0.70	-0.70
654 - Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands Bioregion	0.60	0.00	0.00	-0.60	-0.60
679 - Black Gum grassy woodland of damp flats and drainage lines of the eastern Southern Tablelands, South Eastern Highlands Bioregion	0.40	0.00	0.00	-0.40	-0.40
727 - Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion	0.00	0.03	0.03	0.03	0.03
731 - Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills, South Eastern Highlands Bioregion	2.50	0.00	0.00	-2.50	-2.50
732 - Broad-leaved Peppermint - Ribbon Gum grassy open forest in the north east of the South Eastern Highlands Bioregion	1.10	0.00	0.00	-1.10	-1.10
765 - Carex - Juncus sedgeland/wet grassland of the South Eastern Highlands Bioregion	0.00	0.00	0.00	0.00	0.00
1093 - Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion	2.10	3.24	3.24	1.14	1.14
1191 - Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion	0.00	2.11	2.11	2.11	2.11
1197 - Snow Gum - Mountain Gum tussock grass-herb forest of the South Eastern Highlands Bioregion	0.30	0.96	0.96	0.66	0.66

Table 6.4 Comparison of pipeline development PCT impacts

Plant community type	Residual impact EIS (ha)	Residual impact - Amended project: southern option (ha)	Residual impact - Amended project: northern option (ha)	Change (southern option)	Change (northern option)
1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	0.50	9.80	7.13	9.30	6.63
Total	**8.30**	**18.51**	**15.84**	**10.21**	**7.54**

Table 6.5 Comparison of pipeline species impacts

Species	EIS impacts (ha)	Amended project impacts (ha)			Change	
		Southern option	Northern option	Notes	Southern option	Northern option
Flora						
Silky Swainson-pea	0.46	0.57	0.57	Revised vegetation mapping has increased and changed the area of habitat.	0.11	0.11
Austral Toadflax	0.27	0.09	0.09	Revised vegetation mapping has refined the area of habitat.	-0.18	-0.18
Acacia meiantha	0	3.83	3.83	New candidate species predicted by BAMC during 2020 assessment.	3.83	3.83
Black Gum	0	0.42	0.42	New candidate species predicted by BAMC during 2020 assessment.	0.42	0.42
Lepidium hyssopifolium	0	0.09	0.09	New candidate species predicted by BAMC during 2020 assessment.	0.09	0.09
Clandulla Geebung	0	0.19	0.19	New candidate species predicted by BAMC during 2020 assessment.	0.19	0.19
Small Purple-pea	0	0.39	0.39	New candidate species predicted by BAMC during 2020 assessment.	0.39	0.39
Veronica blakelyi	0	0.87	0.87	New candidate species predicted by BAMC during 2020 assessment.	0.87	0.87
Fauna						
Eastern Pygmy Possum	7.4	4.67	4.67	Revised vegetation mapping has refined the area of habitat.	-2.73	-2.73
Southern Myotis	0.2	0.00	0.00	Species habitat now classified as degraded.	-0.20	-0.20
Barking Owl	0.27	0.41	0.41	Additional hollow trees recorded have increased the habitat area.	0.14	0.14
Powerful Owl	0.27	2.34	2.34	Additional hollow trees recorded have increased the habitat area.	2.07	2.07
Bathurst Copper Butterfly	0.29	0	0	The route now avoids direct impacts on potential host plants for the species.	-0.29	-0.29

Table 6.5 Comparison of pipeline species impacts

Species	EIS impacts (ha)	Amended project impacts (ha)			Change	
		Southern option	Northern option	Notes	Southern option	Northern option
Squirrel Glider	4.42	4.56	4.56	Revised vegetation mapping has increased and changed the area of habitat.	0.14	0.14
Brush-tailed Phascogale	2.9	2.15	2.15	Revised vegetation mapping has refined the area of habitat.	-0.75	-0.75
Booroolong Frog	0	0.37	0.38	New candidate species predicted by BAMC during 2020 assessment.	0.37	0.38
Brush-tailed Rock Wallaby	0	0.13	0.13	New candidate species predicted by BAMC during 2020 assessment.	0.13	0.13
Bush Stone-curlew	0	1.15	1.15	New candidate species predicted by BAMC during 2020 assessment.	1.15	1.15
Gang-gang Cockatoo	0	1.66	1.66	New candidate species predicted by BAMC during 2020 assessment.	1.66	1.66
Koala	0	4.77	4.77	New candidate species predicted by BAMC during 2020 assessment.	4.77	4.77
Large-eared Pied Bat	0	0.15	0.15	New candidate species predicted by BAMC during 2020 assessment.	0.15	0.15
Pink-tailed Worm Lizard	0	1.25	0.16	New candidate species predicted by BAMC during 2020 assessment.	1.25	0.16
Total	**16.48**	**30.05**	**28.98**	**-**	**13.57**	**12.50**

6.4 Avoidance, minimisation and management

6.4.1 Avoidance and minimisation strategy for direct and indirect impacts

i Mine development

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 mine 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 White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grasslands (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 mine project area. The mining lease application area was reduced to avoid potential biophysical strategic agricultural land (BSAL) in the western portion of the mine project area.

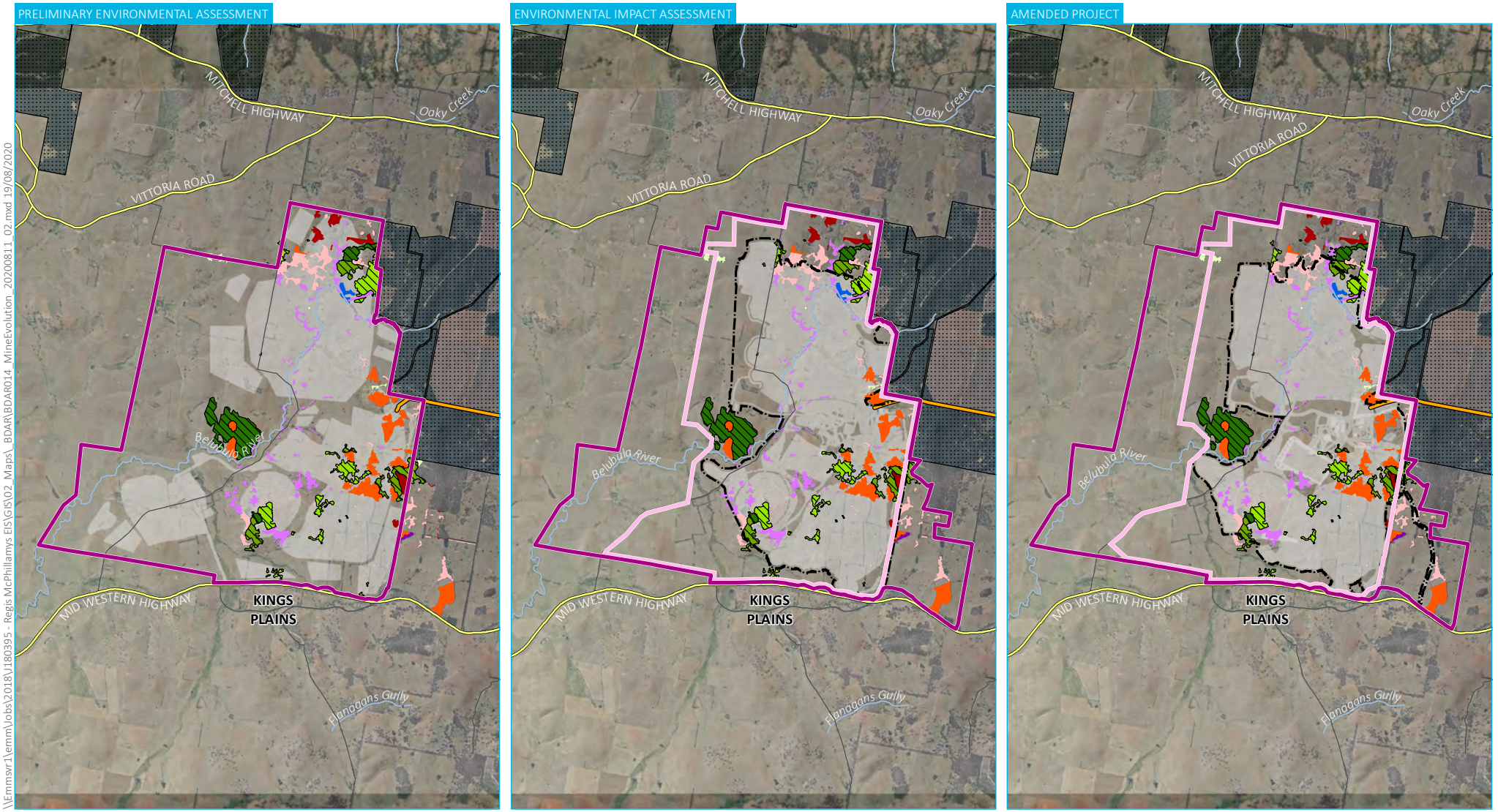
Iterative project planning, informed by the baseline studies outlined above, has allowed a range of impacts to be avoided and others to be minimised throughout the life of the project. To compensate for unavoidable disturbance, biodiversity offsets will be provided.

Key avoidance measures that have been implemented by Regis comprise:

- avoidance of the majority of White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grasslands CEEC in High condition apart from a small area (1.47 ha) in the direct footprint of the open cut mine and tailings dam;
- minimisation of impacts to PCT 1330_Medium condition wherever feasible; and
- 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).

The anticipated impact of the mine development on a listed ecological community, namely Box Gum Woodland CEEC (EPBC Act) at the time of the pre-referral meeting with the then 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 mine 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 20.43 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 6.1 shows the mine development during the PEA, EIS and current mine development and demonstrates how the design has evolved to avoid and or minimise impacts on threatened biodiversity. Table 6.6 summarises the avoidance and minimisation measures already incorporated into the mine development's design and the additional measures to minimise the potential for unacceptable mine development-related impacts on biodiversity.



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KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Additional (post-closure) disturbance footprint
- Pipeline

Project general arrangement
- Design lines
- Design polygons

Existing environment
- Major road
- Minor road
- Named watercourse
- Vittoria State Forest

Box Gum Woodland TEC (EMM, 2019)

Plant community types

PCT 727 | Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion
- High
- Medium
- Poor

PCT 766 | Carex sedgeland of the slopes and tablelands
- Poor

PCT 951 | Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion
- Medium
- Poor

PCT 1330 | Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
- High
- Medium
- Poor
- Other

Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); ELVIS (2014)

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Evolution of the mine development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 6.1

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The above avoidance, minimisation and mitigation measures were developed with consideration of recovery strategies and actions for Box Gum Woodland and the Koala and other threatened species that would be impacted by the mine. The National Recovery Plan for White Box Yellow Box Blakely's Red Gum Woodland (DECCW 2010a) 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.

A Koala revegetation project is proposed in areas of retained Koala habitat. The revegetation project will aim to reconnect fragmented patches of Koala habitat surrounding the mine and create links with larger areas of native vegetation to the north and east. The Koala revegetation project directly addresses the priority management action of re-connecting fragmented Koala populations.

ii Pipeline development

The pipeline has been designed, where possible, to avoid sensitive biodiversity areas. Regis has invested significant time and expense in revising vegetation mapping, conducting targeted surveys and assessing habitat for threatened species in response the BCD's concerns with the EIS pipeline biodiversity assessment.

The additional surveys and assessments have been carried out in parallel with, and have informed the evolution of, the pipeline corridor design. This process has ensured the avoidance of environmental constraints, including impacts on Box Gum Woodland and threatened species habitat, as far as practicable.

Key avoidance measures that have been implemented by Regis comprise:

- selection of a pipeline route that maximises use of existing roads and non-native vegetation and minimises disturbance to native vegetation;
- reducing the pipeline disturbance footprint from 20 m as presented in the EIS to 8 m width, with a further restriction to 6 m width where the pipeline intersects EPBC Act-listed Box Gum Woodland;
- underboring large waterways including the Macquarie River to avoid impacts on aquatic habitats and species;
- avoiding direct impacts on Bathurst Copper Butterfly host plants; and
- avoiding direct and indirect impacts on potential Tarengo Leek Orchid habitat (to be informed by the outcomes of a targeted survey in November 2020).

6.4.2 Impact avoidance and minimisation strategy

Table 6.6 details the avoidance and minimisation measures already incorporated into the mine and pipeline development's design and the additional measures to minimise the potential for unacceptable impacts on biodiversity.

Table 6.6 Impact avoidance and minimisation strategy – mine and pipeline development

Impact	Action	Project components	Intended outcome	Timing	Responsibility
Reduction in habitat critical to the survival of Box Gum Woodland	Avoid majority of impacts on high condition Box Gum Woodland and minimise impacts on moderate condition areas through careful mine design Minimise pipeline disturbance footprint width to 6 m where it intersects EPBC Act-listed Box Gum Woodland	Mine development, pipeline development	High-quality Box Gum Woodland impacts mainly avoided, impacts on moderate condition minimised (completed)	Design	Client
Reduction in clearing Werriwa Tablelands Cool Temperate Grassy Woodland and native PCTs	Minimise pipeline disturbance footprint to 8 m maximum width	Pipeline development	Impacts on Werriwa Tablelands Cool Temperate Grassy Woodland and native PCTs minimised (completed)	Design	Client
Reduction in habitat critical to the survival of Koala	Shift location of tailings storage facility into cleared land and minimise footprint such that Koala corridors along the Belubula River are retained	Mine development	Retention of Koala habitat prioritised, minimise impact on habitat resulting from project (completed)	Design	Client
Impacts on threatened species and ecological communities	Place access roads and other infrastructure in cleared land	Mine development	Impacts on threatened species and communities minimised (completed)	Design	Client
	Select pipeline route that maximises use of existing roads and non-native vegetation	Pipeline development	Impacts on threatened species and communities minimised (completed)	Design	Client
	Retain native vegetation and habitats where not required for mine infrastructure	Mine development	Retention of native vegetation and threatened species habitats	Prior to and during clearing operations	Environmental manager
	Retain and protect the area of native vegetation and Koala habitat north of the waste emplacement area	Mine development	Retention of native vegetation and Koala habitat	During mining	Environmental manager
	Identify the limit of approved disturbance areas on the ground through the use of suitable visible markers and ensure that all ground disturbing activities are only undertaken within approved areas	Mine development, pipeline development	Minimise impacts on threatened species and communities	Prior to and during clearing operations	Environmental manager, Project ecologist

Table 6.6 Impact avoidance and minimisation strategy – mine and pipeline development

Impact	Action	Project components	Intended outcome	Timing	Responsibility
	Carefully remove vegetation in such a way that avoids damage to surrounding vegetation	Mine development, pipeline development	Minimise impacts on threatened species and communities	Prior to and during clearing operations	Environmental manager, Project ecologist
	Undertake a pre-clearing inspection to identify and, where practicable, remove nesting or roosting fauna	Mine development, pipeline development	Minimise impacts on threatened species and communities	Prior to and during clearing operations	Environmental manager, Project ecologist
	Develop specific procedures for Koala pre-clearing inspections and safe relocation outside the clearing area	Mine development, pipeline development	Prevent injury and mortality of Koalas during clearing operations by relocating into adjacent retained habitat	Prior to and during clearing operations	Environmental manager, Project ecologist
	Undertake a revegetation project targeted at Koalas	Mine development	Increase the connectivity of fragmented patches of Koala habitat within the mine project area, and outside the mine disturbance footprint	To be determined as part of BMP development	Environmental manager, Project ecologist
	Undertake a staged clearing of native vegetation and fauna habitat to minimise impacts to native fauna species	Mine development	Allow fauna to gradually self-relocate outside of project footprint	During clearing operations	Environmental manager, Project ecologist
	Stockpile vegetation onsite for use during rehabilitation operations, where practicable. Larger vegetation may be retained whole for use in rehabilitation operations on site	Mine development	Retain important structural habitat features in the mine project area for use in rehabilitation and/or at offset site	During clearing operations	Environmental manager, Project ecologist
	implement a weed and pathogen monitoring program	Mine development	Monitor weed impacts to retained vegetation outside the mine disturbance footprint, but within the mine project area to target weed control efforts	Prior to and during clearing operations and mine operation	Environmental Manager, weed contractor

Table 6.6 Impact avoidance and minimisation strategy – mine and pipeline development

Impact	Action	Project components	Intended outcome	Timing	Responsibility
	Undertake weed management and pest control programs in consultation with surrounding landholders, based on the results of the weed and pathogen monitoring program	Mine development	Maintain or improve condition of retained native vegetation	Prior to and during clearing operations and mine operation	Environmental Manager, weed contractor
	Undertake progressive rehabilitation	Mine development	Retain native vegetation and fauna habitats for as long as possible	In stages as the mine progresses	Environmental Manager, rehabilitation consultant and restoration ecologist
	Underbore large waterways where required. Trenching of watercourses will be carried out in accordance with Policy and Guidelines for fish habitat conservation and management (DPI 2013)	Pipeline development	Avoid impacts on aquatic species and habitats	Concept Design	Client
	Minimise corridor to avoid direct impacts on Bathurst Copper Butterfly host plants	Pipeline development	Further avoid direct impacts on newly recorded Bathurst Copper Butterfly host plants	Concept Design	Client

Table 6.6 Impact avoidance and minimisation strategy – mine and pipeline development

Impact	Action	Project components	Intended outcome	Timing	Responsibility
	Conduct targeted pre-clearance survey for Tarengo Leek Orchid during the peak flowering season (October to November 2020) in the 0.62 ha of potential habitat to determine presence or absence of the species. If the species is present, the following procedures will be implemented: • the route will be microsited such that direct impacts to individuals are avoided; • protective fencing will be established prior to trenching in the species habitat with a 5 m buffer around each individual or group of individuals; and • existing hydrological conditions will be determined in the area where individuals have been recorded, with this hydrology maintained during the construction period.	Pipeline development	If found, the route will be microsited such that direct impacts are avoided, and indirect impacts are appropriately managed.	Detailed design	Environmental manager, Project ecologist
	Conduct pre-clearance surveys for Basalt Peppercress and Hoary Sunray during their flowering season (concurrent with Tarengo Leek Orchid surveys in October/November 2020) in potential habitats.	Pipeline development	If found, the route will be microsited such that the least possible number of individuals of each species are impacted.	Detailed design	Environmental manager, Construction Manager, Project ecologist
	A pre-clearance inspection will be conducted prior to trenching potential Booroolong Frog habitat near Coxs River (and Evans Plains Creek if the northern option is selected), surrounding the candidate species polygons shown on Figure 5.6p, q, s and u. During the pre-clearance inspection, Booroolong Frogs (if present) will be salvaged and safely relocated outside of the trenching area and into adjacent retained habitats. The project ecologist will be present for the duration of trenching through the abovementioned areas to undertake salvage and relocation.	Pipeline development	Avoid damage to upstream and downstream vegetation and rocks (potential Booroolong Frog habitat) and minimise frog injury/mortality.	Prior to and during trenching operations	Environmental manager, Project ecologist

Table 6.6 Impact avoidance and minimisation strategy – mine and pipeline development

Impact	Action	Project components	Intended outcome	Timing	Responsibility
	The route will be microsited such that impacts on large trees, hollow-bearing trees and recorded individuals of Black Gum, Clandulla Geebung are minimised where possible. Protective fencing (eg parawebbing) will be placed around retained individuals for their protection during trenching.	Pipeline development	Maintain or improve condition of retained native vegetation	Prior to and during clearing operations and mine operation	Environmental Manager, weed contractor
	The route will be microsited through the area of potentially suitable rocky habitat for Pink-tailed Worm Lizard, delineated by the species polygons shown on Figure 5.6 p, q, s and u. A pre-clearance inspection will be completed to salvage and safely relocate Pink-tailed Worm Lizards (if present) outside the trenching area and into adjacent retained habitats. The project ecologist will be present for the duration of trenching through the abovementioned areas to undertake salvage and relocation.	Pipeline development	The route will be microsited such that the least area of potential habitat is impacted during trenching and minimise reptile injury/mortality during trenching.	Prior to and during clearing operations and mine operation	Environmental manager, Project ecologist
	Trenches while left open will be subject to daily inspection and escape measures or shelter provided (eg ramps or material under which animals can shelter). If species are trapped in the trench they will be freed by a trained and competent individual.	Pipeline development	Animal injury is minimised during trenching.	Daily inspections in active (open) trenching areas	Environmental manager, Project ecologist

6.4.3 Adaptive management strategy for prescribed and uncertain impacts

An adaptive management strategy has been developed for the project to monitor and respond to prescribed and uncertain biodiversity impacts (Table 6.7).

Table 6.7 Adaptive management strategy for prescribed and uncertain biodiversity impacts

Prescribed/uncertain biodiversity impact	Project component	Monitoring/management strategy	Trigger for management	Response
Impacts on potential Booroolong Frog habitat in non-native vegetation	Pipeline development	A pre-clearance inspection will be conducted prior to trenching through potential habitat (at the locations specified in the BDAR).	Frogs are present in trenching area	Place frogs in upstream/downstream habitats out of trenching area, in accordance with Hygiene guidelines: Protocols to protect priority biodiversity areas in NSW from Myrtle Rust (Phytophthora cinnamomi), amphibian chytrid fungus and invasive plants (EES 2020).
Impacts on potential Pink-tailed Worm Lizard habitat	Pipeline development	A pre-clearance inspection will be conducted prior to trenching through potential habitat (at the locations specified in the BDAR).	Lizards are present in trenching area.	Place lizards in retained rocky habitats out of trenching area.
Direct and indirect impacts on Black Gum in non-native vegetation	Pipeline development	Protective fencing (eg parawebbing) will be placed around retained individuals for their protection during trenching, where required. The condition of the fencing will be monitored during trenching. The condition of the two Black Gum in the TRWIMZ will be assessed prior and following trenching to determine if an impact has occurred.	Protective fencing is breached (where installed). The health of the two trees declines when compared to baseline arboricultural assessment	Repair fencing (where required). Mitigate damage in accordance with arborist's recommendations
Indirect impacts on Black Gum in native vegetation in TRWIMZ and WIMZ	Pipeline development	The condition of the three Black Gum in the TRWIMZ and 11 in the WIMZ will be assessed by an arborist prior to, during and following trenching to determine if an impact has occurred.	The health of the 14 trees declines when compared to baseline arboricultural assessment	Mitigate damage in accordance with arborist's recommendations

Table 6.7 Adaptive management strategy for prescribed and uncertain biodiversity impacts

Prescribed/uncertain biodiversity impact	Project component	Monitoring/management strategy	Trigger for management	Response
Indirect impacts on Tarengo Leek Orchid	Pipeline development	If Tarengo Leek Orchids are recorded during targeted survey, the route will be microsited such that direct impacts are avoided. Indirect impacts will be managed through providing a 5 m buffer of protective fencing around recorded individuals (or groups of individuals) and implementing controls that maintain existing hydrological conditions during construction.	Protective fencing is breached	Repair protective fencing
			Hydrological controls are breached	Repair hydrological controls
Fragmentation of vegetated corridors in the mine project area	Mine development	Monitor increases in tree cover against benchmark values for the target PCTs (to be selected during development of the Biodiversity Management Plan, see Section 6.4.4).	Tree cover does not achieve 25% of the benchmark values by Year 10 of mining.	Conduct additional tree planting to increase tree cover
Potential entrapment of fauna during pipeline trenching	Pipeline development	Daily inspections of open trenches for trapped fauna and condition of escape and shelter measures provided.	Animal is trapped in open trench and/or condition of escape and shelter measures are breached	Rescue and release fauna from open trench, unless injured or juvenile. Injured or juvenile fauna will be taken to a vet or wildlife carer.

6.4.4 Biodiversity management plan

The biodiversity management measures outlined in Section 6.4 would be documented and fully detailed in a biodiversity management plan, to be prepared following project approval in consultation with relevant government agencies and stakeholders.

6.5 Serious and irreversible Impacts

Section 10.2.2 of the BAM requires additional impact assessment for threatened species and ecological communities that are also listed as candidate entities for Serious and Irreversible Impacts (SAII) under the BC Act. The project will impact two candidate entities for SAII, namely:

- White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grassland (mine and pipeline development); and
- Werriwa Tablelands Cool Temperate Grassy Woodland in the South Eastern Highlands and South East Corner Bioregions (pipeline development only).

These SAII candidate entities are assessed against the assessment criteria provided in Section 10.2.2 of the BAM and Table 6.9, and total area of each has been assessed in the pipeline corridor to allow a cumulative assessment.

It should be noted that Table 6.8 assesses White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grassland, as listed under the BC Act. The extent of the BC Act-listed community is much larger than the similarly named community listed under the EPBC Act due to the higher condition thresholds. The EPBC Act-listed ecological community is assessed separately in Section 7.1.

Table 6.8 SAII assessment for White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grasslands

<table>
<tr><th colspan="2">Assessment question</th><th>Mine development</th><th>Pipeline development</th></tr>
<tr><td>a)</td><td>What is the action and what measures have been taken to avoid direct and indirect impacts on the SAII candidate entity</td><td>The action is to construct an open cut gold mine (and associated infrastructure) and a water supply pipeline (Section 1.6). Measures to avoid direct and indirect impacts on the community are detailed in Section 6.4.</td><td>The action is to construct an open cut gold mine (and associated infrastructure) and a water supply pipeline (Section 1.6). Measures to avoid direct and indirect impacts on the community are detailed in Section 6.4.</td></tr>
<tr><td>b)</td><td>What is the area (ha) and condition (ie vegetation integrity score for each vegetation zone) of the TEC to be directly and indirectly impacted by the proposed development?</td><td><table><tr><th>Vegetation zone</th><th>Direct impacts (ha)</th><th>Indirect impacts (ha)</th><th>VI score</th></tr><tr><td>1330_High</td><td>1.47</td><td>0.16</td><td>39.4</td></tr><tr><td>1330_Medium</td><td>18.96</td><td>2.05</td><td>55.0</td></tr><tr><td>1330_Other</td><td>0.76</td><td>-</td><td>26.4</td></tr><tr><td>1330_Poor</td><td>24.65</td><td>0.65</td><td>43.2</td></tr><tr><td>Total</td><td>45.84</td><td>2.87</td><td>-</td></tr></table></td><td><table><tr><th rowspan="2">Vegetation zone</th><th colspan="2">Southern option</th><th colspan="2">Northern option</th><th rowspan="2">VI score</th></tr><tr><th>Direct impacts (ha)</th><th>Indirect impacts (ha)</th><th>Direct impacts (ha)</th><th>Indirect impacts (ha)</th></tr><tr><td>1330_DNG</td><td>7.53</td><td>13.12</td><td>4.09</td><td>7.89</td><td>17.4</td></tr><tr><td>1330_Fragments</td><td>0.00</td><td>0.10</td><td>0.51</td><td>0.95</td><td>3.8</td></tr><tr><td>1330_Intact</td><td>0.42</td><td>1.19</td><td>0.76</td><td>1.75</td><td>19.2</td></tr><tr><td>1330_Shrubland</td><td>0.05</td><td>0.15</td><td>0.05</td><td>0.15</td><td>51.2</td></tr><tr><td>1330_Sparse</td><td>1.79</td><td>3.25</td><td>1.74</td><td>3.12</td><td>20.1</td></tr><tr><td>277_DNG</td><td>0.74</td><td>1.31</td><td>0.74</td><td>1.31</td><td>3.5</td></tr><tr><td>277_Intact</td><td>0.32</td><td>0.78</td><td>0.32</td><td>0.78</td><td>27.8</td></tr><tr><td>277_Moderate</td><td>1.31</td><td>2.55</td><td>1.31</td><td>2.55</td><td>31.6</td></tr><tr><td>Total</td><td>12.16</td><td>22.45</td><td>9.5</td><td>18.51</td><td>-</td></tr></table></td></tr>
<tr><td>c)</td><td>To what extent does the impact exceed the threshold for the candidate entity in Guidance to assist a decision-maker to determine a serious and irreversible impact?</td><td>There are no thresholds specified for the ecological community.</td><td>There are no thresholds specified for the ecological community.</td></tr>
</table>

Table 6.8 SAII assessment for White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grasslands

Assessment question	Mine development	Pipeline development
d) What is the extent and overall condition of the TEC within a 1,000 ha and 10,000 ha buffer of the development footprint?	The extent of the TEC within a 1,000 ha and 10,000 ha buffer of the mine development is 62.05 ha and 812.85 ha, respectively (OEH 2018). The TEC is highly fragmented in the region, and varies between high and poor condition patches, depending on the level of agricultural disturbance.	The extent of the TEC within a 1,000 ha and 10,000 ha buffer of the pipeline development footprint is 18.65 ha and 420.22 ha for the southern option, respectively and 33.64 and 520.85 for the northern option, respectively (OEH 2018). The TEC is highly fragmented in the region, and varies between high and poor condition patches, depending on the level of agricultural disturbance.
e) What is the extant area and overall condition of the TEC remaining in the IBRA subregion before and after the proposed development?	The estimated extant area (OEH 2018) of the TEC in the Orange IBRA subregion is 24,145.38 ha. Following the mine development, it is estimated to reduce to 24,099.78.	The extant area of the TEC in each IBRA subregion was estimated by combining spatial datasets from OEH (2015), OEH (2018) and DPIE (2019). The estimated extant area of the TEC in the Orange IBRA subregion is 24,531.07 ha. Following the pipeline development, it is estimated to reduce to 24,528.88 ha for the southern option and northern options. The estimated extant area of the TEC in the Bathurst IBRA subregion is 24,145.38 ha. Following the pipeline development, it is estimated to reduce to 24,136.27 ha for the southern option and 24, 139.68 ha for the northern option. The estimated extant area of the TEC in the Hill End IBRA subregion is 25,490.78 ha. Following the pipeline development, it is estimated to reduce to 25,489.93 ha for the southern option and northern options. The estimated extant area of the TEC in the Capertee Uplands IBRA subregion is 1,354.92 ha. It is absent from the pipeline disturbance footprint in this region and therefore the extant area will not change as a result of the pipeline development.

Table 6.8 SAII assessment for White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grasslands

Assessment question	Mine development	Pipeline development
f) How much (ha) of the TEC is reserved within the IBRA region and IBRA subregion?	It is estimated that 440.99 ha of the TEC (OEH 2018) is reserved in the Orange IBRA subregion, and 12,318 ha is reserved in the South-eastern Highlands IBRA subregion (DPIE 2019;OEH 2015; OEH 2018).	It is estimated that 440.99 ha of the TEC is reserved in the Orange IBRA subregion, 876.55 in the Bathurst IBRA subregion, 305.13 ha in the Hill End IBRA subregion and 27.89 ha in the Capertee Uplands IBRA subregion (OEH 2015; OEH 2018). It is estimated that 12,318 ha is reserved in the South-eastern Highlands IBRA subregion (DPIE 2019;OEH 2015; OEH 2018).
What is the development's impact on:		
g) abiotic factors critical to the long-term survival of the TEC (eg how much the impact will lead to a reduction of groundwater levels or alter surface flow patterns)?	Abiotic factors including soil and surface hydrology will be modified in the mine project area, and therefore represents a permanent impact. The listed community occurs directly north and south-west of the mine disturbance footprint, within the mine project area. An assessment of changes to groundwater availability and quality that these retained patches would use opportunistically was conducted. The assessment concluded that retained patches of the community would not be adversely affected by the project (Chapter 8).	Abiotic factors including soil will be modified during trenching in the pipeline disturbance footprint. This soil would be reinstated following completion of trenching, and therefore abiotic factors necessary for the ecological community's survival will not be destroyed.
h) characteristic and functionally important species through impacts including, but not limited to, inappropriate fire/flooding regimes, removal of understorey species or plant harvesting?	The project will remove 45.6 ha of habitat for the ecological community within the mine disturbance footprint. Retained areas of the ecological community outside the mine disturbance footprint 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 mine disturbance footprint, but within the mine project area.	The pipeline development will clear 12.15 ha of the listed community for the southern option and up to 9.49 ha for the northern option. Within these areas, impacts to Box Gum woodland will be restricted to trenching through small patches of the community and trenching activities will seek to avoid removal of mature trees where practicable. As the disturbed soil would be reinstated following the completion of trenching, a substantial change in species composition is not expected.

Table 6.8 SAII assessment for White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grasslands

Assessment question	Mine development	Pipeline development
	The project will remove all areas of this community within the mine disturbance footprint; consequently, there will be no residual risk within the mine project area. The condition of retained vegetation in the mine project area will increase with management. Areas outside of the mine 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 mine disturbance footprint, but within the mine project area. The development of the weed and pest species management plan has the potential to result in improvements to areas of retained vegetation within the mine lease area.	Areas of the community will be removed within the pipeline disturbance footprint. Following trenching and soil stabilisation, it is expected that some of the groundcovers and potentially tree species would regenerate. Minor disturbances would occur to the groundlayer should maintenance be required during operation. The ecological community in the pipeline corridor has been subjected to agricultural activities for a long period of time and therefore is in poorer condition with lower VI scores compared with the mine project area. The majority of weed species within the CEEC are exotic pasture species associated with current agricultural land uses. Weed management measures will be developed and implemented in retained areas of the community outside the pipeline disturbance footprint, but within the pipeline corridor.

Table 6.8 SAII assessment for White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grasslands

Assessment question	Mine development	Pipeline development
i) Will an important area of the TEC be directly or indirectly fragmented or isolated?	A national recovery plan has been developed (DECCW 2010a) 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.	A national recovery plan has been developed (DECCW 2010a) 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 (*Eucalyptus albens*), Yellow Box (*E. melliodora*) or Blakelys Red Gum (*E. blakelyi*), have a predominantly native understorey (ie 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.
	Approximately 20.43 ha of vegetation in the mine 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 1.8%.	Approximately 0.81 ha of vegetation in the footprint meets the above criteria. According to the PCT mapping (OEH 2018) there is approximately 344.2 ha of PCTs that represent the listed community within a 5 km radius of the pipeline corridor. The project would reduce the extent of critical habitat in the locality by approximately 0.2%, which does not represent an adverse impact.
j) What measures are proposed to assist with the TEC's recovery in the IBRA subregion?	Avoidance and minimisation measures relating to the project are detailed in Section 6.4. Offsets will be provided in accordance with the BAM to assist with the TEC's recovery in the IBRA subregion.	

Table 6.9 SAII assessment for Werriwa Tablelands Cool Temperate Grassy Woodland in the South Eastern Highlands and South East Corner Bioregions

Assessment question	Pipeline development
a) What is the action and what measures have been taken to avoid direct and indirect impacts on the SAII candidate entity	The action is to construct an open cut gold mine (and associated infrastructure) and a water supply pipeline (Section 1.6). Measures to avoid direct and indirect impacts on the community are detailed in Section 6.4.
b) What is the area (ha) and condition (ie vegetation integrity score for each vegetation zone) of the TEC to be directly and indirectly impacted by the proposed development?	See nested table below
c) To what extent does the impact exceed the threshold for the candidate entity in *Guidance to assist a decision-maker to determine a serious and irreversible impact?*	There are no thresholds specified for the ecological community.

Vegetation zone	Southern option		Northern option		VI score
	Direct impacts (ha)	Indirect impacts (ha)	Direct impacts (ha)	Indirect impacts (ha)	
1191_DNG	0.11	0.24	0.11	0.24	32.6
1191_Fragments	0.12	0.27	0.12	0.27	31.6
1191_Intact	1.40	2.81	1.40	2.81	51.3
1191_Shrubland	0.37	0.89	0.37	0.89	64.5
1191_Sparse	0.11	0.47	0.11	0.47	3.4
1197_DNG	0.00	0.16	0.00	0.16	20.4
1197_Intact	0.87	3.56	0.87	3.56	71.8
1197_Shrubland	0.04	0.31	0.04	0.31	28.2
1197_Sparse	0.04	0.24	0.04	0.24	26.8
Total	**3.07**	**8.92**	**3.07**	**8.92**	-

Table 6.9 SAII assessment for Werriwa Tablelands Cool Temperate Grassy Woodland in the South Eastern Highlands and South East Corner Bioregions

Assessment question		Pipeline development
d)	What is the extent and overall condition of the TEC within a 1,000 ha and 10,000 ha buffer of the development footprint?	The extent of the TEC within a 1,000 ha and 10,000 ha buffer of the pipeline development footprint is 29.72 ha and 293.97 ha for the southern option, respectively and 15.64 ha and 295.82 ha for the northern option, respectively (OEH 2018). The TEC is highly fragmented in the region, and varies between high and poor condition patches, depending on the level of agricultural disturbance.
e)	What is the extant area and overall condition of the TEC remaining in the IBRA subregion before and after the proposed development?	The extant area of the TEC in each IBRA subregion was estimated by combining spatial datasets from OEH (2015), OEH (2018) and DPIE (2019). The TEC is not impacted by the pipeline disturbance footprint in the Orange or Bathurst IBRA subregions. The estimated extant area of the TEC in the Hill End IBRA subregion is 4,789.63 ha. Following the pipeline development, it is estimated to reduce to 4,788.49 ha for the southern option and northern options. The estimated extant area of the TEC in the Capertee Uplands IBRA subregion is 675.18 ha. Following the pipeline development, it is estimated to reduce to 673.25 ha for the southern option and northern options.
f)	How much (ha) of the TEC is reserved within the IBRA region and IBRA subregion?	It is estimated that 667.95 ha in the Hill End IBRA subregion and 0 ha in the Capertee Uplands IBRA subregion (OEH 2015; OEH 2018). It is estimated that 50,117 ha is reserved in the South-eastern Highlands IBRA subregion (DPIE 2019; OEH 2015; OEH 2018).
		Abiotic factors including soil will be modified during trenching in the pipeline disturbance footprint. This soil would be reinstated following completion of trenching, and therefore abiotic factors necessary for the ecological community's survival will not be destroyed.
		Within the areas to be removed, impacts to the ecological community will be restricted to trenching through small patches of the community and trenching activities will seek to avoid removal of mature trees where practicable. As the disturbed soil would be reinstated following the completion of trenching, a substantial change in species composition is not expected.
		Areas of the community will be removed within the pipeline disturbance footprint. Following trenching and soil stabilisation, it is expected that some of the groundcovers and potentially tree species would regenerate. The ecological community in the pipeline corridor has been subjected to agricultural activities for a long period of time and therefore is in poorer condition with lower VI scores compared with the mine project area. The majority of weed species within the CEEC are exotic pasture species associated with current agricultural land uses. Weed management measures will be developed and implemented in retained areas of the community outside the pipeline disturbance footprint, but within the mine project area.

Table 6.9 SAII assessment for Werriwa Tablelands Cool Temperate Grassy Woodland in the South Eastern Highlands and South East Corner Bioregions

Assessment question		Pipeline development
g)	Will an important area of the TEC be directly or indirectly fragmented or isolated?	Important areas of the TEC have not been designated.
h)	What measures are proposed to assist with the TEC's recovery in the IBRA subregion?	Avoidance and minimisation measures relating to the project are detailed in Section 6.4. Offsets will be provided in accordance with the BAM to assist with the TEC's recovery in the IBRA subregion.

6.6 Impacts not requiring offsets

Areas not requiring assessment in accordance with Section 10.4 of the BAM (OEH 2017) include:

- existing roads;
- cleared and highly disturbed land, particularly associated with past mining activities (eg mullock heaps); and
- watercourses.

Areas not requiring offset are shown on Figure 6.2 and Figure 6.3.

In accordance with Section 10.3 of the BAM (OEH 2017), impacts on vegetation zones and threatened species habitat do not require offsets where:

- a vegetation zone representative of a critically endangered or endangered ecological community has a vegetation integrity score less than 15/100; and/or
- a vegetation zone representative of a vulnerable ecological community and/or threatened species habitat has a vegetation integrity score less than 17/100; and/or
- a vegetation zone that is not listed has a vegetation integrity score less than 20/100; and/or
- threatened species habitat where the vegetation integrity score is less than 17/100.

Table 6.11 provides a summary of the vegetation zones that do not trigger the above thresholds, relating to the pipeline development. All vegetation and threatened species impacts for the mine development require offset.

Table 6.10 Summary of native vegetation impacts not requiring offsets – pipeline development

Vegetation zone number	PCT	Vegetation zone name	Area	Current vegetation integrity score	Change in vegetation integrity score	Total change in vegetation integrity score	Credits required
Orange							
3	277 - Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	277_DNG	1.6	3.5	-3.5	-1.2	0
Bathurst – southern option							
1	277 - Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	277_DNG	0.4	3.5	-3.5	-1.4	0
Bathurst – northern option							
1	277 - Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	277_DNG	0.5	3.5	-3.5	-1.3	0
4	1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	1330_Fragments	1.4	3.8	-3.8	-1.4	0
Hill End							
9	1191 - Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion	1191_Sparse	0.3	3.4	-3.4	-0.5	0
15	1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	1130_Fragments	0.1	3.8	-3.8	-0.0	0
Capertee							
8	1191 - Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion	1191_Sparse	0.3	3.4	-3.4	-0.8	0
Total			-		-	-	**0**

Table 6.11 Summary of threatened species impacts not requiring offsets – pipeline development

Species	Vegetation zone name	Area (ha)/individual (HL)	Current habitat condition	Future habitat condition	Loss of habitat condition	Candidate SAII	Species credits
Orange							
Barking Owl	277_Intact	0.09	10.2	0	-10.2	No	0
Powerful Owl	277_Intact	0.09	10.2	0	-10.2	No	0
Powerful Owl	1093_Intact	0.12	4.8	0	-4.8	No	0
Squirrel Glider	277_Intact	0.09	10.2	0	-10.2	No	0
Squirrel Glider	1093_Intact	0.12	4.8	0	-4.8	No	0
Bathurst (southern option)							
Pink-tailed Worm Lizard	1330_Intact	0.02	7.4	0	-7.4	No	0
Pink-tailed Worm Lizard	1330_Sparse	0.05	8.9	0	-8.9	No	0
Booroolong Frog	1330_Intact	0.11	7.4	0	-7.4	No	0
Aromatic Peppercress	277_Moderate	0.02	1.5	0	-1.5	No	0
Aromatic Peppercress	277_Intact	0.44	1.4	0	-1.4	No	0
Bathurst (northern option)							
Aromatic Peppercress	277_Moderate	0.02	1.5	0	-1.5	No	0
Aromatic Peppercress	277_DNG	0.48	1.3	0	-1.3	No	0
Hill End							
Bush Stone-curlew	1197_Shrubland	0.02	7.5	0	-7.5	No	0
Gang-gang Cockatoo	727_Shrubland	0.12	3.1	0	-3.1	No	0
Gang-gang Cockatoo	1197_Shrubland	0.04	7.5	0	-7.5	No	0
Eastern Pygmy Possum	1093_Shrubland	0.03	11.4	0	-11.4	No	0
Eastern Pygmy Possum	1191_Sparse	0.32	0.5	0	-0.5	No	0
Powerful Owl	727_Intact	0.16	6.0	0	-6.0	No	0

Table 6.11 Summary of threatened species impacts not requiring offsets – pipeline development

Species	Vegetation zone name	Area (ha)/individual (HL)	Current habitat condition	Future habitat condition	Loss of habitat condition	Candidate SAII	Species credits
Powerful Owl	727_Shrubland	0.03	3.1	0	-3.1	No	0
Powerful Owl	727_Shrubland	0.02	11.4	0	-11.4	No	0
Powerful Owl	727_Shrubland	0.02	7.5	0	-7.5	No	0
Bathurst Copper Butterfly	1093_DNG	0.06	4.9	0	-4.9	No	0
Bathurst Copper Butterfly	1093_Fragments	0.01	19.0	0	-19.0	No	0
Bathurst Copper Butterfly	1093_Shrubland	0.05	11.4	0	-11.4	No	0
Bathurst Copper Butterfly	1330_DNG	0.05	7.3	0	-7.3	No	0
Bathurst Copper Butterfly	1330_Intact	0.15	4.6	0	-4.6	No	0
Squirrel Glider	1191_Sparse	0.06	0.5	0	-0.5	No	0
Squirrel Glider	1197_Shrubland	0.02	7.5	0	-7.5	No	0
Masked Owl	727_Intact	0.16	6.0	0	-6.0	No	0
Masked Owl	727_Shrubland	0.03	3.1	0	-3.1	No	0
Masked Owl	1093_Shrubland	0.02	11.4	0	-11.4	No	0
Masked Owl	1197_Shrubland	0.02	7.5	0	-7.5	No	0
Capertee Uplands							
Eastern Pygmy Possum	1191_Sparse	0.17	0.8	0	-0.8	No	0
Large-eared Pied Bat	1191_Sparse	0.17	0.8	0	-0.8	No	0
Booroolong Frog	1191_DNG	0.03	12.2	0	-12.2	No	0
Booroolong Frog	1191_Sparse	0.26	0.8	0	-0.8	No	0
Brush-tailed Rock-wallaby	1191_Sparse	0.1	0.8	0	-0.8	No	0

6.7 Impacts requiring offset

This section provides an assessment of the impacts requiring offsetting in accordance with Section 10 of the BAM (OEH 2017).

6.7.1 Mine development

i Impacts on native vegetation

Impacts on native vegetation requiring offsets and a summary of the ecosystem credits required for all vegetation zones, including changes in vegetation integrity score, are provided in Table 6.12. A total of 2,541 ecosystem credits are required to offset the residual impacts of the mine development. A credit report is provided in Appendix D.

Offsets will be provided in accordance with the biodiversity offset framework outlined in Section 6.8.

Table 6.12 Summary of ecosystem credits required for all vegetation zones – mine development

Vegetation zone number	PCT	Vegetation zone name	Vegetation zone (ha)[1]	Current vegetation integrity score	Total change in vegetation integrity score	Credits required
1	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion	727_High	3.9	41.0	-31.6	54
2	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion	727_Poor	12.1	42.0	-36.4	193
3	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion	727_Medium	36.7	45.4	-44.1	708
4	Carex sedgeland of the slopes and tablelands	766_Poor	3.0	17.4	-17.4	26
5	Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion	951_Poor	33.7	28.3	-27.6	464
6	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	1330_Other	0.8	26.4	-26.4	10
7	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	1330_High	1.6	39.4	-35.9	29
8	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	1330_Medium	21.0	55.0	-49.8	523
9	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	1330_Poor	25.3	43.2	-42.2	534
Total						**2,541**

Notes: 1. The vegetation zone area comprises the mine disturbance footprint and weed impact management zone, as depicted on Plate 4.1.

ii Impacts on threatened species

Impacts to threatened species habitat requiring offsets and a summary of the species credits required for all vegetation zones occupied by the threatened species, including changes in vegetation integrity score, are provided in Table 6.13. A total of 5,082 ecosystem credits are required to offset the residual impacts of the mine development. A credit report is provided in Appendix D.

Offsets will be provided in accordance with the biodiversity offset framework outlined in Section 6.8.

Table 6.13 Summary of threatened species credits – mine development

Species	Vegetation zone name	Area (ha)/individual (HL)[1]	Current habitat condition	Future habitat condition	Loss of habitat condition	Candidate SAII	Species credits
Squirrel Glider	951_Poor	33.68	27.6	0.0	-27.6	No	464
Squirrel Glider	1330_High	1.63	35.9	0.0	-35.9	No	29
Squirrel Glider	1330_Medium	21.01	49.8	0.0	-49.8	No	523
Squirrel Glider	1330_Poor	25.30	42.2	0.0	-42.2	No	534
Squirrel Glider	1330_Other	0.76	26.4	0.0	-26.4	No	10
Squirrel Glider	727_High	3.89	31.6	0.0	-31.6	No	62
Squirrel Glider	727_Medium	36.74	44.0	0.0	-44.0	No	809
Squirrel Glider	727_Poor	12.08	36.4	0.0	-36.4	No	220
Koala	951_Poor	33.68	27.6	0.0	-27.6	No	464
Koala	1330_High	1.63	35.9	0.0	-35.9	No	29
Koala	1330_Medium	21.01	49.8	0.0	-49.8	No	523
Koala	1330_Poor	25.30	42.2	0.0	-42.2	No	534
Koala	1330_Other	0.76	26.4	0.0	-26.4	No	10
Koala	727_High	3.90	31.6	0.0	-31.6	No	62
Koala	727_Medium	36.74	44.0	0.0	-44.0	No	809
Total							**5,082**

Notes: 1. The area/individuals shown are the sum of areas of habitat/individuals in the mine disturbance footprint and weed impact management zone, depicted on Plate 4.1.

6.7.2 Pipeline development

i Impacts on native vegetation

Impacts on native vegetation requiring offsets and a summary of the ecosystem credits required for all vegetation zones, including changes in vegetation integrity score, are provided in Table 6.14. A total of 363 ecosystem credits are required to offset the residual impacts of the southern option, while 331 ecosystem credits would be required for the northern option. Credit reports are provided in Appendix D.

Offsets will be provided in accordance with the biodiversity offset framework outlined in Section 6.8.

Table 6.14 Summary of ecosystem credits required for all vegetation zones – pipeline development

Vegetation zone number	PCT	Vegetation zone name	Vegetation zone (ha)[1]	Current vegetation integrity score	Total change in vegetation integrity score	Credits required
Orange						
2	277 - Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	277_Intact	1.1	27.8	-10.2	6
4	277 - Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	277_Moderate	3.8	31.6	-11.8	23
1	1093 - Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion	1093_Intact	0.5	77.1	-4.8	1
Bathurst (southern option)						
2	277 - Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	277_Moderate	0.0	31.6	-1.5	1
3	1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	1330_DNG	18.9	17.4	-7.6	72
4	1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	1330_Intact	0.8	19.2	-7.4	3
5	1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	1330_Shrubland	0.1	51.2	-22.9	1
6	1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	1330_Sparse	4.8	20.1	-8.9	21
Bathurst (northern option)						
2	277 - Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	277_Moderate	0	31.6	-1.5	1
3	1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	1330_DNG	10.2	17.4	-7.2	37
5	1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	1330_Intact	1.7	19.2	-7.6	6
6	1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	1330_Shrubland	0.1	51.2	-22.9	1

Table 6.14 Summary of ecosystem credits required for all vegetation zones – pipeline development

Vegetation zone number	PCT	Vegetation zone name	Vegetation zone (ha)[1]	Current vegetation integrity score	Total change in vegetation integrity score	Credits required
7	1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	1330_Sparse	4.7	20.1	-9.0	21
Hill End						
1	727 - Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion	727_Intact	0.3	79.0	-6.0	1
2	727 - Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion	727_Shrubland	0.5	44.1	-3.1	1
3	1093 - Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion	1093_DNG	0.2	43.4	-4.9	1
4	1093 - Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion	1093_Fragments	0.4	60.9	-19.0	3
5	1093 - Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion	1093_Intact	1.0	77.1	-16.3	7
6	1093 - Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion	1093_Shrubland	0.6	44	-11.4	3
7	1191 - Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion	1191_Fragments	0.1	31.6	-10.0	1
8	1191 - Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion	1191_Intact	0.6	51.3	-10.6	4
10	1197 - Snow Gum - Mountain Gum tussock grass-herb forest of the South Eastern Highlands Bioregion	1197_DNG	0.2	20.4	-2.6	1
11	1197 - Snow Gum - Mountain Gum tussock grass-herb forest of the South Eastern Highlands Bioregion	1197_Intact	4.4	71.8	-17.2	48
12	1197 - Snow Gum - Mountain Gum tussock grass-herb forest of the South Eastern Highlands Bioregion	1197_Shrubland	0.4	28.2	-7.5	2
13	1197 - Snow Gum - Mountain Gum tussock grass-herb forest of the South Eastern Highlands Bioregion	1197_Sparse	0.3	26.8	-7.0	1

Table 6.14 Summary of ecosystem credits required for all vegetation zones – pipeline development

Vegetation zone number	PCT	Vegetation zone name	Vegetation zone (ha)[1]	Current vegetation integrity score	Total change in vegetation integrity score	Credits required
14	1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	1330_DNG	1.8	17.4	-7.3	6
16	1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	1330_Intact	0.9	19.2	-4.6	2
17	1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	1330_Shrubland	0.1	51.2	-9.3	1
18	1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	1330_Sparse	0.2	20.1	-7.4	1
Capertee Uplands						
1	1093 - Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion	1093_Fragments	0.9	60.9	-18.7	7
2	1093 - Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion	1093_Intact	5.3	77.1	-24.9	58
3	1093 - Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion	1093_Shrubland	2.6	44.0	-18.3	21
4	1191 - Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion	1191_DNG	0.3	32.6	-12.2	3
5	1191 - Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion	1191_Fragments	0.3	31.6	-13.5	2
6	1191 - Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion	1191_Intact	3.6	51.3	-20.1	45
7	1191 - Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion	1191_Shrubland	1.3	64.5	-20.8	16
Total (southern option)		-	-	-	-	**363**
Total (northern option)		-	-	-	-	**331**

Notes: 1. The vegetation zone is the sum of the area within the pipeline disturbance footprint, tree root and weed impact management zone and weed impact management zone, as depicted on Plate 4.1.

ii Impacts on threatened species

Impacts to threatened species habitat requiring offsets and a summary of the species credits required for all vegetation zones occupied by the threatened species, including changes in vegetation integrity score, are provided in Table 6.15. A total of 968 species credits are required to offset the residual impacts of the pipeline development (southern option) and 833 to offset the pipeline development (northern option). A credit report is provided in Appendix D.

Offsets will be provided in accordance with the biodiversity offset framework outlined in Section 6.8.

Table 6.15 Summary of threatened species credit required for threatened species – pipeline development

Species	Vegetation zone name	Area (ha)/individual (HL)[1]	Current habitat condition	Future habitat condition	Loss of habitat condition	Candidate SAII	Species credits
Orange							
Brush-tailed Phascogale	277_Intact	1.1	10.2	0	-10.2	No	6
Brush-tailed Phascogale	1093_Intact	0.54	4.8	0	-4.8	No	1
Koala	277_Intact	1.01	10.2	0	-4.8	No	5
Koala	1093_Intact	0.4	4.8	0	-4.8	No	1
Pink-tailed Worm Lizard	277_Intact	0.53	10.2	0	-10.2	No	3
Powerful Owl	277_Moderate	0.99	11.8	0	-11.8	No	6
Silky Swainson-pea	277_Intact	1	10.2	0	-10.2	No	5
Silky Swainson-pea	277_Moderate	3.84	11.8	0	-11.8	No	23
Small Purple-pea	277_Intact	1	10.2	0	-10.2	No	5
Small Purple-pea	277_Moderate	3.84	11.8	0	-11.8	No	23
Squirrel Glider	277_Intact	1.1	10.2	0	-10.2	No	6
Squirrel Glider	1093_Intact	0.54	4.8	0	-4.8	No	1
Sub-total Orange							*85*
Bathurst (southern option)							
Pink-tailed Worm Lizard	1330_DNG	2.93	7.6	0	-7.6	No	11
Aromatic Peppercress	1330_DNG	18.88	7.6	0	-7.6	No	72
Aromatic Peppercress	1330_Intact	0.29	7.4	0	-7.4	No	1
Aromatic Peppercress	1330_Shrubland	0.1	22.9	0	-22.9	No	1
Booroolong Frog	1330_Intact	0.3	7.4	0	-7.4	No	1
Booroolong Frog	1330_Shrubland	0.49	8.9	0	-8.9	No	2
Squirrel Glider	1330_Intact	0.43	7.4	0	-7.4	No	2
Squirrel Glider	1330_Shrubland	0.07	22.9	0	-22.9	No	1

Table 6.15 Summary of threatened species credit required for threatened species – pipeline development

Species	Vegetation zone name	Area (ha)/individual (HL)[1]	Current habitat condition	Future habitat condition	Loss of habitat condition	Candidate SAII	Species credits
Squirrel Glider	1330_Sparse	0.25	8.9	0	-8.9	No	1
Koala	1330_Intact	0.43	7.4	0	-7.4	No	2
Koala	1330_Sparse	0.25	8.9	0	-8.9	No	1
Silky Swainson-pea	1330-DNG	18.88	7.6	0	-7.6	No	72
Silky Swainson-pea	1330_Intact	0.29	7.4	0	-7.4	No	1
Silky Swainson-pea	1330_Shrubland	0.07	22.9	0	-22.9	No	1
Austral Toadflax	1330-DNG	18.88	7.6	0	-7.6	No	54
Austral Toadflax	1330_Intact	0.29	7.4	0	-7.4	No	1
Austral Toadflax	1330_Shrubland	0.07	22.9	0	-22.9	No	1
Sub-total Bathurst (southern option)							*225*
Bathurst (northern option)							
Aromatic Peppercress	1330_DNG	10.21	7.2	0	-7.2	No	37
Aromatic Peppercress	1330_Intact	0.29	7.6	0	-7.6	No	1
Aromatic Peppercress	1330_Shrubland	0.07	22.9	0	-22.9	No	1
Booroolong Frog	1330_Intact	0.3	7.6	0	-7.6	No	1
Booroolong Frog	1330_Sparse	0.26	9.0	0	-9.0	No	1
Squirrel Glider	1330_Intact	0.43	7.4	0	-7.4	No	2
Squirrel Glider	1330_Shrubland	0.07	22.9	0	-22.9	No	1
Squirrel Glider	1330_Sparse	0.25	8.9	0	-8.9	No	1
Koala	1330_Intact	0.43	7.4	0	-7.4	No	2
Koala	1330_Sparse	0.25	8.9	0	-8.9	No	1
Silky Swainson-pea	1330_DNG	10.21	7.2	0	-7.2	No	37
Silky Swainson-pea	1330_Intact	0.29	7.4	0	-7.4	No	1

Table 6.15 Summary of threatened species credit required for threatened species – pipeline development

Species	Vegetation zone name	Area (ha)/individual (HL)[1]	Current habitat condition	Future habitat condition	Loss of habitat condition	Candidate SAII	Species credits
Silky Swainson-pea	1330_Shrubland	0.07	22.9	0	-22.9	No	1
Austral Toadflax	1330_DNG	0.07	22.9	0	-22.9	No	1
Austral Toadflax	1330_Intact	0.29	7.4	0	-7.4	No	1
Austral Toadflax	1330_Shrubland	0.29	7.4	0	-7.4	No	1
Sub-total Bathurst (northern option)							*90*
Hill End							
Gang-gang Cockatoo	727_Intact	0.29	6.0	0	-6.0	No	1
Gang-gang Cockatoo	1197_Intact	1.2	17.2	0	-17.2	No	10
Eastern Pygmy Possum	727_Intact	0.29	6.0	0	-6.0	No	1
Eastern Pygmy Possum	1093_Intact	0.91	16.3	0	-16.3	No	7
Eastern Pygmy Possum	1191_Intact	0.6	10.6	0	-10.6	No	3
Powerful Owl	1093_Intact	0.41	16.3	0	-16.3	No	3
Powerful Owl	727_Intact	0.55	17.2	0	-17.2	No	5
Bathurst Copper Butterfly	1197_Intact	0.25	17.2	0	-17.2	No	2
Squirrel Glider	1191_Intact	0.24	10.6	0	-10.6	No	1
Squirrel Glider	1197_Intact	3.78	17.2	0	-17.2	No	32
Squirrel Glider	1330_Intact	0.74	4.6	0	-4.6	No	2
Brush-tailed Phascogale	1093_Intact	0.95	16.3	0	-16.3	No	8
Koala	727_Intact	0.29	6.0	0	-6.0	No	1
Koala	1093_Intact	0.95	16.3	0	-16.3	No	8
Koala	1191_Intact	0.6	10.6	0	-10.6	No	3
Koala	1197_Intact	3.78	17.2	0	-17.2	No	32
Koala	1330_Intact	0.47	4.6	0	-4.6	No	1

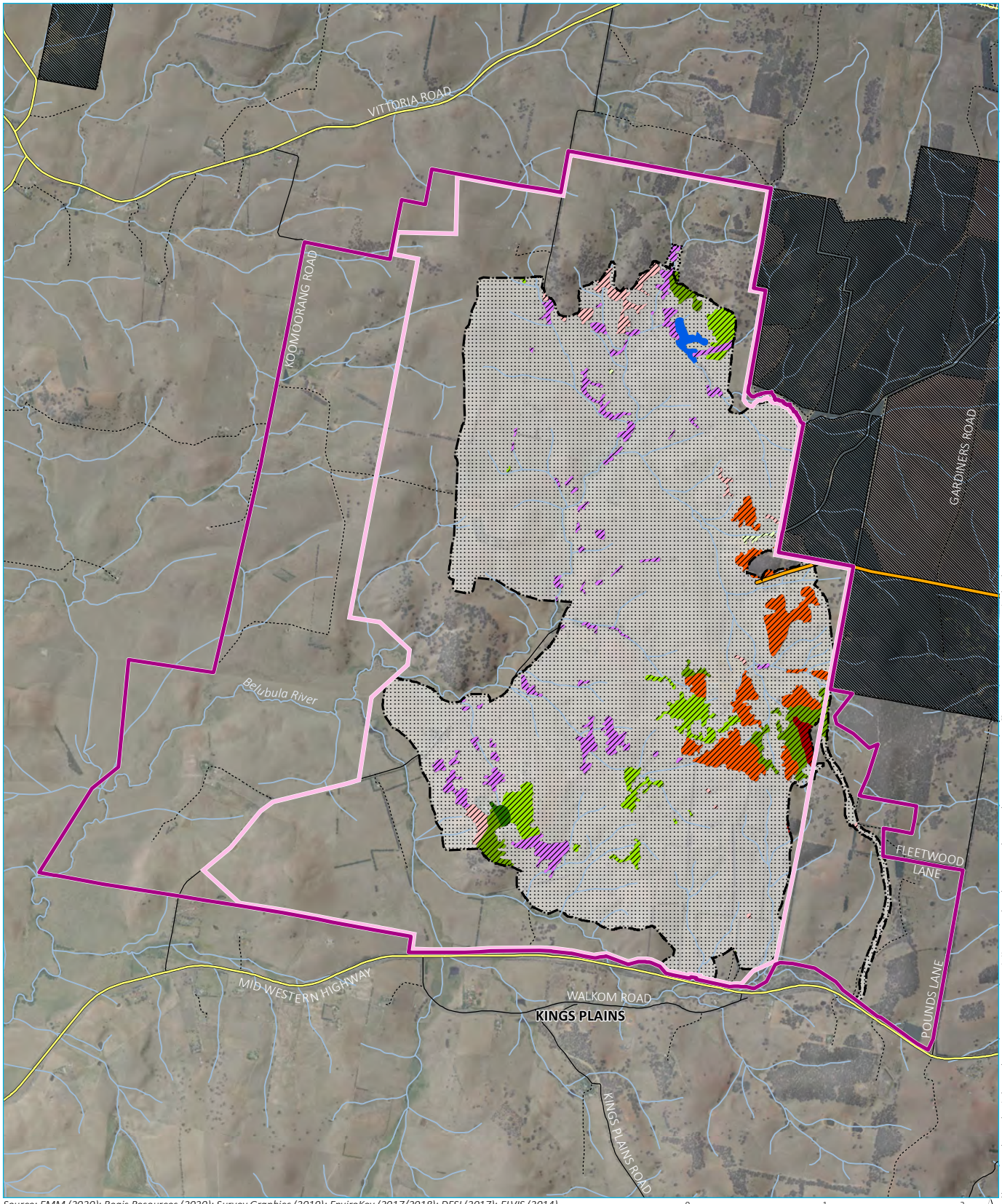
Table 6.15 Summary of threatened species credit required for threatened species – pipeline development

Species	Vegetation zone name	Area (ha)/individual (HL)[1]	Current habitat condition	Future habitat condition	Loss of habitat condition	Candidate SAII	Species credits
Silky Swainson-pea	1191_Intact	0.6	10.6	0	-10.6	No	3
Silky Swainson-pea	1330_Intact	0.85	4.6	0	-4.6	No	2
Masked Owl	1093_Intact	0.41	16.3	0	-16.3	No	3
Masked Owl	1197_Intact	0.55	17.2	0	-17.2	No	5
Veronica blakelyi	1197_Intact	4.43	17.2	0	-17.2	No	38
Subtotal Hill End							*171*
Capertee Uplands							
Eastern Pygmy Possum	1093_Fragments	0.83	18.7	0	-18.7	No	8
Eastern Pygmy Possum	1093_Intact	5.2	24.9	0	-24.9	No	65
Eastern Pygmy Possum	1093_Shrubland	1.77	18.3	0	-18.3	No	16
Eastern Pygmy Possum	1191_Intact	3.27	20.1	0	-20.1	No	33
Eastern Pygmy Possum	1191_Shrubland	0.75	20.8	0	-20.8	No	8
Large-eared Pied Bat	1191_Shrubland	0.29	20.8	0	-20.8	No	5
Black Gum	1191_Sparse	1	N/A	N/A	N/A	No	2
Booroolong Frog	1191_Intact	3.11	20.1	0	-20.1	No	31
Barking Owl	1191_Intact	0.58	20.1	0	-20.1	No	6
Powerful Owl	1093_Intact	0.39	24.9	0	-24.9	No	5
Powerful Owl	1093_Shrubland	0.19	18.3	0	-18.3	No	2
Powerful Owl	1191_Intact	0.78	20.1	0	-20.1	No	8
Bathurst Copper Butterfly	1093_Intact	0.43	24.9	0	-24.9	No	5
Bathurst Copper Butterfly	1093_Shrubland	0.18	18.3	0	-18.3	No	2
Clandulla Geebung	1093_Intact	0.24	24.9	0	-24.9	No	3
Clandulla Geebung	1093_Shrubland	0.06	18.3	0	-18.3	No	1

Table 6.15 Summary of threatened species credit required for threatened species – pipeline development

Species	Vegetation zone name	Area (ha)/individual (HL)[1]	Current habitat condition	Future habitat condition	Loss of habitat condition	Candidate SAII	Species credits
Squirrel Glider	1093_Intact	5.25	24.9	0	-24.9	No	65
Squirrel Glider	1191_Intact	3.61	20.1	0	-20.1	No	36
Brush-tailed Rock-wallaby	1191_Shrubland	0.29	20.8	0	-20.8	No	5
Brush-tailed Phascogale	1093_Intact	5.25	24.9	0	-24.9	No	65
Koala	1093_Intact	5.25	24.9	0	-24.9	No	65
Koala	1191_Intact	3.61	20.1	0	-20.1	No	36
Masked Owl	1093_Intact	0.39	24.9	0	-24.9	No	5
Masked Owl	1093_Shrubland	0.19	18.3	0	-18.3	No	2
Masked Owl	1191_Intact	0.78	20.1	0	-20.1	No	8
Sub-total Capertee Uplands							*487*
Total (southern option)							**968**
Total (northern option)							**833**

Notes: 1. The area/individuals shown are the sum of areas of habitat/individuals in the pipeline disturbance footprint, tree root and weed impact management zone and weed impact management zone.



Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); EnviroKey (2017/2018); DFSI (2017); ELVIS (2014)

0 1 2 km

GDA 1994 MGA Zone 55

N

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KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Additional (post-closure) disturbance footprint
- Pipeline

Existing environment
- Major road
- Minor road
- Vehicular track
- Watercourse/drainage line
- Vittoria State Forest

- Species credit polygon for Koala and Squirrel Glider
- Areas not requiring offset

Plant community types

PCT 727 | Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion
- High
- Medium
- Poor

PCT 766 | Carex sedgeland of the slopes and tablelands
- Poor

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

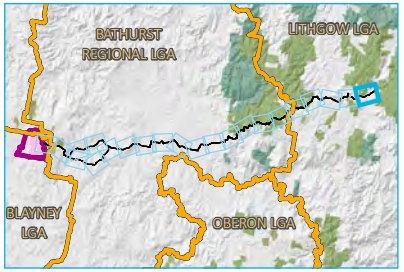
PCT 1330 | Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
- High
- Medium
- Poor
- Other

Impacts requiring offsets, impacts not requiring offsets and areas not requiring assessment – mine development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 6.2

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Pipeline underbore section
- Areas not requiring assessment (Northern option: 372.82 ha Southern option: 364.79 ha)
- Plant community types (PCTs) not requiring offsets

Plant community types (PCTs) requiring offsets

PCT 1093 | Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion

- Shrubland

PCT 1191 | Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion

- Shrubland
- Sparse
- Derived native grassland

Source: EMM (2020); Regis Resources (2020); ESRI (2020); OzArk (2019); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

N

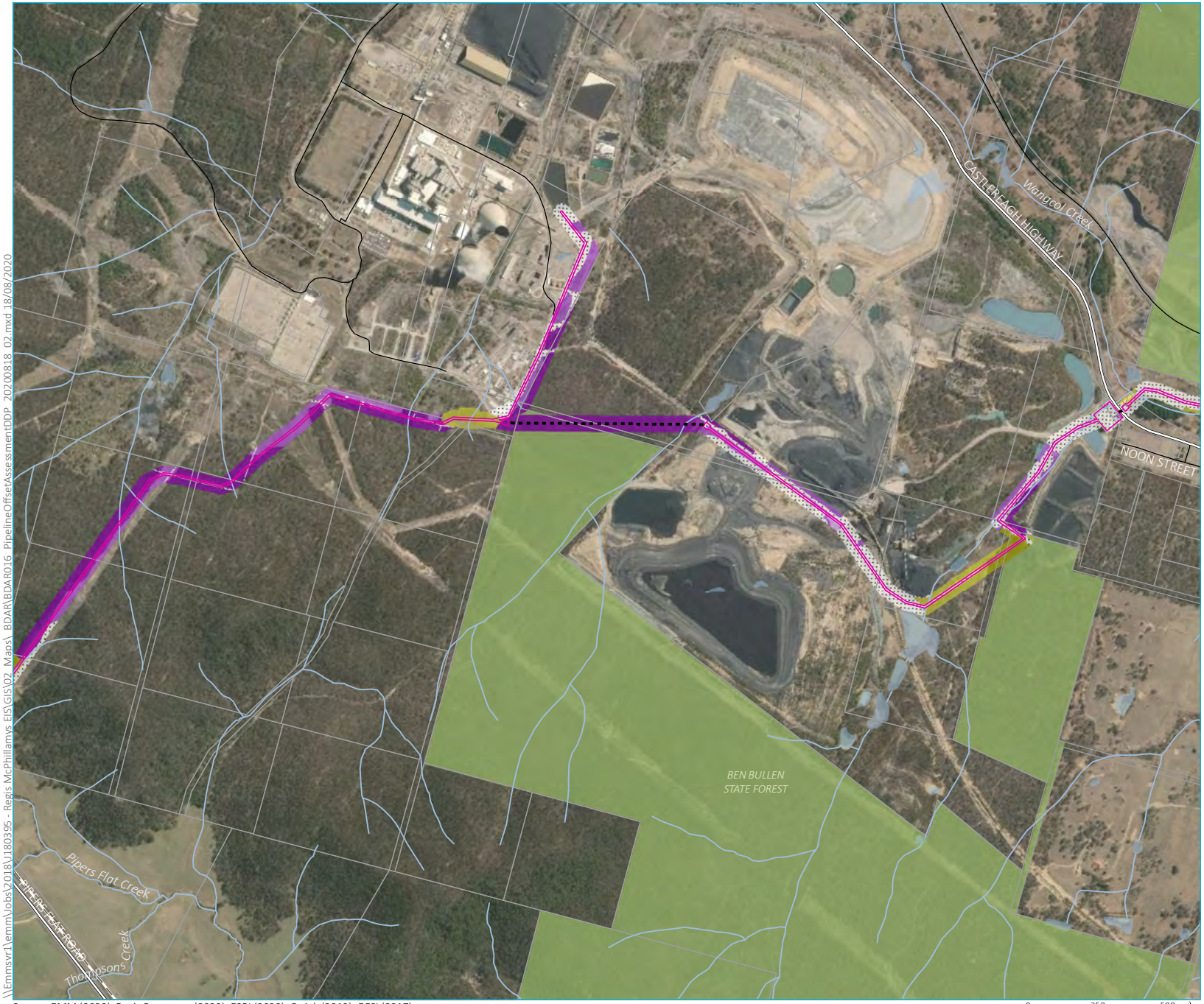
\\Emmsvr1\emm\Jobs\2018\I180395 - Regis McPhillamys EIS\GIS\02 Maps\ BDAR\BDAR016 PipelineOffsetAssessmentDDP 20200818 02.mxd 18/08/2020

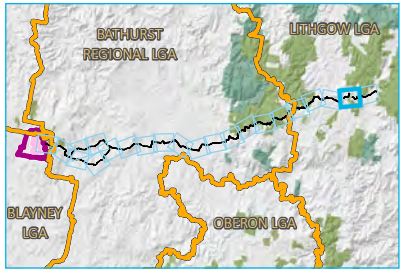
Impacts requiring offsets, impacts not requiring offsets and areas not requiring assessment – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 6.3.a

REGIS RESOURCES LTD

EMM creating opportunities





KEY

- Rail line
- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Pipeline underbore section
- Areas not requiring assessment (Northern option: 372.82 ha Southern option: 364.79 ha)

Plant community types (PCTs) requiring offsets

PCT 1093 | Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion

- Intact
- Shrubland
- Fragments

PCT 1191 | Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion

- Intact
- Shrubland
- Derived native grassland

\\Emmsvr1\emm\Jobs\2018\I180395 - Regis McPhillamys EIS\GIS\02_Maps_BDAR\BDAR016_PipelineOffsetAssessmentDDP_20200818_02.mxd 18/08/2020

Source: EMM (2020); Regis Resources (2020); ESRI (2020); OzArk (2019); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

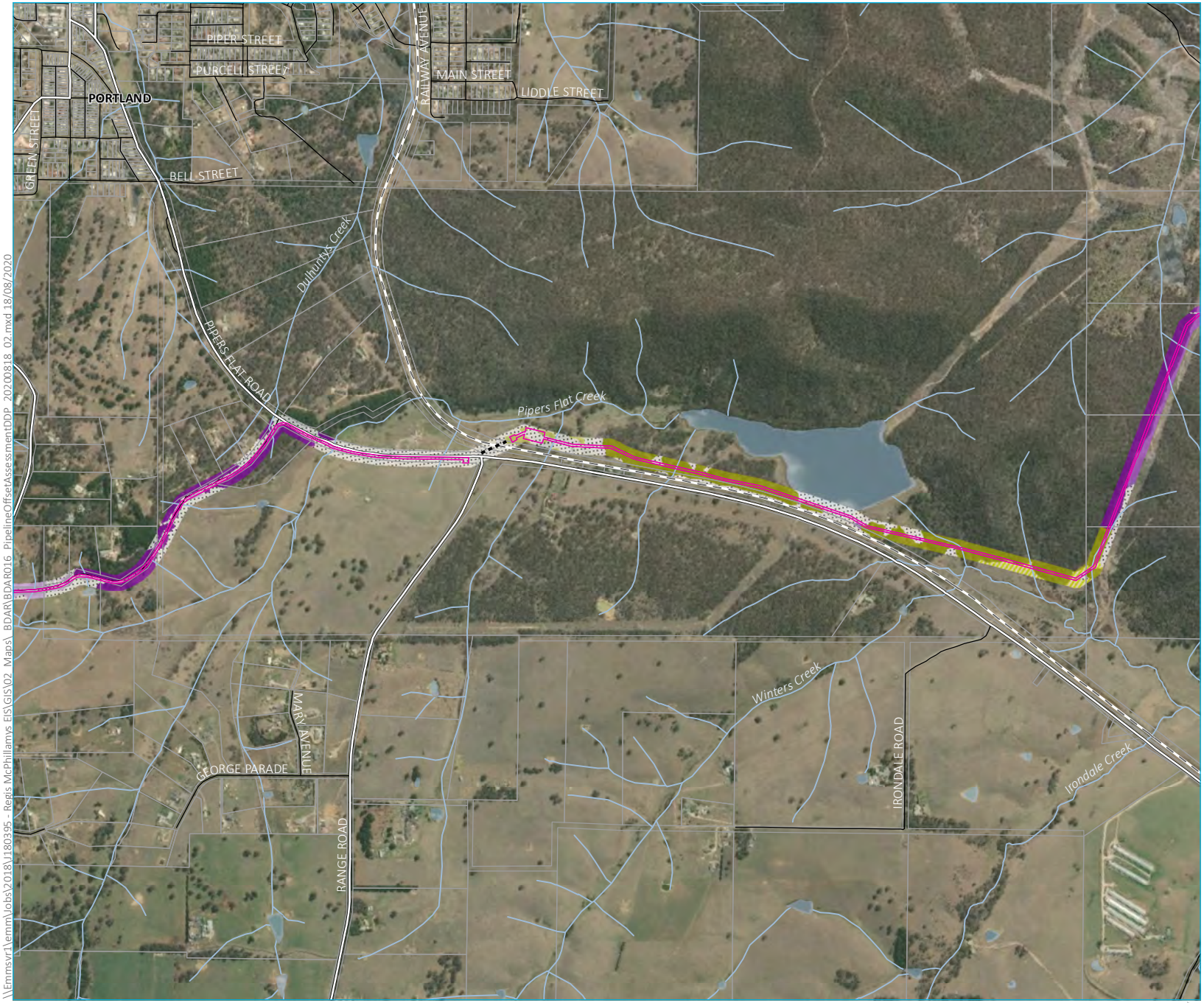
N

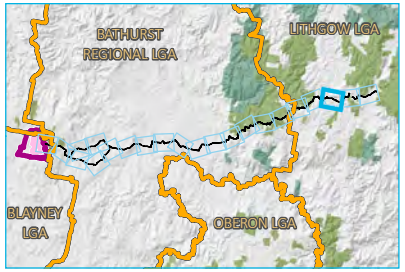
Impacts requiring offsets, impacts not requiring offsets and areas not requiring assessment – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 6.3.b

REGIS RESOURCES LTD

EMM creating opportunities





KEY

- Rail line
- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Pipeline underbore section
- Areas not requiring assessment (Northern option: 372.82 ha Southern option: 364.79 ha)

Plant community types (PCTs) requiring offsets

PCT 1093 | Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion

- Intact
- Shrubland
- Fragments

PCT 1191 | Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion

- Intact
- Fragments
- Derived native grassland

\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02 Maps\ BDAR\BDAR016 PipelineOffsetAssessmentDDP 20200818 02.mxd 18/08/2020

Source: EMM (2020); Regis Resources (2020); ESRI (2020); OzArk (2019); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

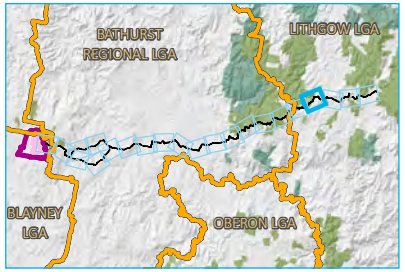
N

Impacts requiring offsets, impacts not requiring offsets and areas not requiring assessment – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 6.3.c

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Areas not requiring assessment (Northern option: 372.82 ha Southern option: 364.79 ha)

Plant community types (PCTs) requiring offsets

PCT 1093 | Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion

- Intact
- Shrubland
- Fragments

PCT 1191 | Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion

- Intact
- Fragments

PCT 1197 | Snow Gum - Mountain Gum tussock grass-herb forest of the South Eastern Highlands Bioregion

- Sparse
- Derived native grassland

\\Emmsvr1\emm\Jobs\2018\180395 - Regis McPhillamys EIS\GIS\02 Maps\ BDAR\BDAR016 PipelineOffsetAssessmentDDP 20200818 02.mxd 18/08/2020

Source: EMM (2020); Regis Resources (2020); ESRI (2020); OzArk (2019); DFSI (2017)

0 250 500 m

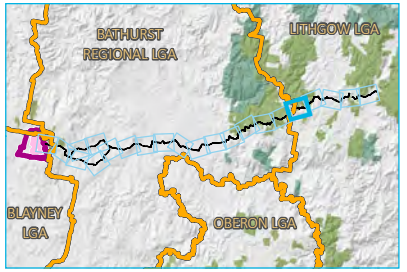
GDA 1994 NSW Lambert

Impacts requiring offsets, impacts not requiring offsets and areas not requiring assessment – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 6.3.d

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Areas not requiring assessment (Northern option: 372.82 ha Southern option: 364.79 ha)
- Plant community types (PCTs) not requiring offsets

Plant community types (PCTs) requiring offsets

PCT 1191 | Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion

- Sparse

PCT 1197 | Snow Gum - Mountain Gum tussock grass-herb forest of the South Eastern Highlands Bioregion

- Intact
- Shrubland
- Sparse
- Derived native grassland

Source: EMM (2020); Regis Resources (2020); ESRI (2020); OzArk (2019); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

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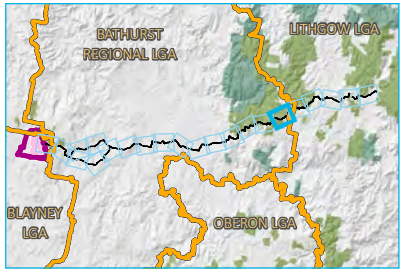
Impacts requiring offsets, impacts not requiring offsets and areas not requiring assessment – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 6.3.e

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Areas not requiring assessment (Northern option: 372.82 ha Southern option: 364.79 ha)
- Plant community types (PCTs) not requiring offsets

Plant community types (PCTs) requiring offsets

PCT 1191 | Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion

- Intact
- Sparse

PCT 1197 | Snow Gum - Mountain Gum tussock grass-herb forest of the South Eastern Highlands Bioregion

- Intact

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Source: EMM (2020); Regis Resources (2020); ESRI (2020); OzArk (2019); DFSI (2017)

0 250 500 m

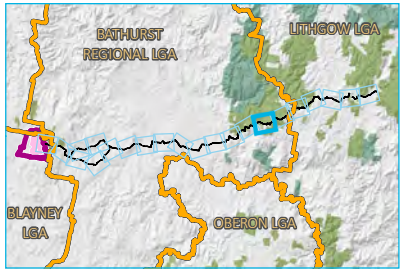
GDA 1994 NSW Lambert

Impacts requiring offsets, impacts not requiring offsets and areas not requiring assessment – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 6.3.f

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Areas not requiring assessment (Northern option: 372.82 ha Southern option: 364.79 ha)
- Plant community types (PCTs) not requiring offsets

Plant community types (PCTs) requiring offsets

PCT 1191 | Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion

- Intact
- Sparse

PCT 1197 | Snow Gum - Mountain Gum tussock grass-herb forest of the South Eastern Highlands Bioregion

- Intact

Source: EMM (2020); Regis Resources (2020); ESRI (2020); OzArk (2019); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

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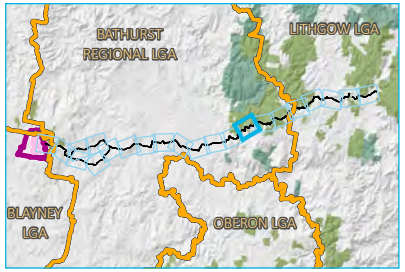
Impacts requiring offsets, impacts not requiring offsets and areas not requiring assessment – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 6.3.g

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Areas not requiring assessment (Northern option: 372.82 ha Southern option: 364.79 ha)

Plant community types (PCTs) requiring offsets

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

- Intact
- Shrubland

PCT 1093 | Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion

- Intact

PCT 1197 | Snow Gum - Mountain Gum tussock grass-herb forest of the South Eastern Highlands Bioregion

- Intact
- Shrubland

Source: EMM (2020); Regis Resources (2020); ESRI (2020); OzArk (2019); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

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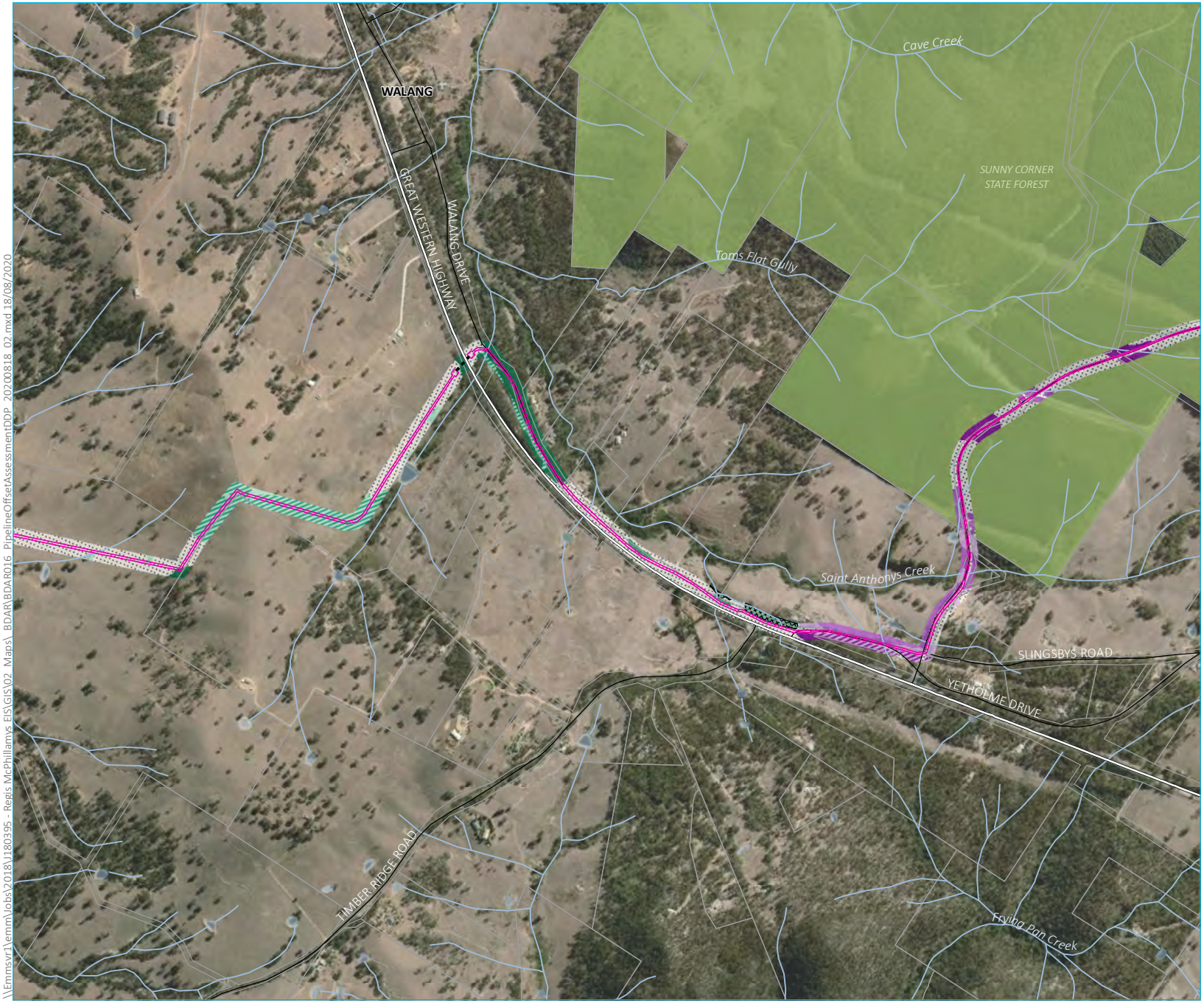
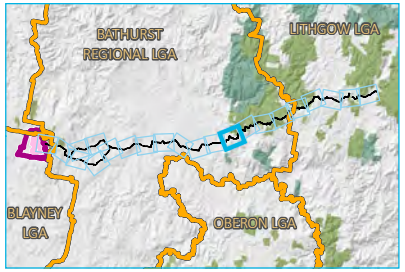
Impacts requiring offsets, impacts not requiring offsets and areas not requiring assessment – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 6.3.h

REGIS RESOURCES LTD

EMM creating opportunities





KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Pipeline underbore section
- Areas not requiring assessment (Northern option: 372.82 ha Southern option: 364.79 ha)
- Plant community types (PCTs) not requiring offsets

Plant community types (PCTs) requiring offsets

PCT 1093 | Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion

- Intact
- Shrubland
- Fragments
- Derived native grassland

PCT_1330 | Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

- Intact
- Shrubland
- Fragments
- Sparse
- Derived native grassland

Source: EMM (2020); Regis Resources (2020); ESRI (2020); OzArk (2019); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

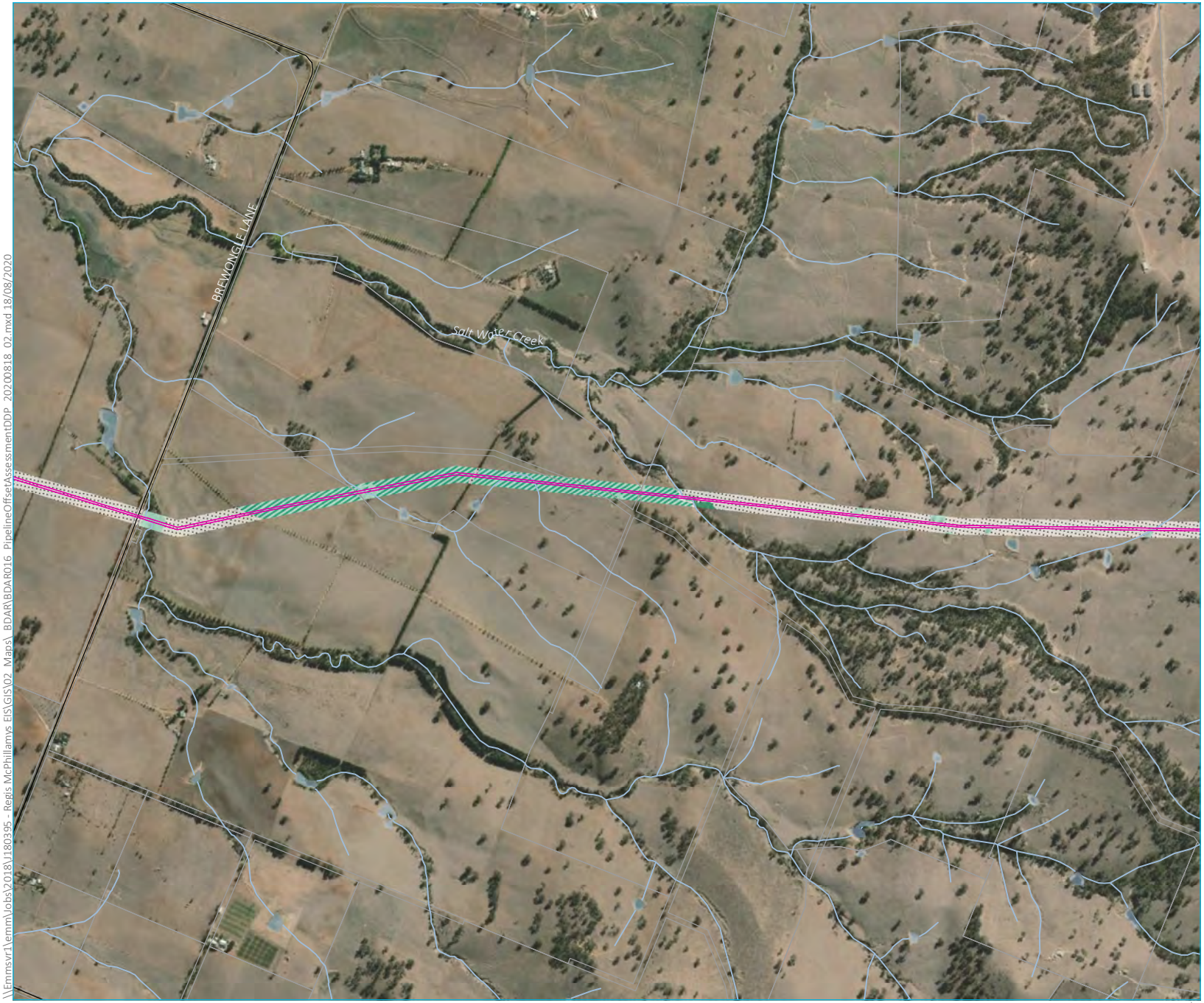
\\Emmsvr1\emm\Jobs\2018\I180395 - Regis McPhillamys EIS\GIS\02 Maps\ BDAR\BDAR016 PipelineOffsetAssessmentDDP 20200818 02.mxd 18/08/2020

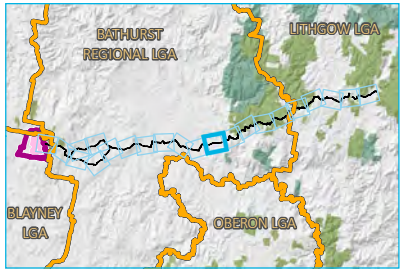
Impacts requiring offsets, impacts not requiring offsets and areas not requiring assessment – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 6.3.i

REGIS RESOURCES LTD

EMM creating opportunities





KEY

- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Areas not requiring assessment (Northern option: 372.82 ha Southern option: 364.79 ha)

Plant community types (PCTs) requiring offsets

PCT_1330 | Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

- Shrubland
- Sparse
- Derived native grassland

Source: EMM (2020); Regis Resources (2020); ESRI (2020); OzArk (2019); DFSI (2017)

0 250 500 m

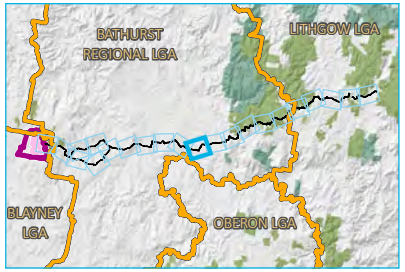
GDA 1994 NSW Lambert

N

\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02 Maps\ BDAR\BDAR016 PipelineOffsetAssessmentDDP 20200818 02.mxd 18/08/2020

Impacts requiring offsets, impacts not requiring offsets and areas not requiring assessment – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 6.3.j



KEY

- Rail line
- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Pipeline underbore section
- Areas not requiring assessment (Northern option: 372.82 ha Southern option: 364.79 ha)

Plant community types (PCTs) requiring offsets

PCT_1330 | Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

- Sparse

\\Emmsvr1\emm\Jobs\2018\I180395 - Regis McPhillamys EIS\GIS\02 Maps\ BDAR\BDAR016 PipelineOffsetAssessmentDDP 20200818 02.mxd 18/08/2020

Source: EMM (2020); Regis Resources (2020); ESRI (2020); OzArk (2019); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

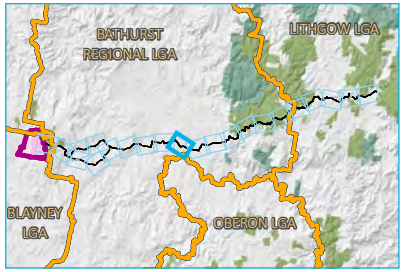
N

Impacts requiring offsets, impacts not requiring offsets and areas not requiring assessment – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 6.3.k

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Areas not requiring assessment (Northern option: 372.82 ha Southern option: 364.79 ha)

Source: EMM (2020); Regis Resources (2020); ESRI (2020); OzArk (2019); DFSI (2017)

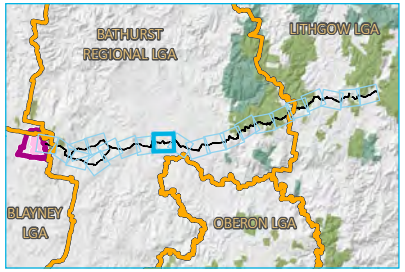
0 250 500 m

GDA 1994 NSW Lambert

\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02 Maps\ BDAR\BDAR016 PipelineOffsetAssessmentDDP 20200818 02.mxd 18/08/2020

Impacts requiring offsets, impacts not requiring offsets and areas not requiring assessment – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 6.3.l



KEY

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Pipeline underbore section
- Areas not requiring assessment (Northern option: 372.82 ha Southern option: 364.79 ha)

Plant community types (PCTs) requiring offsets

PCT_1330 | Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

- Sparse
- Derived native grassland

\\Emmsvr1\emm\Jobs\2018\I180395 - Regis McPhillamys EIS\GIS\02 Maps\ BDAR\BDAR016 PipelineOffsetAssessmentDDP 20200818 02.mxd 18/08/2020

Source: EMM (2020); Regis Resources (2020); ESRI (2020); OzArk (2019); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

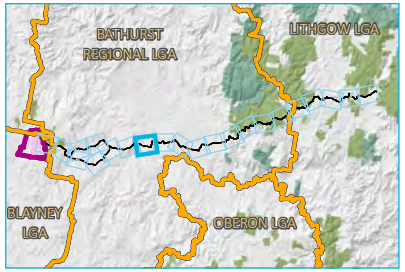
N

Impacts requiring offsets, impacts not requiring offsets and areas not requiring assessment – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 6.3.m

REGIS RESOURCES LTD

EMM creating opportunities



KEY

- Rail line
- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- NPWS reserve
- State forest
- Waterbody
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Direct impact management zone
- Pipeline underbore section
- Areas not requiring assessment (Northern option: 372.82 ha Southern option: 364.79 ha)

Plant community types (PCTs) requiring offsets

PCT_1330 | Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

- Intact
- Sparse
- Derived native grassland

\\Emmsvr1\emm\Jobs\2018\I180395 - Regis McPhillamys EIS\GIS\02 Maps\ BDAR\BDAR016 PipelineOffsetAssessmentDDP 20200818 02.mxd 18/08/2020

Source: EMM (2020); Regis Resources (2020); ESRI (2020); OzArk (2019); DFSI (2017)

0 250 500 m

GDA 1994 NSW Lambert

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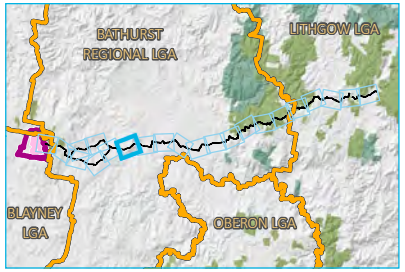
Impacts requiring offsets, impacts not requiring offsets and areas not requiring assessment – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 6.3.n

REGIS RESOURCES LTD

EMM creating opportunities



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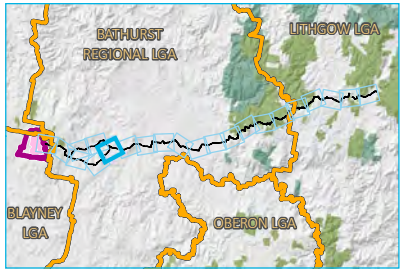
Impacts requiring offsets, impacts not requiring offsets and areas not requiring assessment – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 6.3.o

REGIS RESOURCES LTD

EMM creating opportunities



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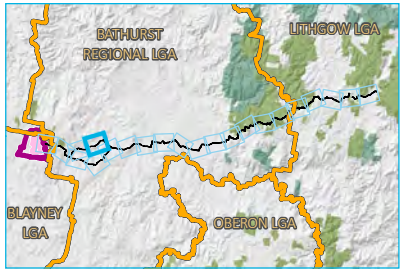
Impacts requiring offsets, impacts not requiring offsets and areas not requiring assessment – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 6.3.p

REGIS RESOURCES LTD

EMM creating opportunities



KEY

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- Local government area (refer to inset)

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Plant community types (PCTs) requiring offsets

PCT_1330 | Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

- Intact
- Fragments
- Sparse
- Derived native grassland

Source: EMM (2020); Regis Resources (2020); ESRI (2020); OzArk (2019); DFSI (2017)

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GDA 1994 NSW Lambert

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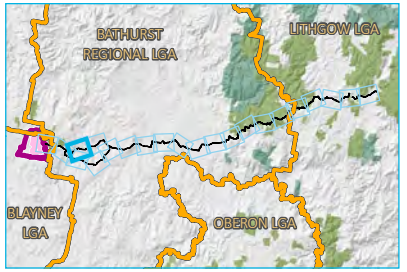
Impacts requiring offsets, impacts not requiring offsets and areas not requiring assessment – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 6.3.q

REGIS RESOURCES LTD

EMM creating opportunities



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Source: EMM (2020); Regis Resources (2020); ESRI (2020); OzArk (2019); DFSI (2017)

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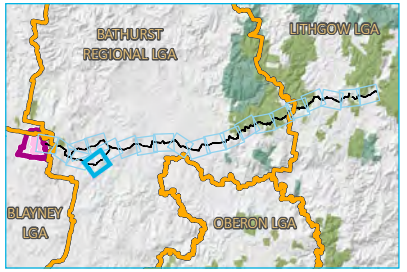
Impacts requiring offsets, impacts not requiring offsets and areas not requiring assessment – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 6.3.r

REGIS RESOURCES LTD

EMM creating opportunities



KEY

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Plant community types (PCTs) requiring offsets

PCT_1330 | Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

- Intact
- Sparse
- Derived native grassland

Source: EMM (2020); Regis Resources (2020); ESRI (2020); OzArk (2019); DFSI (2017)

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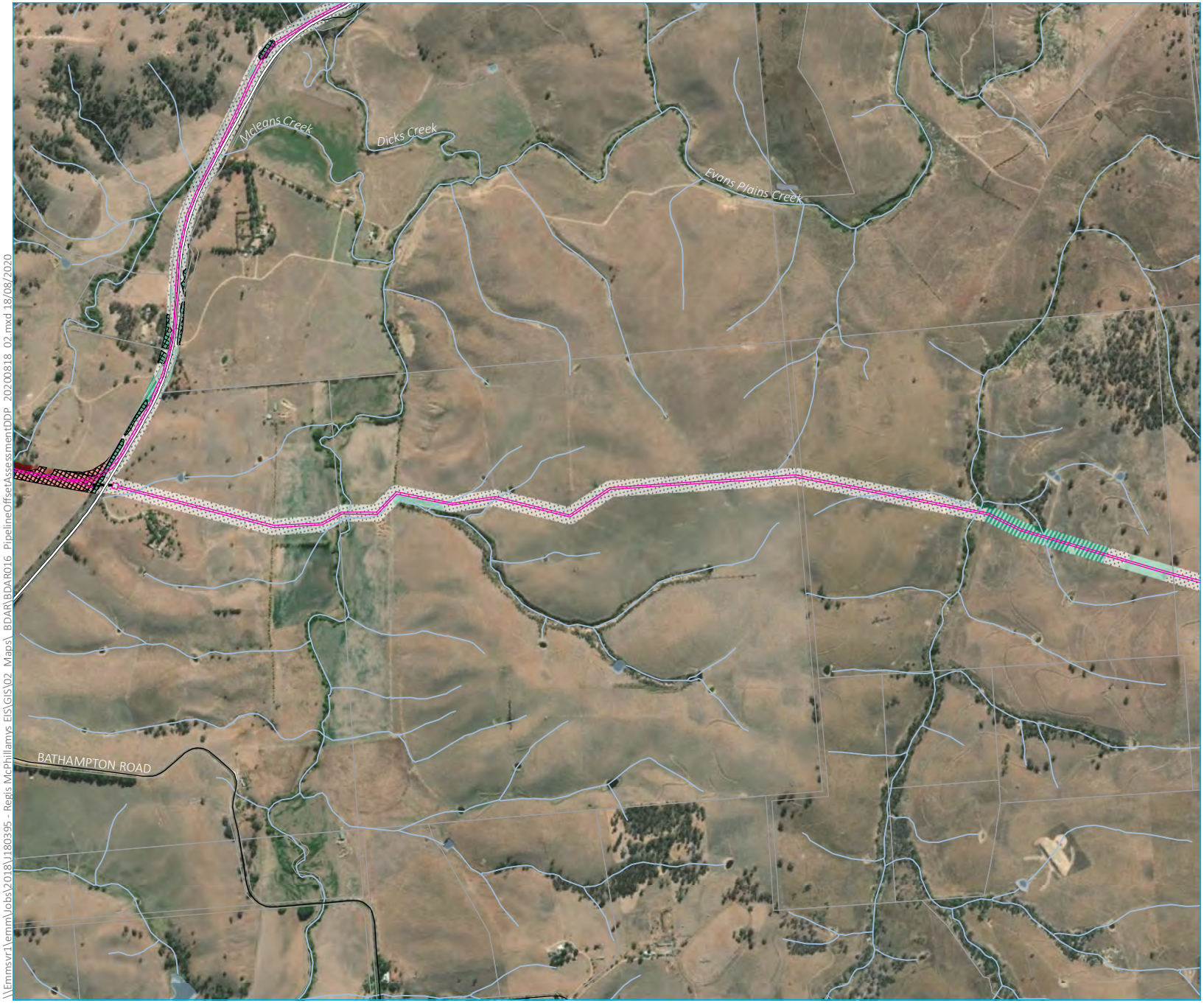
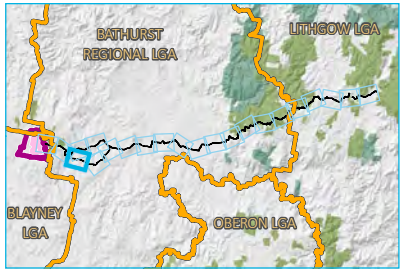
Impacts requiring offsets, impacts not requiring offsets and areas not requiring assessment – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 6.3.s

REGIS RESOURCES LTD

EMM creating opportunities





KEY

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Project application area

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- Areas not requiring assessment (Northern option: 372.82 ha Southern option: 364.79 ha)
- Plant community types (PCTs) not requiring offsets

Plant community types (PCTs) requiring offsets

PCT 277 | Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion

- Intact
- Moderate
- Derived native grassland

PCT_1330 | Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

- Intact
- Fragments
- Sparse
- Derived native grassland

\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02 Maps\ BDAR\BDAR016 PipelineOffsetAssessmentDDP 20200818 02.mxd 18/08/2020

Source: EMM (2020); Regis Resources (2020); ESRI (2020); OzArk (2019); DFSI (2017)

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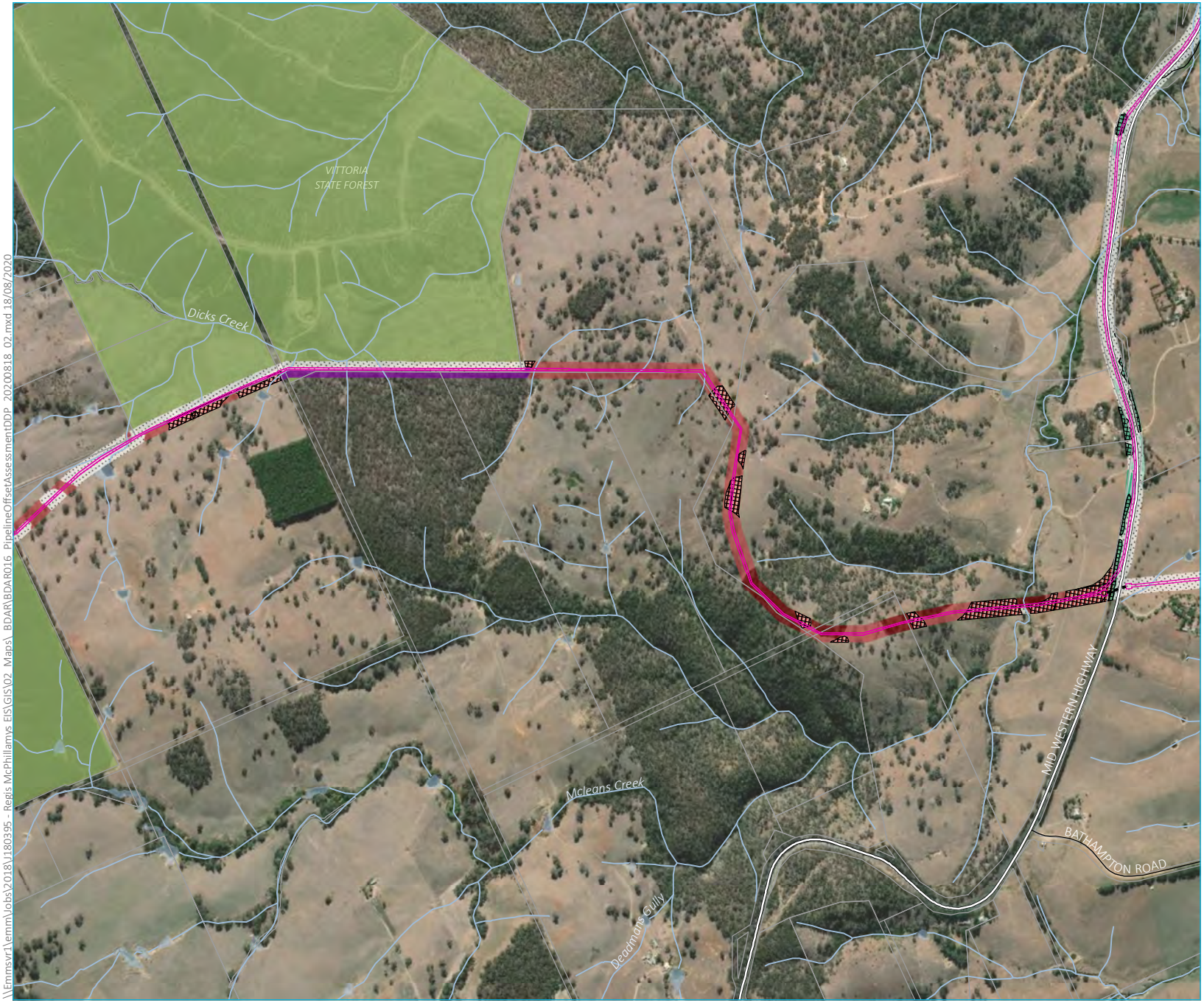
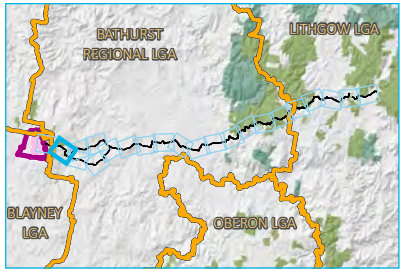
Impacts requiring offsets, impacts not requiring offsets and areas not requiring assessment – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 6.3.t

REGIS RESOURCES LTD

EMM creating opportunities





KEY

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- Plant community types (PCTs) not requiring offsets

Plant community types (PCTs) requiring offsets

PCT 277 | Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion

- Intact
- Moderate
- Derived native grassland

PCT 1093 | Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion

- Intact

PCT_1330 | Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

- Fragments
- Sparse
- Derived native grassland

\\Emmsvr1\emm\Jobs\2018\I180395 - Regis McPhillamys EIS\GIS\02 Maps\ BDAR\BDAR016 PipelineOffsetAssessmentDDP 20200818 02.mxd 18/08/2020

Source: EMM (2020); Regis Resources (2020); ESRI (2020); OzArk (2019); DFSI (2017)

0 250 500 m

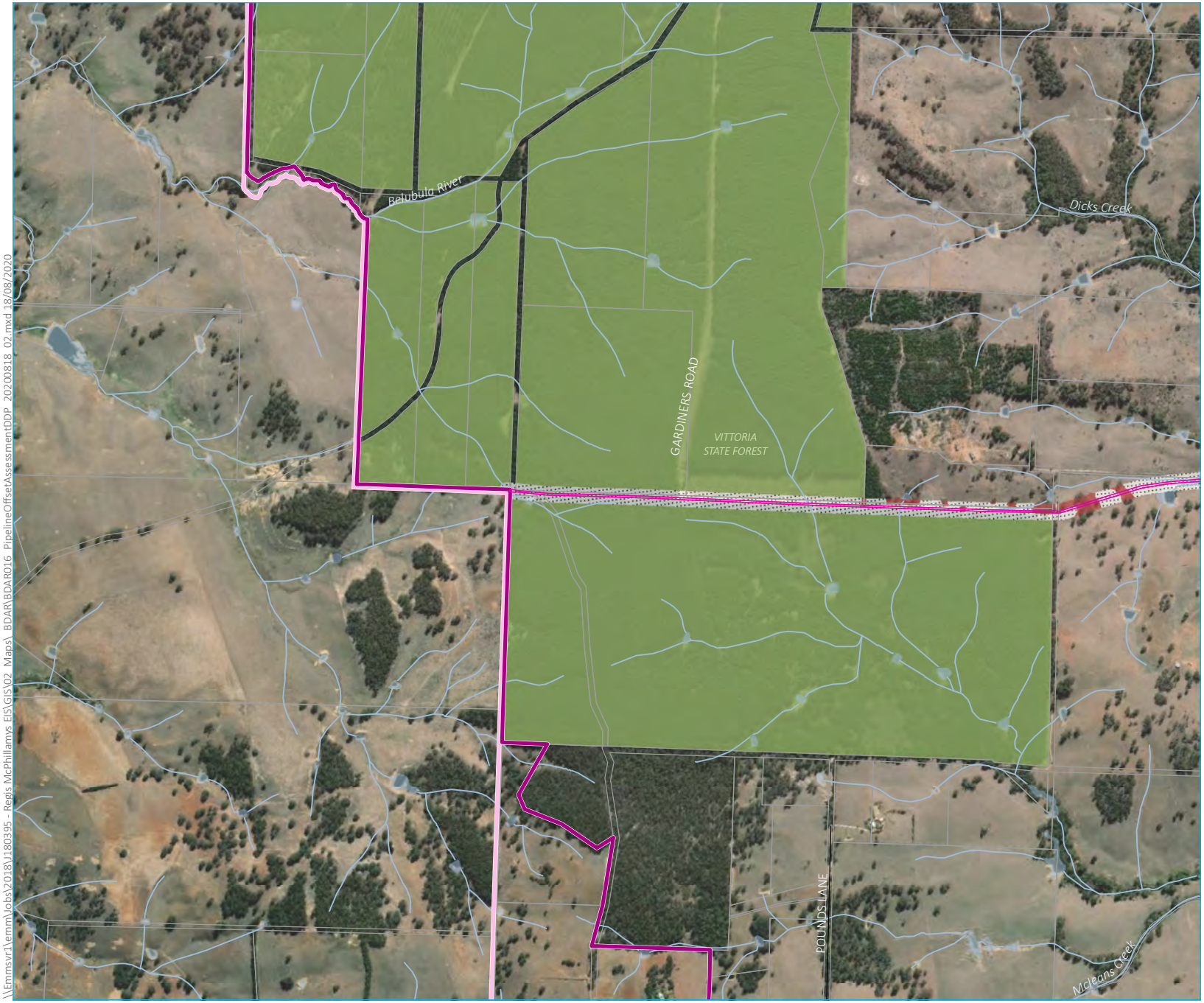
GDA 1994 NSW Lambert

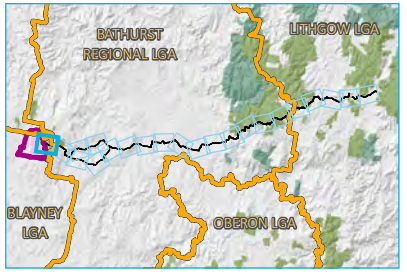
Impacts requiring offsets, impacts not requiring offsets and areas not requiring assessment – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 6.3.u

REGIS RESOURCES LTD

EMM creating opportunities





KEY

- Minor road
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Plant community types (PCTs) requiring offsets

PCT 277 | Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion

- Moderate

\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02 Maps\ BDAR\BDAR016 PipelineOffsetAssessmentDDP 20200818 02.mxd 18/08/2020

Source: EMM (2020); Regis Resources (2020); ESRI (2020); OzArk (2019); DFSI (2017)

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GDA 1994 NSW Lambert

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Impacts requiring offsets, impacts not requiring offsets and areas not requiring assessment – pipeline development

McPhillamys Gold Project
Biodiversity development assessment report
Figure 6.3.v

REGIS RESOURCES LTD

EMM creating opportunities

6.8 Biodiversity offset strategy

Under the NSW Biodiversity Offsets Scheme, proponents can meet their offset requirements through one, or a combination of the following actions:

1. establishment of a biodiversity stewardship site containing the required ecosystem and species credits;

2. purchase and retirement of the required ecosystem and species credits from the biodiversity credit market;

3. payment into the Biodiversity Conservation Fund; and

4. fund a management action that directly benefits the species and/or ecological communities impacted.

For the pipeline, a corridor has been identified, representing the area in which the pipeline disturbance footprint will sit. Impacts and associated offset requirements have been calculated based on the disturbance footprint, which is based on the concept design. The disturbance footprint may shift within the construction envelope. This is designed to allow Regis with some degree of flexibility to microsite the pipeline to avoid impacts and address construction issues (eg areas of shallow rock) during construction. Following detailed design and construction Regis proposes to recalculate the ecosystem and species credit requirements for the pipeline development, in consultation with DPIE.

The proponent has purchased and conducted detailed studies to assess native PCTs and threatened species at a future stewardship site in Blayney (ie option 1, above). The property is approximately 388 ha and contains some of the required ecosystem and species credits (PCT 951, PCT 1330 and Koala). It is the proponent's intention to secure the property under a Biodiversity Stewardship Agreement with the Biodiversity Conservation Trust. The proponent will assess the residual ecosystem and species credits and secure these under one or a combination of options 1 to 3. Option 4 is not available under the ancillary rules for any of the species or communities impacted.

7 Key legislation assessment

7.1 Environment Protection and Biodiversity Conservation Act 1999

This chapter provides an assessment of the amended project's impacts specific to species and communities listed under the EPBC Act. Protected matters are assessed separately for the mine and pipeline developments as it was deemed that the mine development is a controlled action, while the pipeline development is not, as described in Section 2.1 above.

A likelihood of occurrence assessment is presented in Section 7.1.1.

7.1.1 Likelihood of occurrence

i Threatened ecological communities

Four PCTs were predicted to occur within the mine project area and/or pipeline corridor by the Protected Matters Search Tool (PMST):

- White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland;
- Natural Temperate Grassland of the South Eastern Highlands;
- Temperate Highland Peat Swamps of the Sydney Basin Bioregion; and
- Upland Basalt Forests of the Sydney Basin Bioregion.

Table 7.1 assesses the likelihood of these TECs occurring within both the mine project area and pipeline corridor. White Box - Yellow Box - Blakely's Red Gum Grassy Woodland was recorded within both the mine development project area and pipeline corridor. None of the PCTs recorded across either site are consistent with the other TECs predicted to occur, and these TECs are not considered further.

One TEC listed under the EPBC Act, Box Gum Woodland CEEC, was recorded within both the mine development project area and pipeline corridor. Impacts to this TEC are discussed further in Section 7.1.2.

Table 7.1 Likelihood of occurrence for listed ecological communities

Ecological community	EPBC Act Status	Habitat requirements	Likelihood of occurrence	
			Mine development	Pipeline development
White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grasslands	CE	Characterised by a species-rich understorey of native tussock grasses, herbs and scattered shrubs, and the dominance, or prior dominance, of White Box, Yellow Box or Blakely's Red Gum trees. Tree-cover is generally discontinuous and consists of widely spaced trees of medium height in which the canopies are clearly separated.	**Recorded.** Up to 20.43 ha directly impacted. Further assessment of this ecological community is provided in Section 7.1.2i.	**Recorded.** Up to 0.81 ha will be directly impacted if the southern option is selected, or up to 1.34 ha if the northern option is selected. Further assessment provided in Section 7.1.2iii.
Natural Temperate Grassland of the South Eastern Highlands	CE	Characterised by a dominance of native perennial tussock grasses, the tallest stratum of which is typically up to 1.0 m in height, when present. There is usually a second, lower stratum of shorter perennial and annual grasses and forbs growing between the taller tussocks. The major dominant or co-dominant grass species are: Kangaroo grass, Snowgrass, River Tussock Grass, Kneed Speargrass (*Austrostipa bigeniculata*), Corkscrew Speargrass, Red grass, various Wallaby grass species (*Rytidosperma* spp.), Blowngrass (*Lachnagrostis filiformis*) and Wild Sorghum (*Sorghum leiocladum*).	Negligible. Does not occur – this community is not consistent with any of the PCTs identified during the field surveys.	Negligible. Does not occur – this community is not consistent with any of the PCTs identified during the field surveys.
Temperate Highland Peat Swamps of the Sydney Basin Bioregion	E	Temporary or permanent swamps occurring on sandstone in the temperate highlands region in NSW (DEH, 2005) from around 600–1100 m above sea level. The wetter parts of the swamps are occupied by sphagnum bogs and fens, while sedge and shrub associations occur in the drier parts (TSSC, 2005). Can occur as hanging swamps on valley sides and swamps along watercourses.	Negligible. Does not occur – this community is not consistent with any of the PCTs identified during the field surveys.	Negligible. Does not occur – this community is not consistent with any of the PCTs identified during the field surveys.
Upland Basalt Forests of the Sydney Basin Bioregion	E	Tall, open eucalypt forest occurring on basalt soils and substrates, between 650 and 1050 m elevation. Contains a mix of eucalypts, most commonly Brown Barrel (*Eucalyptus fastigata*), and Narrow-leaved Peppermint (*E. radiata* subsp. *radiata*). Can also contain Messmate Stringybark (*E. obliqua*), River Peppermint (*E. elata*), White-topped Box (*E. quadrangulata*), Ironbark Peppermint (*E. smithii*), Blue Mountains Ash (*E. oreades*), Blaxland Stringybark (*E. blaxlandii*), Mountain Grey Gum (*E. cypellocarpa*), Swamp Gum (*E. ovata*) and River Peppermint (*E. piperita*).	Negligible. Does not occur – this community is not consistent with any of the PCTs identified during the field surveys.	Negligible. Does not occur – this community is not consistent with any of the PCTs identified during the field surveys.

ii Threatened species

The PMST and/or BAMC predicted that 30 species and 50 species listed under the EPBC Act could occur within the mine and pipeline developments, respectively. The likelihood of occurrence for these species is assessed in 2.

Table 7.2 Likelihood of occurrence for threatened species

Scientific Name	Common Name	EPBC Status	Source	Likelihood of occurrence – mine development	Likelihood of occurrence – pipeline development
Plants					
Acacia bynoeana	Bynoe's Wattle	V	PMST, BAMC	-	Low. Unlikely to occur as associated canopy species are absent from the pipeline corridor.
Acacia meiantha	-	E	BAMC	Low. Not predicted by PMST but is a predicted candidate species under the BAM. Information on microhabitats from the expert report completed for the pipeline were used to assess habitat for the species which was determined to be absent (Appendix E).	Low. Not predicted by PMST but is a predicted candidate species under the BAM. The expert assessment is provided at Appendix E. Targeted surveys were completed by an expert botanist and none were recorded, therefore further assessment has not been conducted.
Boronia deanei	Deane's Boronia	V	PMST	-	Low. Unlikely to occur as high-altitude swamps are absent from the pipeline corridor.
Cryptostylis hunteriana	Leafless Tongue Orchid	V	PMST	-	Low. Unlikely to occur as areas with moist, sandy soils are absent from the pipeline corridor.
Dichanthium setosum	Bluegrass	V	PMST	-	Low. Unlikely as the species has not been recorded from the region, with the closest records in Mudgee.
Eucalyptus aggregata	Black Gum	V	PMST, BAMC	Low. Not recorded during targeted surveys.	**Recorded**. Up to 4 individuals potentially impacted. Further assessment is provided in Section 7.1.2iii.
Eucalyptus pulverulenta	Silver-leaved Mountain Gum, Silver-leaved Gum	V	PMST, BAMC	Low. Potential to occur in PCT 727 and 1330 due to presence of associated species comprise Brittle Gum, Red Stringybark, Broad-leaved Peppermint and Apple Box. However, targeted surveys in accordance with NSW Guide to Surveying Threatened Plants (OEH 2016) did not record the species.	Low. Historical record at eastern end of pipeline revisited and occurs outside the area of impact. No change to original assessment.

Table 7.2 Likelihood of occurrence for threatened species

Scientific Name	Common Name	EPBC Status	Source	Likelihood of occurrence – mine development	Likelihood of occurrence – pipeline development
Eucalyptus robertsonii. subsp. hemisphaerica	Robertson's Peppermint	V	PMST, BAMC	-	Low. Although associated species are present in Red Stringy Bark – Brittle Gum – Inland Scribbly Gum dry open forest of the tablelands, the species is not known to occur in Sunny Corner or Portland where the associated species were recorded. However, targeted surveys in accordance with NSW Guide to Surveying Threatened Plants (OEH 2016) did not record the species.
Euphrasia arguta	-	CE	PMST	Low. Unlikely to occur. Elevations in the mine project area exceed 900 m, while this species occurs up to 700 m asl.	Low. Unlikely to occur. Elevations in the pipeline corridor exceed 700 m, while this species occurs up to 700 m asl.
Lepidium hyssopifolium	Basalt Peppercress	E	PMST, BAMC	Low. Known only from three populations in Bathurst, Bungendore and Crookwell. The mine development project area is outside the species known and predicted habitat range.	**Moderate**. The pipeline corridor traverses Perthville where there is a known record of the species. Likely areas for this species were searched following NSW guidelines and the species was not recorded. However, surveys were completed during drought conditions, and therefore its presence could not be discounted. Further assessment provided in Section 7.1.2iii.
Leucochrysum albicans var. *tricolor*	Hoary Sunray, Grassland Paper-daisy	E	PMST	Low. The species was considered during the assessment for the project, with targeted surveys undertaken for this species. The species was not recorded within the mine project area.	**Moderate**. May occur in Box Gum Woodland and Red Stringy Bark – Brittle Gum – Inland Scribbly Gum dry open forest of the tablelands. Likely areas for this species were searched following NSW guidelines and the species was not recorded. However, surveys were completed during drought conditions, and therefore its presence could not be discounted. Further assessment provided in Section 7.1.2iii.
Persoonia marginata	Clandulla Geebung	V	PMST, BAMC	-	**Recorded**. Up to 4 individuals potentially impacted. Further assessment provided in Section 7.1.2iii.

Table 7.2 Likelihood of occurrence for threatened species

Scientific Name	Common Name	EPBC Status	Source	Likelihood of occurrence – mine development	Likelihood of occurrence – pipeline development
Prasophyllum petilum	Tarengo Leek Orchid	E	PMST, BAMC	-	Low. Conservatively assessed in accordance with expert report conclusions. Further information on the expert assessment is provided at Appendix E. Although this species has a low likelihood, the risk of impact would be high if recorded. Accordingly, Regis has committed to conducting targeted surveys during the flowering season. If recorded, the route would be microsited such that direct and indirect impacts are avoided. Further assessment provided in Section 7.1.2iii.
Prasophyllum sp. Wybong	-	CE	PMST	-	Low. Unlikely to occur as the pipeline development does not traverse the known populations.
Pultenaea glabra	Smooth Bush Pea	V	PMST	-	Low. Unlikely to occur as the route does not traverse the higher Blue Mountains, and associated plant species do not occur in the route.
Swainsona recta	Small Purple Pea	E	PMST, BAMC	Low. Targeted surveys failed to detect the species.	**Moderate**. Not predicted by PMST but is a predicted candidate species under the BAM. Potential habitat in ungrazed woodlands. Further assessment provided in Section 7.1.2iii.
Thesium australe	Austral Toadflax	V	PMST, BAMC	Low. Kangaroo Grass, which the species requires to occur, was rarely to uncommonly recorded in the project area.	**Moderate**. May occur on ungrazed roadside edges containing Kangaroo Grass. Further assessment provided in Section 7.1.2iii.
Xerochrysum palustre	Swamp Everlasting	V	PMST	-	Low. Unlikely as the pipeline development does not intersect any swamps.
Insects					
Paralucia spinifera	Bathurst Copper Butterfly	V	PMST, BAMC	-	**High**. Up to four host plants impacted. Further assessment provided in Section 7.1.2iii.

Table 7.2 Likelihood of occurrence for threatened species

Scientific Name	Common Name	EPBC Status	Source	Likelihood of occurrence – mine development	Likelihood of occurrence – pipeline development
Birds					
Anthochaera phrygia	Regent Honeyeater	CE	PMST, BAMC	Low. Targeted surveys conducted in accordance with Commonwealth guidelines did not record the species. In addition, tree removal (ie potential foraging habitat) will be limited to saplings.	Low. Targeted surveys conducted in accordance with Commonwealth guidelines did not record the species. In addition, tree removal (ie potential foraging habitat) will be limited to saplings.
Botaurus poiciloptilus	Australasian Bittern	E	PMST	-	Low. Potential to occur near Macquarie River; however, this area is being underbored and therefore will not be impacted. No further assessment conducted.
Calidris ferruginea	Curlew Sandpiper	CE	PMST	Low. Unlikely to occur as suitable foraging habitat (intertidal mudflats, swamps, lakes, lagoons) are absent.	Low. Unlikely to occur as suitable foraging habitat (intertidal mudflats, swamps, lakes, lagoons) are absent.
Falco hypoleucos	Grey Falcon	V	PMST	Negligible. Unlikely to occur given the absence of required habitat types (shrubland, grassland and wooded watercourses of arid and semi-arid regions).	-
Grantiella picta	Painted Honeyeater	V	PMST, BAMC	Low. Targeted surveys conducted in accordance with Commonwealth guidelines did not record the species. In addition, trees did not contain mistletoes (ie potential foraging habitat).	Low. Trees did not contain mistletoes (ie potential foraging habitat).
Hirundapus caudacutus	White-throated Needletail	V	PMST	Low. Unlikely to use habitats onsite as native vegetation is heavily fragmented.	Low. Unlikely to use habitats onsite as native vegetation is heavily fragmented.
Lathamus discolor	Swift Parrot	CE	PMST, BAMC	Low. Targeted surveys conducted in accordance with Commonwealth guidelines did not record the species.	Low. Targeted surveys conducted in accordance with Commonwealth guidelines did not record the species.

Table 7.2 Likelihood of occurrence for threatened species

Scientific Name	Common Name	EPBC Status	Source	Likelihood of occurrence – mine development	Likelihood of occurrence – pipeline development
Leipoa ocellata	Malleefowl	V	PMST	Negligible. Unlikely to occur due to the absence of required habitat types.	Negligible. Unlikely to occur due to the absence of required habitat types.
Numenius madagascariensis	Eastern Curlew	CE	PMST	Negligible. Unlikely to occur given the absence of required foraging habitat types (ie mudflats, mangroves, coastal lakes).	Negligible. Unlikely to occur given the absence of required foraging habitat types (ie mudflats, mangroves, coastal lakes).
Polytelis swainsonii	Superb Parrot	V	PMST, BAMC	**Moderate**. The species was recorded by Envirokey south of the mine project area, on Kings Plain, and is known to occur in the local area. Potential for the species to forage within the mine project area. Breeding unlikely to occur in the locality, as the species breeds in the Riverina. Further assessment provided in Section 7.1.2i.	**Moderate** Potential to occur given recent records of the species proximal to the pipeline. The area is likely to provide habitat for the birds during movements to and from breeding areas. Targeted surveys were conducted in suitable habitat during the breeding season. The species was not recorded. Further assessment provided in Section 7.1.2iii.
Rostratula australis	Australian Painted-Snipe	E	PMST	Low. Unlikely to occur given the absence of preferred foraging habitats including swamps and marshes.	Low. Unlikely to occur given the absence of preferred foraging habitats including swamps and marshes.
Fish					
Maccullochella macquariensis	Trout Cod	E	PMST	-	Low. May occur in the Macquarie River as it has been stocked with the species. This falls outside the pipeline development as the Macquarie River will be underbored.
Maccullochella peelii	Murray Cod	V	PMST	Low. Aquatic habitats within the mine project area do not provide suitable habitat for this species	Low. Likely to occur in the Macquarie River. They also potentially occur in larger tributaries, such as Evan's Plains Creek. No further assessment required as these creeks will be underbored.
Macquaria australasica	Macquarie Perch	E	PMST	Low. Aquatic habitats within the mine project area do not provide suitable habitat for this species.	Low. The pipeline corridor traverses the Macquarie River where the species is known to occur. This falls outside the pipeline development as the Macquarie River will be underbored.

Table 7.2 Likelihood of occurrence for threatened species

Scientific Name	Common Name	EPBC Status	Source	Likelihood of occurrence – mine development	Likelihood of occurrence – pipeline development
Prototroctes maraena	Australian Grayling	V	PMST	-	Low. Not known to occur in the rivers intersected by the pipeline development.
Frogs					
Heleioporus australiacus	Giant Burrowing Frog	V	PMST, BAMC	-	Low. Unlikely as this habitat is absent from the pipeline corridor.
Litoria aurea	Green and Golden Bell Frog	V	PMST, BAMC	-	Low. Unlikely as water bodies affected by the pipeline are not suitable habitat for this species. Those that contained potentially suitable unshaded, shallow pools were inhabited by Gambusia or were flowing streams.
Litoria booroolongensis	Booroolong Frog	E	PMST, BAMC	Low. The Belubula River within the mine project area does not provide suitable breeding habitat for this species.	**Moderate**. The Coxs River in the northern and southern options contains a cobble-lined stream with potential breeding habitat, while the northern option also contains potential breeding habitat along Evans Plains Creek. Further assessment is provided in Section 7.1.2iii.
Litoria castanea	Yellow-spotted Tree Frog	E	PMST, BAMC	Low. Require large permanent ponds or slow flowing streams with plenty of emergent vegetation such as bulrushes. The only extant population known is in Yass.	Low. Unlikely to occur as the species is locally extinct.
Litoria littlejohni	Littlejohn's Tree Frog	V	PMST	-	Low. Unlikely to occur as coastal forests, woodlands and heath are absent from the pipeline corridor.
Mammals					
Chalinolobus dwyeri	Large-eared Pied Bat	V	PMST, BAMC	Low. Unlikely to occur as the mine project area does not contain and is not proximal to suitable roosting habitat (cliffs).	Low. The pipeline corridor does not intersect any roosting habitat (cliffs). Some potential roosting habitat is located less than 2 km away and therefore the species may occasionally forage in the area.

Table 7.2 Likelihood of occurrence for threatened species

Scientific Name	Common Name	EPBC Status	Source	Likelihood of occurrence – mine development	Likelihood of occurrence – pipeline development
Dasyurus maculatus maculatus	Spotted-tail Quoll (SE mainland population)	E	PMST, BAMC	Low. Unlikely to occur as the species has not been recorded in the former Lachlan CMA area in which the mine project area is located.	Low. Unlikely to occur as the species has not been recorded in the former Lachlan CMA area in which the pipeline is located.
Nyctophilus corbeni	Corben's Long-eared Bat	V	PMST	-	Low. Unlikely to occur as the vegetation types it is more commonly found in are absent from the pipeline development.
Petaurus volans	Greater Glider	V	PMST	Low. Unlikely to occur given the highly degraded nature and open structure of tall moist eucalypt forest.	**Moderate**. May occur in the eastern part of the pipeline. 1.15 ha of habitat potentially impacted. Further assessment provided in Section 7.1.2iii.
Petrogale penicillata	Brush-tailed Rock Wallaby	V	PMST, BAMC	-	Low. The pipeline does not intersect any rocky habitats.
Phascolarctos cinereus	Koala (NSW, QLD and ACT)	V	PMST, BAMC	**Recorded**. The species was recorded within the mine project area. Further assessment provided in Section 7.1.2i.	**High**. Potential to occur. Approximately 5.17 ha of habitat potentially impacted. Further assessment provided in Section 7.1.2iii.
Pseudomys novaehollandiae	New Holland Mouse	V	PMST	-	Low. Unlikely to occur as the required habitat types do not occur in the pipeline corridor.
Pteropus poliocephalus	Grey-headed Flying-fox	V	PMST, BAMC	Low. Unlikely to occur as there are no roosting camps that intersect the pipeline corridor.	Low. Unlikely to occur as there are no roosting camps that intersect the pipeline corridor.
Reptiles					
Aprasia parapulchella	Pink-tailed Worm Lizard	V	PMST, BAMC	Low. Targeted surveys did not record the species.	**Moderate**. Potential to occur in granite/rocky areas in Box Gum Woodland. 1.19 ha of habitat potentially impacted. Further assessment provided in Section 7.1.2iii.

Table 7.2 Likelihood of occurrence for threatened species

Scientific Name	Common Name	EPBC Status	Source	Likelihood of occurrence – mine development	Likelihood of occurrence – pipeline development
Delma impar	Striped Legless Lizard	V	PMST, BAMC	Low. Unlikely as the species is not known to occur in the region.	Low. Unlikely as the species is not known to occur in the region.
Eulamprus leuraensis	Blue Mountains Water Skink	E	PMST	-	Low. Unlikely to occur as the pipeline development is west of its known range and swamps, its required habitat, are absent.
Hoplocephalus bungaroides	Broad-headed Snake	V	PMST	-	Low. Unlikely to occur as rocky outcrops do not occur in the pipeline corridor.

The Koala was recorded in the mine project area, while the Superb Parrot was recorded to the south. Two species listed as threatened under the EPBC Act (Black Gum and Clandulla Geebung) were recorded as being present in the pipeline corridor. A further 11 species are considered likely to occur in the pipeline corridor:

- Austral Toadflax;
- Basalt Peppercress;
- Hoary Sunray;
- Small Purple Pea;
- Tarengo Leek Orchid;
- Bathurst Copper Butterfly;
- Superb Parrot;
- Booroolong Frog;
- Koala;
- Greater Glider; and
- Pink-tailed Worm Lizard.

These species are discussed further in Section 7.1.2.

iii Migratory species

Fourteen species listed as migratory under the EPBC Act were predicted to occur in the project application area based on database searches undertaken. Table 7.3 provides an assessment of the likelihood of these species utilising habitat within the mine development and pipeline development areas.

Two species listed as migratory under the EPBC Act (Rainbow Bee-eater and Latham's Snipe) were recorded as being present in mine project area and have potential to occur in the pipeline corridor. These species are discussed further below.

Table 7.3 Likelihood of occurrence for migratory species

Scientific name	EPBC Status	Source	Potential presence – mine development	Potential presence – pipeline development
Australian Painted-snipe (*Rostratula australis*)	E, Ma	PMST	Low. Unlikely to occur given the absence of preferred foraging habitats including swamps and marshes.	Low. Unlikely to occur given the absence of preferred foraging habitats including swamps and marshes.
Black-faced Monarch (*Monarcha melanopsis*)	Ma, Mi	PMST	-	Low. Unlikely to occur given the absence of wet sclerophyll forests, the species preferred habitat.
Common Sandpiper (*Actitis hypoleucos*)	Ma	PMST	Negligible. Unlikely to occur as wetlands are absent from the mine project area.	Negligible. Unlikely to occur as wetlands are absent from the pipeline area.
Curlew Sandpiper (*Calidris ferruginea*)	CE, Mi	PMST	Negligible. Unlikely to occur as suitable foraging habitat (intertidal mudflats, swamps, lakes, lagoons) are absent.	Negligible. Unlikely to occur as suitable foraging habitat (intertidal mudflats, swamps, lakes, lagoons) are absent.
Eastern Curlew (*Numenius madagascariensis*)	CE, Ma, Mi	PMST	Negligible. Unlikely to occur given the absence of required foraging habitat types (i.e. mudflats, mangroves, coastal lakes).	Negligible. Unlikely to occur given the absence of required foraging habitat types (ie mudflats, mangroves, coastal lakes).
Fork-tailed Swift (*Apus pacificus*)	Ma, Mi	PMST	Low. Recorded by EMM in Feb 2019. Unlikely to use habitats onsite as the species is almost exclusively aerial.	Low. Although the species was recorded during surveys, it is unlikely to use habitats onsite as it is almost exclusively aerial.
Latham's Snipe (*Gallinago hardwickii*)	Ma, Mi	PMST	**Recorded.** Observed in the mine project area by EnviroKey (one record). Further assessment of this migratory species is provided below.	**Moderate.** Potential to occur in farm dams, however not recorded during surveys.
Pectoral Sandpiper (*Calidris melanotos*)	Ma, Mi	PMST	Negligible. Unlikely to occur as wetlands are absent from the mine project area.	Negligible. Unlikely to occur as wetlands are absent from the pipeline area.

Table 7.3 Likelihood of occurrence for migratory species

Scientific name	EPBC Status	Source	Potential presence – mine development	Potential presence – pipeline development
Rainbow Bee-eater (*Merops ornatus*)	Mi	PMST	**Recorded.** Observed in the mine project area by EnviroKey (one record). Further assessment of this migratory species is provided below.	**Moderate.** Species has a wide distribution and habitat requirements. Further assessment of this migratory species is provided below.
Rufous Fantail (*Rhipidura rufifrons*)	Ma, Mi, B	PMST	Low. Unlikely to occur as moist, dense forests are absent from the mine project area.	Low. Unlikely to occur as moist, dense forests are absent from the pipeline area.
Satin Flycatcher (*Myiagra cyanoleuca*)	Ma, Mi, B	PMST	Low. Unlikely to occur as tall wet sclerophyll forests and rainforests are absent from the mine project area.	Low. Unlikely to occur as tall wet sclerophyll forests and rainforests are absent from the pipeline area.
Sharp-tailed Sandpiper (*Calidris acuminata*)	Ma, Mi, B C, J, R	PMST	Negligible. Unlikely to occur as wetlands are absent from the mine project area.	Negligible. Unlikely to occur as wetlands are absent from the pipeline area.
White-throated Needletail (*Hirundapus caudacutus*)	Ma, Mi, C, J, R, V	PMST	Low. May occur overhead only. Unlikely to use habitats onsite as native vegetation is heavily fragmented	Low. Unlikely to use habitats onsite as native vegetation is heavily fragmented.
Yellow Wagtail (*Motacilla flava*)	Mig (EPBC Act)	PMST	Low. Unlikely as well watered open grasslands and wetlands are absent from the mine project area.	Low. Unlikely as well watered open grasslands and wetlands are absent from the pipeline corridor.mine

7.1.2 Significant impact assessment

i Mine Development

White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland and the Koala were recorded within the mine project area, while the Superb Parrot was considered a moderate likelihood of occurrence following targeted surveys. Two species (the Rainbow Bee-eater and Latham's Snipe) listed under the migratory provisions of the EPBC Act were also recorded within the mine project area.

Impacts to this TEC, two threatened species and two migratory species are assessed below.

a White Box – Yellow Box – Blakely's Red Gum Grassy 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 (*Eucalptus albens*), Yellow Box and/or Blakely's Red Gum 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 (DECCW 2010a) 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 7.1).

The structure and diversity of the native plant community types (PCTs) in the project application area have been compared with the flowchart (Plate 7.1) to determine if they represent the listed community.

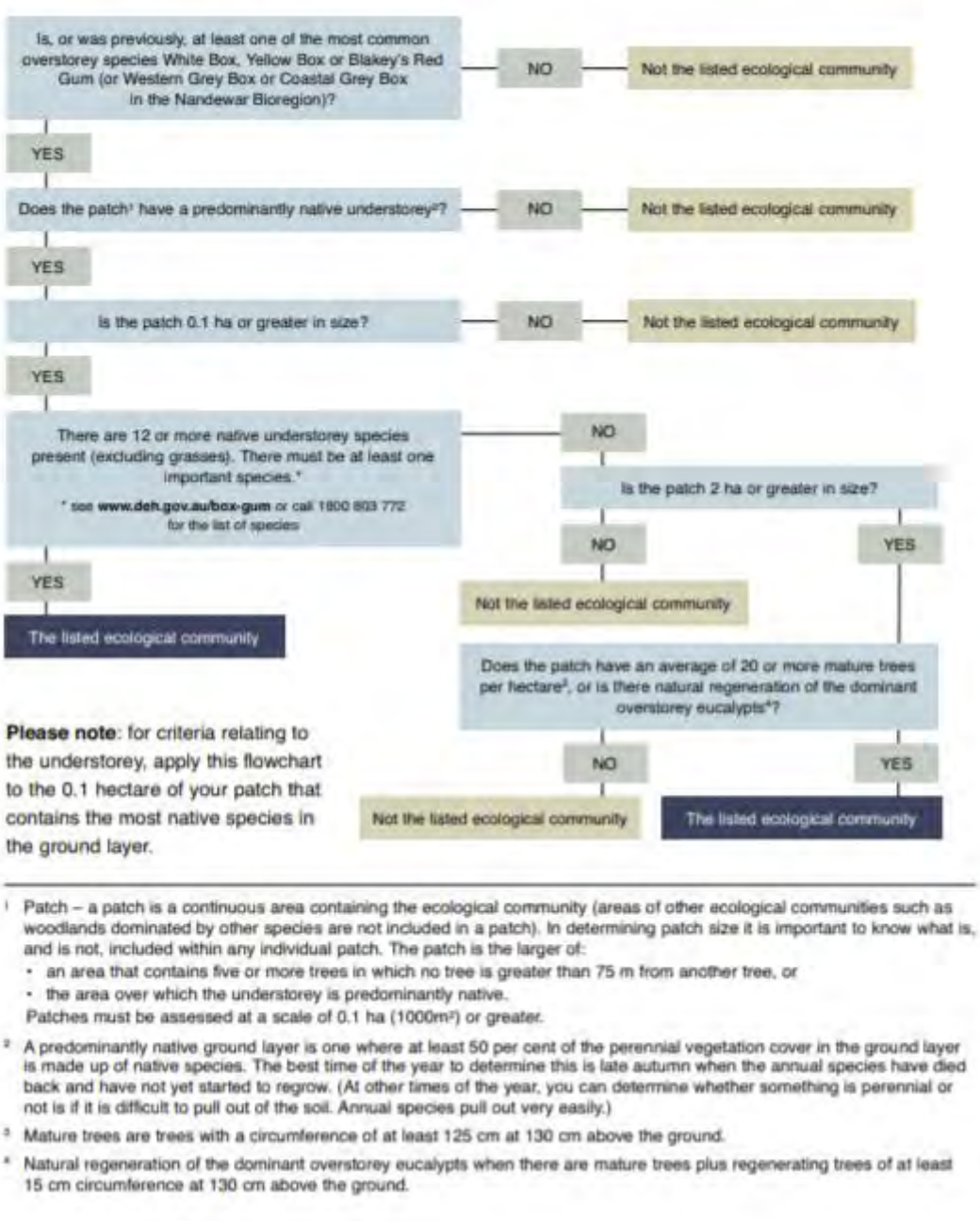


Plate 7.1 Flowchart to determine presence of the listed community (or otherwise)

Assessments of significance for White Box-Yellow Box – Blakely's Red Gum Woodland and Derived Native Grassland relevant to the mine development is provided in the following sections.

Approximately 20.43 ha of the EPBC Act listed community will be impacted by the mine development. Table 7.4 provides an assessment of significance for the removal of 20.43 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 2013a).

Table 7.4 Assessment of significance for White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the mine project area

Criteria	Discussion
Conservation status	Critically endangered
1. Reduce the extent of an ecological community	Approximately 20.43 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 mine project area, using plant community type mapping for the central tablelands (OEH 2018). Within a 5 km buffer of the mine 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. PCT 1330 has been identified as representing Box Gum Woodland in the mine project area. Accordingly, the project would result in a reduction of 1.8% 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). 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 0.008% 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.
2. Fragment or increase fragmentation	The listed community is highly fragmented within and surrounding the mine project area, and the vegetation within the mine lease represents the western edge of a tract of relatively contiguous, albeit fragmented, vegetation. Largely cleared land is located west and south. Several patches of the community will be removed from the mine disturbance footprint, further fragmenting some patches located to the west from areas of retained vegetation to the east and north. Accordingly, the project will increase the degree of fragmentation of the community.
3. Adversely affect critical habitat	A national recovery plan has been developed (DECCW 2010a) 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. Approximately 20.43 ha of vegetation in the mine 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 1.8%.
4. Modify or destroy abiotic factors necessary for survival	Abiotic factors including soil and surface hydrology will be modified in the mine project area, and therefore represents a permanent impact. The listed community occurs directly north and south-west of the mine disturbance footprint, within the mine project area. An assessment of changes to groundwater availability and quality that these retained patches would use opportunistically was conducted. 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 20.43 ha of habitat for the listed community within the mine disturbance footprint. Retained areas of the listed community outside the mine disturbance footprint 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 mine disturbance footprint, but within the mine project area. The condition of these areas is likely to improve in quality with this management.

Table 7.4 Assessment of significance for White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the mine project area

Criteria	Discussion
6. Cause a substantial reduction in quality or integrity	The project will remove all areas of this community within the mine disturbance footprint; consequently, there will be no residual risk within the mine project area. Areas outside of the mine 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 mine disturbance footprint, but within the mine project area.
7. Interfere with recovery	A national recovery plan has been developed (DECCW 2010a), with the objective to promote the recovery and minimise the risk of extinction of the ecological community through: • 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. The clearance of up to 20.43 ha of the CEEC will directly contravene Point 1, by reducing the extent of the listed community. Section 6.4.2 details avoidance measures implemented by Regis into the project design to minimise impacts on this community. Detailed design has avoided and minimised impacts to areas of high condition Box Gum Woodland within the mine project area, apart from a small area (1.47 ha) 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 Box Gum Woodlandidentified within the TSF investigation area. Management of retained areas of the community on the site will assist in protecting areas of good condition habitat to be retained There is no approved Conservation Advice for this ecological community.
Conclusion	The project is likely to result in a significant impact on the listed community as 20.43 ha of habitat critical to its survival will be removed. Impacts to the 20.43 ha of the community removed by the project are known, predictable and irreversible.

b 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 mine 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 koala management area, Apple Box and Yellow Box (PCT 1330). Approximately 123.03 ha of Koala habitat occurs in the disturbance footprint.

An assessment has been completed for the mine 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 7.5.

Table 7.5 Koala habitat assessment tool (DoE 2014) for the in the mine project area

Attribute	Score	Data source	Habitat assessment
Koala occurrence	+2 (high)	Desktop	The NSW Atlas of Wildlife identifies one recent record (1986), east of the mine 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 central and southern tablelands KMA were mapped for the mine project area. Scat searches were completed in the mine project area using the Spot Assessment Technique (Phillips and Callaghan 2011). No scats were found. Nocturnal spotlighting was also completed, and no Koalas were recorded during this activity. However, a single Koala was found resting in an Apple Box during the day.
Vegetation structure and composition	+2 (high)	Desktop	The project is in the central and southern tablelands KMA. High regional use species identified by SEPP (Koala Habitat Protection) 2019 in the mine project area comprise Manna Gum, Brittle Gum, Blakely's Red Gum, Apple Box and Yellow Box.
		On ground	On-ground surveys confirmed that the mine project area contains Koala habitat, comprising the food tree species listed above.
Habitat connectivity	0 (low)	Desktop	Koala habitat in the mine project area is highly fragmented. In addition, Koala habitat in the mine project area does not connect to any large patches of habitat outside the mine 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 Koala observed in the mine project area appeared to be healthy, with no signs of Chlamydia (eg dry bottom). A high 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 mine 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 mine project area represents habitat critical to the survival of the Koala, in accordance with the referral guidelines (ie score greater than five).

Table 7.6 provides an assessment of significance for the removal of up to 123.03 ha of potential Koala habitat, in accordance with the assessment criteria for vulnerable species (DoE 2013a).

Table 7.6 Assessment of significance for the Koala for the mine project area

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 mine project area during surveys, while targeted searches, including SAT assessments and spotlighting, did not record the species. There is only one NSW Atlas of Wildlife record of the species (from 1986), east of the mine project area. Koala habitat is highly fragmented in the mine project area and region but contains small, patchy woodland remnants in an agricultural setting. Considering the above, Koalas are likely to occur in low densities in the mine 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 mine project area.
3. fragment an important population	An important population of the Koala does not occur in the mine project area.
4. adversely affect critical habitat	Following the precautionary principle, all woodland in the mine project area was identified in the EPBC referral as representing habitat critical to the survival of the Koala. This habitat would be permanently removed from the disturbance footprint, and therefore critical habitat would be adversely affected. SEPP (Koala Habitat Protection) 2019 identifies 39 feed trees that occur in the Central and Southern Tablelands KMA, five of which occur in the mine project area. These areas have been used to define Koala habitat in the mine project area. Section 6.4 details avoidance measures implemented by Regis into the project design to minimise impacts on habitat for this species. Management of retained areas of species habitat on the site (see Section 6.4) will assist in protecting areas of habitat to be retained.
5. disrupt the breeding cycle of an important population	An important population of the Koala does not occur in the mine project area.
6. decrease availability or quality of habitat	The project would decrease habitat availability in the mine project area by approximately 123.03 ha, while areas outside the mine disturbance footprint would be retained. 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. 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. 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 mine project area.
7. result in invasive species	Domestic dogs (*Canis familiaris*) 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	Koalas are susceptible to Chlamydia, a sexually transmitted disease. The single Koala observed in the mine project area during surveys appeared to be in good health and free of the signs of Chlamydia. In general, disease outbreaks occur when animals are stressed. As Koala density in the mine project area is low, the potential for a disease outbreak is also considered to be low.

Table 7.6 Assessment of significance for the Koala for the mine project area

Criteria	Discussion
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 mine project area will address a priority management measure for the Koala outlined in the species conservation advice (TSSC 2012).
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 123.03 ha of critical habitat removed by the project are known, predictable and irreversible.

c Superb Parrot

The Commonwealth Conservation Advice for the Superb Parrot (EPBC Act – vulnerable) (TSSC 2016a) 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, roadkill, 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, Grey Box (*E. microcarpa*), White Box and Red Box (*E. polyanthemos*). Of the species described above, Blakely's Red Gum and Apple Box occur in the project application area and surrounds. However, the project application 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 application 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). Potential habitat within the mine development comprises areas of PCT 1330_high and 1330_medium.

Table 7.7 provides an assessment of significance for the removal of up to 20.43 ha of potential Superb Parrot habitat, in accordance with the assessment criteria for vulnerable species (DoE 2013a).

Table 7.7 Assessment of significance for the Superb Parrot for the mine project area

Criteria	Discussion
1. Long-term decrease of an important population	Important populations have not been defined in the recovery plan for the Superb 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	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. As the project application area does not fall within the species breeding range, it does not represent habitat critical to the survival of the species. Section 6.4 details avoidance measures implemented by Regis into the project design to minimise impacts on habitat for this species. Management of retained areas of species habitat on the site (see Section 6.4) will assist in protecting areas of habitat to be retained.
5. Disrupt breeding cycle	The project application 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 20.43 ha of potential foraging habitat for the Superb Parrot in the mine development. The project application 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 this 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.

Table 7.7 Assessment of significance for the Superb Parrot for the mine project area

Criteria	Discussion
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 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.

ii Migratory species

a Latham's Snipe

Latham's Snipe was recorded directly adjacent to the mine project area in November 2013. The pipeline corridor contains potential habitat for the species in farm dams and small first-order streams.

Latham's Snipe 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 mine project area.

The Matters of National Environmental Significance Significant Impact Guidelines 1.1 (DoE 2013a) 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 application area.

An assessment of significance (Table 7.8) was prepared for Latham's Snipe in relation to the project, in accordance with the assessment criteria for migratory species (DoE 2013a).

Table 7.8 Assessment of significance for Latham's Snipe in the mine project area

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 *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 individual was recorded adjacent to the mine project area and the pipeline development contains potential habitat only. Therefore, the project application 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 application area will be developed during preparation of the Biodiversity Management Plan. As a ground-dwelling bird, Latham's Snipe are vulnerable to predation from the introduced Red Fox (*Vulpes vulpes*). 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 application 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: • the area does not contain important habitat for the species; and • an ecologically significant proportion of the population will not be disrupted.

b Rainbow Bee-eater

A single Rainbow Bee-eater was recorded in the mine project area. The Rainbow Bee-eater is widely distributed throughout Australia and eastern Indonesia, including Bali, the Lesser Sundas and Sulawesi, and east to Papua New Guinea, the Bismarck Archipelago and, rarely, the Solomon Islands. It is a vagrant visitor to locations further north including Palau, south-western Micronesia, Saipan, the northern Mariana Islands, and Miyako Island and the southern Ryuku Islands in Japan. The majority of the global population breeds in Australia (including on Rottnest Island and islands in the south-west Torres Strait). Breeding has also been recorded in eastern Papua New Guinea (around Port Moresby and the Ramu Valley) and may possibly occur in the Lesser Sundas.

The Rainbow Bee-eater occurs mainly in open forests and woodlands, shrublands, and in various cleared or semi-cleared habitats, including farmland and areas of human habitation. It usually occurs in open, cleared or lightly-timbered areas that are often, but not always, located in close proximity to permanent water. It also occurs in inland and coastal sand dune systems, and in mangroves in northern Australia, and has been recorded in various other habitat types including heathland, sedgeland, vine forest and vine thicket, and on beaches. The Rainbow Bee-eater occurs in open woodlands and shrublands, including mallee, and in open forests that are usually dominated by eucalypts. It also occurs in grasslands and, especially in arid or semi-arid areas, in riparian, floodplain or wetland vegetation assemblages (DoEE 2019).

An assessment of significance is provided for this species in Table 7.9.

Table 7.9 Assessment of significance for Rainbow Bee-eater in the mine project area

Criteria	Discussion
1. Substantially modify important habitat	The Rainbow Bee-eater is a widely distributed and common migratory species. No important habitats have been identified for the species, and it occurs widely in a range of open forests and woodlands, and cleared habitats. The mine project area is unlikely to meet the criteria for important habitat as defined in DoE (2013).
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 mine project area will be developed during the EIS.
3. Disrupt lifecycle of ecologically significant proportion of population	The species was not observed regularly in the mine project area, and the mine project area is unlikely to support an ecologically significant proportion of the Rainbow Bee-eater.
Conclusion	The project will not result in a significant impact on the Rainbow Bee-eater as: • the area does not contain important habitat for the species; and • an ecologically significant proportion of the population will not be disrupted.

iii Pipeline Development

White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland was mapped within the pipeline corridor, while two threatened species were also recorded. A further 11 threatened species were considered a moderate to high likelihood of occurrence. Impacts to this TEC and the threatened species are assessed below.

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

Approximately 0.81 ha of the EPBC Act listed community will be impacted by southern option or 1.34 ha by the northern option of the pipeline development. Table 7.10 provides an assessment of significance for the above impacts on 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 2013a).

Table 7.10 Assessment of significance for White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the pipeline corridor

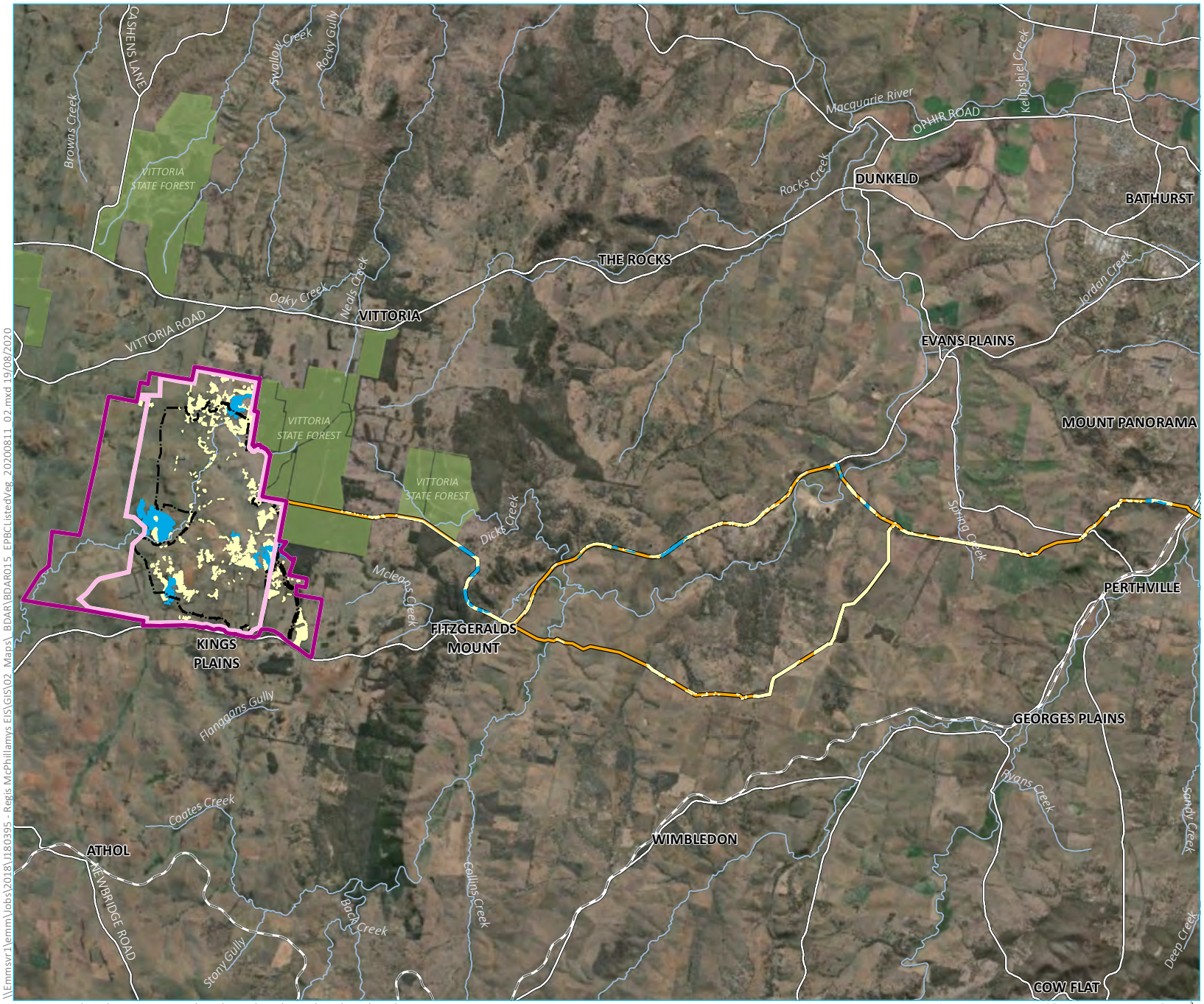
Criteria	Discussion
EPBC Act conservation status	Critically endangered
1. Reduce the extent of an ecological community	Approximately 0.81 ha of the listed community will be disturbed as a result of the pipeline development if the southern option is selected, and up to 1.34 ha if the northern option is selected. Within these areas, conservatively for the purposes of this assessment, total clearance is assumed. However, micro-siting of the trench can result in disturbance being limited to the removal of some saplings and groundcovers in many areas during trenching activities although some removal of mature trees will be required. Approximately 344.2 ha of plant community types that represent Box Gum Woodland (OEH 2018) are mapped as occurring within a 500 m linear buffer either side of the pipeline corridor. Therefore, only 0.2% of the local occurrence would be removed if the southern option is selected and 0.4% of the local occurrence would be removed if the northern option is selected. 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. Therefore, the pipeline development will result in a minor reduction in the extent of the ecological community; although impacts to Box Gum woodland will be restricted to trenching through small patches of the community and trenching activities will seek to avoid removal of nature trees where practicable.
2. Fragment or increase fragmentation	The listed community is highly fragmented within and surrounding the pipeline corridor. The pipeline development will not significantly increase fragmentation for the listed community. The southern option would intersect 10 patches of the ecological community while the northern option would intersect 18 patches. All patches are already isolated, being located on roadsides or in grazed paddocks. Therefore, the pipeline development will not significantly fragment or increase fragmentation of the ecological community.
3. Adversely affect critical habitat	A national recovery plan has been developed (DECCW 2010a) 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. Approximately 0.81 ha of vegetation in the footprint meets the above criteria. According to the PCT mapping (OEH 2018 there is approximately 344.2 ha of PCTs that represent the listed community within a 5 km radius of the pipeline corridor. The project would reduce the extent of critical habitat in the locality by approximately 0.2%, which does not represent an adverse impact.
4. Modify or destroy abiotic factors necessary for survival	Abiotic factors including soil will be modified during trenching in the pipeline disturbance footprint. This soil would be reinstated following completion of trenching, and therefore abiotic factors necessary for the ecological community's survival will not be destroyed.
5. Cause a substantial change in species composition	The pipeline development will clear 0.81 ha of the listed community for the southern option and up to 1.34 ha for the northern option. Within these areas, impacts to Box Gum woodland will be restricted to trenching through small patches of the community and trenching activities will seek to avoid removal of mature trees where practicable. As the disturbed soil would be reinstated following the completion of trenching, a substantial change in species composition is not expected. The development will not cause a substantial change in species composition in the retained Box Gum Woodland surrounding the pipeline corridor. The project Pest Management Plan will incorporate measure to control the introduction and spread of weed and pest species across the pipeline corridor.

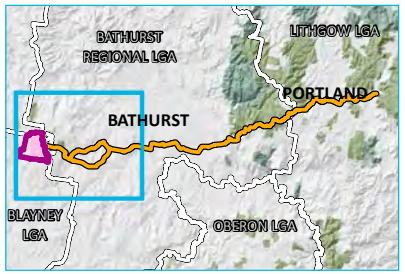
Table 7.10 Assessment of significance for White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the pipeline corridor

Criteria	Discussion
6. Cause a substantial reduction in quality or integrity	The pipeline development will remove 0.81 ha of the listed community for the southern option and up to 1.34 ha if the northern option is selected. The southern option would intersect 10 patches of the ecological community while the northern option would intersect 18 patches. The intersected patches vary from 0.2 to 2.1 ha in size. Patches intersected by the southern alignment that have been ground-truthed vary between the minimum condition criteria of patches > 0.1ha with > 50% of perennial native ground cover native with 12 indicator species present and patches > 2ha containing > 20 mature trees per ha and/or canopy regeneration present. Patches intersected by parts of the northern alignment may vary between the minimum condition criteria of patches > 0.1ha with > 50% of perennial native ground cover native with 12 indicator species (although the number of indicator species cannot be confirmed without survey) and patches > 2ha containing > 20 mature trees per ha and/or canopy regeneration present. As stated in the ecological community's conservation advice (TSSC 2006), the minimum condition criteria do not represent the ideal state of the ecological community. The larger and more diverse a patch is, the more important it is. Additionally, patches that link remnants in the landscape, that occur in depauperate areas, that contain rare, declining or threatened species and, that encompass the entire range of the ecological community, are important to the viability of the ecological community into the future. The median patch size intersected by the pipeline is 0.4 ha in size, with four outlying patches between 1.5 to 2.1 ha. These patches are isolated and do not link remnants in the landscape given the long history of agriculture proximal to the pipeline corridor. Therefore, the patches intersected by the pipeline are not as important to the viability of the community as larger, more intact patches of the ecological community which do not occur in the pipeline corridor. In these areas, impacts to Box Gum woodland will be restricted to trenching through small patches of the community and trenching activities will seek to avoid removal of nature trees where practicable. The project Pest Management Plan will incorporate measure to control the introduction and spread of weed and pest species across the Pipeline corridor.
7. Interfere with recovery	A national recovery plan has been developed (DECCW 2010a), with the objective to promote the recovery and minimise the risk of extinction of the ecological community through: • 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. Clearance of the ecological community will directly contravene Point 1, by resulting in a minor reduction in the extent of the listed community. However, impacts to Box Gum woodland will be restricted to trenching through small patches of the community and trenching activities will seek to avoid removal of nature trees where practicable.

Table 7.10 Assessment of significance for White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the pipeline corridor

Criteria	Discussion
Conclusion	The pipeline development will not result a significant impact on the listed community as only 0.81 ha will be disturbed for the southern option and up to 1.34 ha would be disturbed for the northern option (comprising 0.2 and 0.4% of the occurrence in the locality, respectively). These patches intersected by the pipeline are isolated and do not link remnants in the landscape given the long history of agriculture proximal to the pipeline corridor. Therefore, they are not as important to the viability of the community as larger, more intact patches of the ecological community which do not occur in the pipeline corridor. Impacts to Box Gum woodland will be restricted to trenching through small patches of the community and trenching activities will seek to avoid removal of nature trees where practicable. Removal of saplings and groundcovers during trenching activities will be a temporary impact as groundcovers would quickly recolonise the area and saplings would regrow, while impacts on trees would be avoided where practicable.





KEY

- EPBC Act-listed White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grasslands
- Other surveyed vegetation

Project application area

- Mine development project area
- Mining lease application area
- (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline

Existing environment

- Rail line
- Major road
- Named watercourse
- NPWS reserve (refer to inset)
- State forest
- Local government area (refer to inset)

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Source: EMM (2020); Regis Resources (2020); ESRI (2020); DFSI (2017); GA (2011)

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Distribution of EPBC Act-listed White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grasslands in the mine and pipeline developments

McPhillamys Gold Project
Biodiversity development assessment report
Figure 7.1

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b Koala

A description of the listed Koala population is provided in Section 7.2.1ib, above. Koalas were not recorded in the pipeline footprint; however, areas of PCT 277, 727, 1093, 1191, 1197 and 1330 provide potential habitat for the Koala where there is good habitat connectivity.

An assessment has been completed for the pipeline corridor 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 7.11.

Table 7.11 Koala habitat assessment tool (DoE 2014) in the pipeline corridor

Attribute	Score	Data source	Habitat assessment
Koala occurrence	+2 (high)	Desktop	The NSW Atlas of Wildlife identifies numerous records between 1980 and 2019 clustered to the south of Bathurst. Other records are very sparse and are generally recorded north and south of the Great Western Highway between Bathurst and Lithgow. 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 in areas of connectivity (noting that most of the pipeline traverses non-native vegetation with scattered trees). Scat searches were completed in the pipeline corridor using the Spot Assessment Technique (Phillips and Callaghan 2011). No scats were found.
Vegetation structure and composition	+2 (high)	Desktop	The project is in the central and southern tablelands KMA. High use and regional high use feed trees in SEPP (Koala Habitat Protection) 2019) present in the pipeline corridor include Manna Gum, Brittle Gum, Snow Gum, Red Stringybark and Inland Scribbly Gum.
		On ground	On-ground surveys confirmed that the pipeline corridor contains Koala habitat, comprising the food tree species listed above.
Habitat connectivity	+ 1 (medium)	Desktop	The pipeline corridor mainly follows existing roads and mainly traverses non-native vegetation. It does intersect some areas of native vegetation on roadsides and through paddocks. The corridor intersects four contiguous corridors that extend outside the pipeline corridor. While connectivity is low for most of the route, the large patches intersected by the pipeline are greater than 500 ha (but less than 1000 ha).
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	No Koalas were observed in the pipeline corridor and therefore their disease status is unknown.
Recovery value	+1 (medium)	Desktop and on ground	Koala habitat is highly fragmented in the majority of the pipeline corridor 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 eight, the pipeline corridor intersects habitat critical to the survival of the Koala, in accordance with the referral guidelines (ie score greater than five).

Table 7.12 Assessment of significance for the Koala in the pipeline corridor

Criteria	Discussion
EPBC Act conservation status	Vulnerable
1. long-term decrease of an important population	Approximately 5.17 ha of potential habitat for the listed species will be disturbed as a result of the pipeline development. Within the 5.17 ha, conservatively for the purposes of this assessment, clearance of the complete 5.17 ha is assumed. However, micrositing of the trench can result in disturbance being limited to the removal of some saplings and groundcovers in many areas during trenching activities although some removal of mature trees will be required. The Koala referral guideline (DoE 2014) does not identify any important populations of the species. 124 patches of vegetation are intersected by the pipeline development which may provide habitat for the Koala. Within these patches, disturbance of an area above 0.1 ha will only occur in 14 patches with disturbance ranging between 0.1 ha and 0.37 ha. Consequently, disturbance of patches of vegetation is limited and is unlikely to significantly decrease the habitat available for the species. The impacts of the pipeline will be largely restricted to the disturbance and removal of groundcovers and removal of saplings, which are not important components of Koala habitat. Mature trees (important components of Koala habitat) will largely be avoided although conservatively for this assessment, clearance of the full 5.17 ha is assumed. Accordingly, if present, the pipeline development would not lead to the long-term decrease of the population.
2: reduce area of occupancy of an important population	The impacts of the pipeline are mainly restricted to the disturbance of groundcovers and the removal of saplings, which are not important components of Koala habitat. Mature trees (important components of Koala habitat) will largely be avoided although conservatively complete clearance of the 5.17 ha of potential Koala habitat mapped within the pipeline corridor is assumed. The pipeline corridor remains contiguous with abundant similar habitat within the wider surrounds. Accordingly, if present, the pipeline development would not reduce the occupancy of the population.
3: fragment an important population	The pipeline route mainly traverses cleared areas and pine forests and follows existing tracks where possible. However small areas of native vegetation (e.g. along roadsides or when traversing paddocks) will be impacted although the majority of vegetation in the corridor is already subject to fragmentation. In addition, no permanent structures that would inhibit Koala movement will be constructed within the pipeline corridor. Accordingly, habitat will not be fragmented.
4: adversely affect critical habitat	The pipeline corridor mainly follows existing roads and mainly traverses non-native vegetation. It does intersect some areas of native vegetation on roadsides and through paddocks. The corridor intersects four contiguous corridors that extend outside the pipeline corridor. While connectivity is low for most of the route, the large patches intersected by the pipeline are greater than 500 ha. High-use and regional high-use feed trees in SEPP (Koala Habitat Protection) 2019 for the central and southern koala management area present in the pipeline corridor include Manna Gum, Brittle Gum, Snow Gum, Red Stringybark and Inland Scribbly Gum which would form part of the intersected corridors of critical habitat. Within these areas, impacts will be largely limited to the temporary disturbance or removal of groundcovers and removal of saplings, which are not important components of the critical habitat (although conservatively complete clearance of the potential Koala habitat mapped within the pipeline corridor is assumed) and therefore adverse impacts are not expected.
5: disrupt the breeding cycle of an important population	The Koala referral guideline (DoE 2014) does not identify any important populations of the species. Therefore, the breeding cycle of an important population will not be disrupted. A qualified fauna spotter will carry out a thorough survey for the species prior to any clearing of potential Koala habitat taking place.
6: decrease availability or quality of habitat	Habitat availability and/or quality will not decrease as a result of the pipeline development as impacts will be predominantly limited to the temporary disturbance and removal of groundcovers and removal of saplings, which are not important components of Koala habitat. A conservative assessment of 5.17 ha of clearance has been made for this assessment, although within this area, clearing will be largely restricted to slashing of ground vegetation and most mature trees can be avoided.

Table 7.12 Assessment of significance for the Koala in the pipeline corridor

Criteria	Discussion
7: result in invasive species	Domestic dogs (*Canis familiaris*) are known to prey on Koalas. As the pipeline development will not introduce domestic dogs to the area, the pipeline development will not result in invasive species that would adversely affect the Koala. The Project Pest Management Plan will incorporate measure to control the introduction and spread of weed and pest species across the Pipeline corridor.
8: introduce disease	Koalas are susceptible to Chlamydia, a sexually transmitted disease. In general, disease outbreaks occur when animals are stressed. As predominantly only groundcovers and saplings will be disturbed, and important habitat components will be largely avoided, the pipeline development is not expected to cause sufficient stress to animals such that a disease outbreak would occur.
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 pipeline development will not remove important Koala habitat components, it will not interfere with recovery of the Koala.
Conclusion	The pipeline development is unlikely to result in a significant impact on the Koala.

c Tarengo Leek Orchid and Small Purple-pea

The Tarengo Leek Orchid is only known from five disjunct populations in NSW and the ACT (Hall Cemetery, Captains Flat Cemetery, Ilford Cemetery, Tarengo TSR and Steve's TSR) associated with fertile soils in grassy woodland or natural grasslands. The known sites contain or formerly contained Snow Gum and Black Gum, Yellow Box or Blakely's Red Gum (DECCW 2010).

Small Purple-pea occurs in NSW and the ACT. The species is predominantly associated with grassy woodlands containing Blakely's Red Gum, Yellow Box, Bundy and White Box (*E. albens*) (OEH 2012a).

Table 7.13 provides an assessment of significance for Tarengo Leek Orchid and Small Purple-pea in accordance with the assessment criteria for endangered species (DoE 2013a).

Table 7.13 Assessment of significance for Tarengo Leek Orchid and Small Purple-pea in the pipeline corridor

Criteria	Discussion
EPBC Act conservation status	Endangered
1: long-term decrease in population size	None of the known populations (DECCW 2010b) or areas predicted to have potentially suitable habitat for Tarengo Leek Orchid will be impacted by the pipeline development. A population of the species is not currently known from the pipeline corridor. However, some marginal and potential habitat occurs in 0.62 ha of grassy woodland dominated by Snow Gum and therefore this assessment has been conducted using the precautionary principle. Regis has committed to conducting targeted surveys during the species flowering period. If found, Regis has also committed to avoidance of direct and indirect impacts on the species through micrositing of the pipeline route and protective measures (Section 6.4). None of the known populations of Small Purple-pea (OEH 2012a) will be impacted by pipeline development. However, some potential habitat occurs in 1.63ha of grassy woodland that would be impacted by the pipeline development. The pipeline development is unlikely to result in a long-term decrease in population size for the Tarengo Leek Orchid or Small Purple-pea as targeted surveys would be completed during the flowering period to determine if populations of the species are indeed present. In the unlikely event that individuals are found, the route will be micro-sited to avoid impacts to the species. In addition, appropriate measures will be implemented to maintain existing hydrology if the Tarengo Leek Orchid is recorded.
2: reduce area of occupancy	The area of occupancy for the Tarengo Leek Orchid is estimated at 4.5 ha (DECCW 2010b), which comprises the known populations. The project will not reduce the known area of occupancy as, in the unlikely event that the species is found during targeted survey, impacts will be avoided, and appropriate measures will be implemented to maintain existing hydrology in the area they are recorded. The area of occupancy for the Small Purple-pea is approximately 34 ha in NSW, 0.13 ha in the ACT and 0.002 ha in Victoria, encompassing the 28 known populations (OEH 2012a). The project will not reduce the known area of occupancy as, in the unlikely event that the species is found during targeted survey, impacts will be avoided.
3: fragment a population	The project will not fragment the known populations of the species as, in the unlikely event that the species are found during targeted survey, the route will be microsited such that fragmentation is avoided.
4: adversely affect critical habitat	As Tarengo Leek Orchid and Small Purple-pea occur in a small number of extant populations with low population size at most sites, all known populations, and the habitat they occupy are critical to the survival of the species. The National Recovery Plan for Tarengo Leek Orchid (DECCW 2010b) states that the minimum area representing habitat critical to the survival of the species is the boundary of the TSRs and the cemeteries in which the populations occur. The project will not adversely impact known critical habitat. The National Recovery Plan for the Small Purple-pea (OEH 2012a) does not define the area of critical habitat, however it would comprise the area of all known populations (approximately 34 ha and 0.13ha in the ACT and 0.002 ha in Victoria). The project will not adversely impact known critical habitat. In the unlikely event that the species are found during targeted survey, impacts will be avoided. Appropriate measures will be implemented to maintain existing hydrology in the area if Tarengo Leek Orchid is recorded.

Table 7.13 Assessment of significance for Tarengo Leek Orchid and Small Purple-pea in the pipeline corridor

Criteria	Discussion
5: disrupt the breeding cycle of a population	Tarengo Leek Orchid mainly reproduces from seed although has been known to produce daughter tubers. It is pollinated by wasps, most notably a generalist Thynnine Wasp (DECCW 2010b). Seeds are small and typically disperse only a few metres from the parent plant. Small Purple Pea reproduces by seed and fire is important in seed germination (OEH 2012a). In the unlikely event that the species are recorded, avoidance measures will be implemented, including the protection of any recorded individuals from the construction area. In addition, if Tarengo Leek Orchid is recorded a 3 m avoidance buffer will be placed around individuals (or groups of individuals) and measures will be implemented to maintain existing hydrological regimes. Accordingly, if populations are indeed present, the breeding cycle will not be disrupted given the proposed protection measures.
6: modify, destroy, remove, isolate or decrease availability or quality of habitat	Ground disturbance is a recognised threat to known populations of Tarengo Leek Orchid that occur in active cemeteries (DECCW 2010b). The species is also known to occur in wetter areas of grassy woodlands and grasslands. Accordingly, in the unlikely event that the species is recorded during targeted surveys, avoidance measures will be implemented, including the protection of any recorded individuals from the construction area with a 10 m buffer and the maintenance of existing hydrological regimes. While some disturbance (ie fire and light grazing) can be favourable to Small Purple-pea (OEH 2012a) and has the ability to re-sprout from damaged rootstock, the species will not persist when the shoot growth is periodically removed by repeated disturbance (eg domestic stock grazing). Accordingly, if the species is recorded during targeted surveys, avoidance measures will be implemented, including the protection of any recorded individuals from the construction area.
7: result in invasive species	Weeds are identified as a threat to known populations of Tarengo Leek Orchid and Small Purple-pea. Soil disturbance for trenching has the potential to promote weed growth. In the unlikely event that the species is recorded during targeted surveys, specific weed control measures would be developed and detailed in the project's biodiversity management plan to prevent invasive species adversely affecting the species habitats.
8: introduce disease	These species are not known to be subject to disease.
9: interfere with recovery	Recovery actions for the species focus on the management of known populations and conducting surveys in areas of potentially suitable habitat from which they are currently unknown. As targeted surveys will be conducted in the October to November 2020, direct impacts will be avoided and indirect impacts will be managed, the project does not interfere with the species recovery.
Conclusion	The pipeline development is unlikely to result in a significant impact on Tarengo Leek Orchid as: • known and potentially suitable habitats identified by NPWS will not be impacted; • targeted surveys will be conducted in October to November 2020 for Tarengo Leek Orchid and between September to November for Small Purple-pea; • in the unlikely event that individuals are recorded, measures to avoid direct impacts and manage indirect impacts will be implemented.

d Black Gum, Clandulla Geebung and Austral Toadflax

Black Gum is endemic to south-eastern Australia and is found in the ACT, NSW and in a small isolated sub-population in Victoria. In NSW, the species occurs predominantly in the South Eastern Highlands IBRA bioregion with the most eastern part of the distribution being located just within the Sydney Basin IBRA bioregion. Following a survey in 2002 / 2003 there were believed to be approximately 110 stands in NSW, of which approximately 56% consist of scattered trees on grazed privately owned land or as linear clusters along road edges. Although a few new locations have been recorded since this survey, all are very small and have not expanded the known range or habitat of the species, nor significantly altered the understanding of its abundance or conservation status (Steve Douglas, pers. comm). In their 2010 assessment of this species the NSW Scientific Committee considered there to be 130–150 stands in NSW (TSSC 2015).

Clandulla Geebung is known from the central tablelands and central coast of NSW. The core of its distribution is within Clandulla State Forest, west of Kandos, with disjunct populations occurring to the north at Dingo Creek and Mount Dangar within the Wollemi and Goulburn River National Parks; to the south within Ben Bullen State Forest, south-east of Capertee; and to the south-east at Devils Hole within Parr State Recreation Area, north of Colo Heights. The species inhabits dry sclerophyll forest and woodland on sandstone (in heavier clayey, gravelly loam derived from Permian rocks, at approximately 700 m altitude on low ridges. Associated canopy species include Grey Gum (*Eucalyptus punctata*), Narrow-leaved Stringybark (*E. sparsifolia*), Inland Scribbly Gum (*E. rossii*), Red Ironbark (*E. fibrosa*) and Narrow-leaved Ironbark (*E. crebra*) (TSSC 2008).

The Austral Toadflax occurs in New South Wales, the Australian Capital Territory, Queensland and Victoria. Its current distribution is sporadic but widespread occurring between the Bunya Mountains in south-east Queensland to northeast Victoria and as far inland as the southern, central and northern tablelands in New South Wales and the Toowoomba region. The austral toadflax has been recorded once in Tasmania from the Derwent River valley in 1804, and is considered extinct in the state. Austral Toadflax is semi-parasitic on roots of a range of grass species, notably Kangaroo Grass. It occurs in subtropical, temperate and subalpine climates over a wide range of altitudes. It occurs on soils derived from sedimentary, igneous and metamorphic geology on a range of soils including black clay loams to yellow podzolics and peaty loams (TSSC 2013).

Table 7.14 provides an assessment of significance in accordance with the assessment criteria for vulnerable species (DoE 2013a).

Table 7.14 Assessment of significance for the Black Gum, Clandulla Geebung and Austral Toadflax in the pipeline corridor

Criteria	Discussion
EPBC Act conservation status	Vulnerable
1.Long-term decrease of an important population	Up to four individuals of Black Gum (Hill End IBRA Subregion) and Clandulla Geebung (Capertee Uplands IBRA Subregion) may be directly impacted by the proposed action. In addition, 0.09 ha of potential habitat (Capertee Uplands IBRA Subregion) has been identified for Austral Toadflax. The latter species has a moderate likelihood to occur on ungrazed roadside edges containing Kangaroo Grass. No important populations have been recorded in the pipeline corridor and only four individual plants of Black Gum and Clandulla Geebung will be removed. In areas where Black Gum and Clandulla Geebung have been recorded, the route will be microsited such that impacts on the species are minimised. Accordingly, it is unlikely that the project will lead to a long-term increase in an important population.

Table 7.14 Assessment of significance for the Black Gum, Clandulla Geebung and Austral Toadflax in the pipeline corridor

Criteria	Discussion
2. Reduce occupancy area for important population	The project will not reduce the known area of occupancy of an important population – no important populations are known from the pipeline corridor.
3. Fragment an important population	No important populations are known from the pipeline corridor. Up to four potential Black Gum and Clandulla Geebung will be removed for the construction of the pipeline, and a small area of potential Austral Toadflax habitat would be removed. In areas where Black Gum and Clandulla Geebung have been recorded, the route will be microsited such that impacts on the species are minimised. In addition, Clandulla Geebung seems to respond well to disturbance, with greater densities found along track margins and in areas disturbed by forestry activities (TSSC 2013).
4. Adversely affect habitat critical to survival	There is no indication the pipeline corridor comprises habitat critical for the survival of the species.
5. Disrupt breeding cycle of important population	The project will not disrupt the breeding cycle of an important population – no important populations are known from the pipeline corridor. Clandulla Geebung seems to respond well to disturbance, with greater densities found along track margins and in areas disturbed by forestry activities (TSSC 2013).
6. Modify, destroy, remove, isolate or degrade habitat	Existing habitat has been subject to fragmentation and edge effects and is subject to the invasion of exotic species in groundcovers. Construction will utilise existing disturbed easements and cultivated land and will not decrease the quality of habitat with the assessment area. The pipeline route mainly traverses cleared areas and pine forests and follows existing tracks where possible. However small areas of native vegetation (e.g. along roadsides or when traversing paddocks) will be impacted although the majority of vegetation in the corridor is already subject to fragmentation and edge effects. In areas where Black Gum and Clandulla Geebung have been recorded, the route will be microsited such that impacts on the species are minimised
7.Result in invasive species	Grazing of the host plant by sheep and cattle, and activities of Feral Pigs are recognised as threats to the species. It is unlikely that the project will lead to an increase in the number of invasive species present in the pipeline corridor.
8. Introduce disease	Disease is not recognised as a threat to these species. Given this, it is unlikely that the pipeline will introduce diseases that cause the species to decline.
9. Interfere with recovery	There is no adopted or made recovery plan for these species. Conservation and management actions listed in the Approved Conservation Advice for these species (TSSC 2008; TSSC 2013 and TSSC 2015a) include maintaining wild populations and enhancing potential habitat, as well as weed and grazing control. Despite the potential loss of a small number of individuals, the project will not interfere with these objectives, and the Project Pest Management Plan will incorporate measure to control the introduction and spread of weed and pest species across the Pipeline corridor (including invasive grasses that are a threat to Austral Toadflax.
Conclusion	The pipeline development will not result in a significant impact on these species.

e Basalt Peppercress and Hoary Sunray

The Basalt Peppercress is currently known from about 35 populations containing about 1,700 individuals, most of which occur in Tasmania. There are three populations containing about 40 plants in New South Wales. The original habitat in which the Basalt Peppercress occurred is not precisely known, but was probably eucalypt and/or Allocasuarina woodland with a grassy understorey, and native temperate grasslands (Leigh et al. 1984). Almost all remaining populations of Basalt Peppercress occur in heavily modified, non-natural environments, usually amongst exotic pasture grasses and weed species, sometimes with an overstorey of introduced tree species (Tumino 2010). The pipeline corridor traverses Perthville where there is a known record of the species. Likely areas for this species were searched following NSW guidelines and the species was not recorded. However, surveys were completed during drought conditions, and therefore its presence could be discounted. Potential habitat of up to 2.67 ha is present in the southern option and 1.63 ha in the northern option of the pipeline development.

The Hoary Sunray is endemic to south-eastern Australia, where it occurs in three geographically separate areas. In NSW, the Hoary Sunray currently occurs on the Southern Tablelands and some adjacent areas (e.g. Tarcutta, Bega valley) in an area roughly bounded by Albury, Bega and Goulburn, in the South Eastern Highlands, Australian Alps and Sydney Basin bioregions. It once occurred more widely in inland NSW, with records from near Cobar, Dubbo, Lithgow, Moss Vale and Delegate (Sinclair 2010). Potentially suitable habitat (0.09ha) in the pipeline corridor occurs on ungrazed roadside edges containing Kangaroo Grass.

Table 7.15 Assessment of significance for Basalt Peppercress and Hoary Sunray

Criteria	Discussion
EPBC Act conservation status	Endangered
1: long-term decrease in population size	The local population of Basalt Peppercress was estimated to be three individuals in 2008 (DoEE 2020). Records of the Hoary Sunray are located south of the pipeline corridor, and therefore the local population size is unknown. The pipeline development will not result in a long-term decrease in population size for either species as an additional targeted survey would be completed in climatic conditions optimal for their detection. If any individuals are found, the route will be microsited or underbored to avoid impacts to the species.
2: reduce area of occupancy	The pipeline development will not reduce the area of occupancy for either species as an additional targeted survey would be completed in climatic conditions optimal for their detection. If any individuals are found, the route will be microsited or underbored to avoid impacts to the species.
3: fragment a population	The pipeline development will not fragment the local population of either species as an additional targeted survey would be completed in climatic conditions optimal for their detection. If any individuals are found, the route will be microsited or underbored to avoid impacts to the species.
4: adversely affect critical habitat	Critical habitat has not been defined for either species. Potential habitat for the species will not be adversely affected as impacts are restricted to the temporary disturbance of groundcovers that would quickly recolonise following disturbance.
5: disrupt the breeding cycle of a population	As avoidance measures will be implemented in the event that these species are recorded, the breeding cycle of their populations will not be disrupted.
6: modify, destroy, remove, isolate or decrease availability or quality of habitat	Impacts to the potential habitat of these species are temporary, given that groundcovers would quickly recolonise following the completion of trenching. Therefore, their potential habitat will not be destroyed, removed, isolated. The quality of the potential habitat will be maintained through the implementation of weed control measures developed during the EIS.
7: result in invasive species	Soil disturbance has the potential to promote weed growth. Weed control measures will be developed during the EIS to minimise the risk of weed invasion.

Table 7.15 Assessment of significance for Basalt Peppercress and Hoary Sunray

Criteria	Discussion
8: introduce disease	These species are not known to be subject to disease.
9: interfere with recovery	Basalt Peppercress does not currently have a recovery plan. The National Recovery Plan for the Hoary Sunray focuses on research into the species distribution, ecology and threats. Therefore, the pipeline development does not interfere with the species recovery actions.
Conclusion	The pipeline development will not result in a significant impact on the Basalt Peppercress or Hoary Sunray as measures to avoid individuals detected will be implemented.

f Superb Parrot

A description of the Superb Parrot and its habitat is provided in Section 7.2.1i. Targeted surveys (OzArk 2018) did not record the species. However, potential habitat is present within the pipeline development comprises areas of PCT 277_Intact, 277_Moderate, 1330_Intact and 1330_Fragments.

Table 7.7 provides an assessment of significance for the removal of up to 2.05 ha of potential Superb Parrot habitat for the southern option and 2.05 ha for the northern option, in accordance with the assessment criteria for vulnerable species (DoE 2013a).

Table 7.16 Assessment of significance for the Superb Parrot for the pipeline corridor

Criteria	Discussion
1. Long-term decrease of an important population	Important populations have not been defined in the recovery plan for the Superb 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	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. As the project application area does not fall within the species breeding range, it does not represent habitat critical to the survival of the species. Section 6.4 details avoidance measures implemented by Regis into the project design to minimise impacts on habitat for this species. Management of retained areas of species habitat on the site (see Section 6.4) will assist in protecting areas of habitat to be retained.
5. Disrupt breeding cycle	The project application 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 2.05 ha of potential Superb Parrot habitat for the southern option and 2.05 ha for the northern option of the pipeline development. The project application 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 this potential foraging habitat in which the species is vagrant will not substantially reduce the national extent.

Table 7.16 Assessment of significance for the Superb Parrot for the pipeline corridor

Criteria	Discussion
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 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.

g Booroolong Frog

The Booroolong Frog is restricted to New South Wales and north-eastern Victoria, predominantly along western-flowing streams of the Great Dividing Range, from 200 to 1300 metres above sea level. Further south, the Booroolong Frog has been recorded from a number of streams in recent years. In the central tablelands region, the species has been recorded along nine streams within the Macquarie River catchment (Central West CMA), and seven streams in the Abercrombie River catchment (OEH 2012b).

The Booroolong Frog is generally associated with permanent streams in wet and dry forest, woodland, and cleared grazing land. The species occurs in dissected mountainous country, tablelands, foothills and lowland plains. Adults tend to occur on or near cobble banks or bedrock structures within stream margins, or near slow-flowing connected or isolated pools that contain suitable rock habitats (OEH 2012b).

Potential habitat in the pipeline corridor occurs in the Macquarie River which will be underbored and therefore not impacted. 0.19 ha of potential habitat occurs in the Coxs River in the southern option of the pipeline, while the northern option includes potential habitat at Coxs River and Evans Plains Creek (0.12 ha).

Table 7.17 provides an assessment of significance in accordance with the assessment criteria for endangered species (DoE 2013a).

Table 7.17 Assessment of significance for Booroolong Frog in the pipeline corridor

Criteria	Discussion
EPBC Act conservation status	Endangered
1: long-term decrease in population size	Approximately 0.19 ha of potential habitat for the listed species will be disturbed for the southern option with an additional 0.12 ha if the northern option is selected. Potential habitat has been identified at Coxs River (southern option) and Evans Plains Creek (northern option) being close to known records. The pipeline corridor cuts through open ground at the Coxs River and Evans Plains Creek crossing and impacts to fringing vegetation or rock structures providing habitat for this species will be avoided. As per the original referral, potential habitat at Macquarie River is being avoided through underboring.

Table 7.17 Assessment of significance for Booroolong Frog in the pipeline corridor

Criteria	Discussion
2: reduce area of occupancy	No impacts to in-stream breeding habitat will occur, nor will fringing vegetation in which the species may shelter, be impacted. The pipeline corridor cuts through open ground at the Coxs River crossing and potential habitat at Macquarie River is being underbored.
3: fragment a population	Stream flow will be maintained at the Coxs River and Evans Plains Creek crossings and riparian vegetation retained. Prior to clearance taking place, the area will be subject to a preclearance survey, and the work area when passing adjacent to potential habitat will be fenced. Disturbance will be temporary, and trenching will occur in open ground. Therefore fragmentation of any population at Coxs River and Evans Plains Creek will be avoided.
4: adversely affect critical habitat	No impacts to in-stream breeding habitat will occur, nor will fringing vegetation in which the species may shelter, be impacted. The pipeline corridor cuts through open ground at the Coxs River and Evans Plains Creek crossings and potential habitat at Macquarie River is being underbored. Prior to clearance taking place the area will be subject to a preclearance survey, and the work area when passing adjacent to potential habitat will be fenced.
5: disrupt the breeding cycle of a population	The pipeline corridor at the Coxs River and Evans Plains Creek will not impact on habitat for the species (fringing vegetation or rock structures) and the corridor cuts through cleared ground at this location. Prior to clearance taking place the area will be subject to a preclearance survey, and the work area when passing adjacent to potential habitat will be fenced. Therefore disturbance to the breeding cycle of the species is unlikely.
6: modify, destroy, remove, isolate or decrease availability or quality of habitat	Approximately 0.19 ha of potential habitat will be temporarily disturbed at Coxs River and 0.12 ha at Evans Plains Creek if the northern option is selected. The pipeline corridor cuts through open ground at both crossings and impacts to fringing vegetation or rock structures providing habitat for this species will be avoided. As per the original referral, potential habitat at Macquarie River is being avoided through underboring.
7: result in invasive species	The presence of invasive species such as Cane Toad, Foxes, Feral Pigs and Feral Cats is known to impact native fauna populations. It is unlikely that the project will lead to an increase in the number of invasive species present in the pipeline corridor.
8: introduce disease	A potential threat to the Booroolong Frog population may occur from introduction of 'Chytridiomycosis' disease to the area (which has been identified as the cause of amphibian declines and extinctions on different continents (OEH 2012b). By bringing in vehicles, machinery and people there is potential they may carry spores which then spread into water bodies. Mitigation measures including hygiene protocols to disinfect footwear, machinery and vehicles before working near the Coxs River and Evans Plains Creek will be implemented.
9: interfere with recovery	The overall objective of the recovery plan for the Booroolong Frog (OEH 2012b) is to minimise the probability of extinction of the Booroolong Frog in the wild, and to increase the probability of populations becoming self-sustaining and viable in the longer term. Recovery objectives include reducing the impact of known threats to the species. The project will not interfere with the objectives of this plan.
Conclusion	The pipeline development will not result in a significant impact on the Booroolong Frog.

h Greater Glider

The Greater Glider is restricted to eastern Australia, occurring from the Windsor Tableland in north Queensland through to central Victoria (Wombat State Forest), with an elevational range from sea level to 1200 m above sea level. An isolated inland subpopulation occurs in the Gregory Range west of Townsville, and another in the Einasleigh Uplands. The Greater Glider is an arboreal nocturnal marsupial, largely restricted to eucalypt forests and woodlands. It is primarily folivorous, with a diet mostly comprising eucalypt leaves, and occasionally flowers. It is typically found in highest abundance in taller, montane, moist eucalypt forests with relatively old trees and abundant hollows (TSSC 2016b).

Potential habitat for the species in the pipeline is present in the Hill End IBRA subregion in tall moist forest (PCT 1197_Intact, 1.15 ha).

Table 7.18 provides an assessment of significance in accordance with the assessment criteria for vulnerable species (DoE 2013a).

Table 7.18 Assessment of significance for the Greater Glider in the pipeline corridor

Criteria	Discussion
EPBC Act conservation status	Vulnerable
1.Long-term decrease of an important population	The Greater Glider could occur in the eastern part of the pipeline corridor in the Hill End IBRA subregion. The pipeline route mainly traverses cleared areas and pine forests and follows existing tracks where possible. However, small areas of native vegetation (eg along roadsides or when traversing paddocks) will be impacted totalling 1.15 ha, and additional surveys have recorded more hollow-bearing trees that could represent potential habitat for the Greater Glider. No important population of the species has been identified in the pipeline corridor. The Greater Glider could occur in intact tall woodland areas dominated by Mountain Gum and Brown Barrel (e.g PCT 1197). Impacts are expected to be minor and will not result in any significant reduction in habitat such that any local population would be impacted in any measurable way.
2. Reduce occupancy area for important population	The impacts of the pipeline are predominantly restricted to the disturbance of groundcovers and the removal of saplings, which are not important components of habitat for either species. Mature trees (important components of Greater Glider habitat) will largely be avoided although conservatively complete clearance of the 1.15 ha of potential habitat for Greater Glider respectively mapped within the pipeline corridor is assumed. The pipeline corridor remains contiguous with abundant similar habitat within the wider surrounds. Accordingly, if present, the pipeline development would not reduce the occupancy of the population.
3. Fragment an important population	No 'important population' has been identified within the Pipeline corridor. The impacts of the pipeline are predominantly restricted to the disturbance of groundcovers and the removal of saplings, while mature trees will be largely retained. As mature trees will be largely retained and impacts on patch sizes are small (less than 0.1 ha in most cases), potential species' habitat will not be fragmented. The pipeline route mainly traverses cleared areas and pine forests and follows existing tracks where possible. However small areas of native vegetation (e.g. along roadsides or when traversing paddocks) will be impacted although the majority of vegetation in the corridor is already subject to fragmentation.
4. Adversely affect habitat critical to survival	There is no indication the pipeline corridor comprises habitat critical to the survival of either species. The pipeline route mainly traverses cleared areas and pine forests and follows existing tracks where possible. However small areas of native vegetation (e.g. along roadsides or when traversing paddocks) will be impacted.
5. Disrupt breeding cycle	No 'important population' has been identified within the pipeline corridor. A qualified fauna spotter will carry out a thorough survey for the species prior to any clearing of potential habitat (habitat trees) taking place. It is considered unlikely the pipeline will disrupt the breeding cycle of an important population.
6. Modify, destroy, remove, isolate or degrade habitat	Habitat availability and/or quality will not decrease as a result of the pipeline development as impacts will be predominantly limited to the temporary disturbance and removal of groundcovers and removal of saplings, which are not important components of habitat for either species. A conservative assessment of complete clearance of potential species habitat in the pipeline corridor has been made for this assessment, although within this area, clearing will be largely restricted to slashing of ground vegetation and most mature trees can be avoided.
7.Result in invasive species	Domestic dogs and Feral Cats could prey on the species. As the pipeline development will not introduce domestic dogs or feral cats to the area, the pipeline development will not result in invasive species that would adversely either species.

Table 7.18 Assessment of significance for the Greater Glider in the pipeline corridor

Criteria	Discussion
8. Introduce disease	Disease is not recognised as a threat to the Greater Glider. Given this, it is unlikely that the pipeline will introduce diseases that cause the species to decline.
9. Interfere with recovery	There is no State or Commonwealth recovery plan for Greater Glider. The Approved Conservation Advice for Greater Glider (TSSC 2016b) outlines management actions intended to aid the recovery of the species. Given the minor extent of clearing involved and with mitigation of potential Project impacts including pre-clearing surveys in suitable habitat to identify suitable tree hollows any potential impact on the species, should it occur in the Pipeline corridor, will be minor and is considered unlikely to interfere with the recovery of the species or any of the actions outlined in the Approved Conservation Advice.
Conclusion	The pipeline development will not result in a significant impact on the Greater Glider.

i Pink-tailed Worm Lizard

The Pink-tailed Worm Lizard occurs in New South Wales (NSW), Victoria and the Australian Capital Territory (ACT) where it is widely but patchily distributed along the foothills of the western slopes of the Great Dividing Range between Bendigo in Victoria and Gunnedah in NSW. The species habitat includes primary and secondary grassland, grassy woodland and woodland communities, and the species usually inhabits sloping sites that contain rocky outcrops or scattered, partially buried rocks. These rocky habitats tend to be well-drained mid-slope or ridge-top sites with loosely embedded rocks on soil substrate with ant galleries present. It is typically found sheltering under these rocks and spend considerable time in ant burrows below these rocks, which are considered important foraging and shelter sites (TSSC 2015b).

Potential habitat occurs in areas of granite outcropping in Orange IBRA subregion (PCT 277_Intact) and Bathurst IBRA subregion (southern option) (PCT 1330_DNG, 1330_Intact and 1330_Sparse).

Table 7.19 provides an assessment of significance in accordance with the assessment criteria for vulnerable species (DoE 2013a).

Table 7.19 Assessment of significance for the Pink-tailed Worm Lizard in the pipeline corridor

Criteria	Discussion
EPBC Act conservation status	Vulnerable
1.Long-term decrease of an important population	The species has potential to occur in granite/rocky areas in Box Gum Woodland, and approximately 1.19 ha of potential habitat is potentially impacted. No important populations have been identified in the pipeline corridor, and should the species occur, the development is unlikely to lead to a long-term decrease in any local population. Trenching will seek to be microsited such that impacts on granite boulders, which the species favours, and disturbance are minimised. Trenches while left open will be subject to daily inspection and escape measures or shelter provided (eg ramps or material under which animals can shelter). If species are trapped in the trench they will be freed by a trained and competent individual.
2. Reduce occupancy area for important population	No important populations have been identified in the pipeline corridor. Trenching can be microsited around areas of granite boulders which the species favours and disturbance will be temporary and relate to removal of groundcover while the trench is installed. As such the area of occupancy of an important population is unlikely to be reduced. Although minor temporary reduction of potential habitat may occur, the area will be rehabilitated once the trench is filled.

Table 7.19 Assessment of significance for the Pink-tailed Worm Lizard in the pipeline corridor

Criteria	Discussion
3. Fragment an important population	Disturbance for installation of the pipeline will be temporary and trenching will be microsited around granite boulders which the species favours. Prior to clearance taking place the area will be subject to a preclearance survey, and any individuals will be relocated to nearby areas of retained habitat while trenching takes place. The pipeline route mainly traverses cleared areas and pine forests and follows existing tracks where possible. Construction disturbance will be temporary, and the completed pipeline will not provide a barrier to movement. Following installation of the pipeline, there will be no fragmentation of the species habitat.
4. Adversely affect habitat critical to survival	There is no indication the pipeline corridor comprises habitat critical for the survival of the species. The species favours open woodland with native grassland and rocky areas. Trenching will be microsited such that impacts on granite boulders which the species favours are minimised.
5. Disrupt breeding cycle	No important populations have been identified in the pipeline corridor. Prior to clearance taking place the area will be subject to a preclearance survey, and any individuals will be relocated to nearby areas of retained habitat while trenching takes place. Trenching will be microsited such that impacts on granite boulders which the species favours are minimised. Therefore, disturbance to the breeding cycle of the species is unlikely.
6. Modify, destroy, remove, isolate or degrade habitat	The species inhabits sloping, open woodland areas with predominantly native grassy groundlayers, particularly those dominated by Kangaroo Grass. Sites are typically well-drained, with rocky outcrops or scattered, partially-buried rocks. Trenching will be microsited such that impacts on granite boulders which the species favours are minimised.
7.Result in invasive species	The presence of invasive species such as Cane Toad, Foxes, Feral Pigs and Feral Cats is known to impact native fauna populations. It is unlikely that the project will lead to an increase in the number of invasive species present in the pipeline corridor.
8. Introduce disease	Disease is not recognised as a threat to the Pink-tailed Worm Lizard. Given this, it is unlikely that the pipeline will introduce diseases that cause the species to decline.
9. Interfere with recovery	There is no adopted or made recovery plan for this species. Conservation and management actions listed in the Approved Conservation Advice for the species (TSSC 2015b) include implementing approaches to avoid or reduce the removal of rocks in order to maintain habitat integrity and weed and pest control. The project will not interfere with these actions, and trenching will be microsited such that impacts on granite boulders which the species favours are minimised.
Conclusion	The pipeline development will not result in a significant impact on the Pink-tailed Worm Lizard.

j Bathurst Copper Butterfly

The Bathurst Copper Butterfly is endemic to New South Wales, where it occurs on the Central Tablelands in an area approximately bounded by Capertee, Black Springs, Hartley and Bathurst. It occurs in eucalypt woodland, mainly in open clearings. All locations are above 900 m in altitude and are associated with the presence of the larval food plant; *Bursaria spinosa.* subsp. *lasiophylla* and a species of attendant ant; *Anonychomyrma itinerans*. The Bathurst Copper Butterfly has been recorded from 35 locations, all within the Greater Lithgow, Bathurst Regional and Oberon local government areas (TSSC 2016c).

Four potential host plants for the species (*Bursaria spinosa* ssp. *lasiophylla*) were recorded in the Hill End and Capertee Uplands IBRA subregions. The pipeline disturbance footprint was minimised in these locations to avoid direct impacts.

Table 7.20 provides an assessment of significance in accordance with the assessment criteria for vulnerable species (DoE 2013a).

Table 7.20 Assessment of significance for Bathurst Copper Butterfly in the pipeline corridor

Criteria	Discussion
EPBC Act conservation status	Vulnerable
1.Long-term decrease of an important population	None of the known populations will be impacted by the proposed action. A population of the species is not currently known from the pipeline corridor. However, some potential habitat occurs and additional surveys have recorded four individual potential host plants of Blackthorn (*Bursaria spinosa* subsp. *lasiophylla*). The pipeline disturbance footprint has been minimised in these locations to avoid direct impacts on the species. No important populations have been recorded in the pipeline corridor and up to four potential host plants will be removed. It is unlikely that the project will lead to a long-term increase in an important population.
2. Reduce occupancy area for important population	The project will not reduce the known area of occupancy of an important population – no important populations are known from the pipeline corridor.
3. Fragment an important population	The project will not fragment an important population – no populations are known from the pipeline corridor. The pipeline disturbance footprint has been minimised where potential host plants occur to avoid direct impacts on the species
4. Adversely affect habitat critical to survival	Habitat critical to the survival of Bathurst Copper Butterfly has not been identified. The pipeline disturbance footprint has been minimised where potential host plants occur.
5. Disrupt breeding cycle	Emergence, mating and egg-laying typically occurs during September – November, with larval grazing of the host plant occurring between October and January and pupation between December – October. The trench will be microsited such that impacts on host plants and the breeding cycle are minimised.
6. Modify, destroy, remove, isolate or degrade habitat	Up to four potential host plants may be removed for construction of the pipeline. The trench will be microsited such that habitat impacts are minimised.
7.Result in invasive species	Grazing of the host plant by sheep and cattle, and activities of Feral Pigs are recognised as threats to the species. It is unlikely that the project will lead to an increase in the number of invasive species present in the pipeline corridor.
8. Introduce disease	Disease is not recognised as a threat to the Bathurst Copper Butterfly. Given this, it is unlikely that the pipeline will introduce diseases that cause the species to decline.
9. Interfere with recovery	A State recovery plan (2001-06) (NPWS 2001) was in place for the species but no plan is active. The recovery program for the Bathurst Copper Butterfly aimed to stabilise the population through the prevention of threatening processes, and increase the in-situ population through habitat management. The project will not interfere with these objectives, and the project Pest Management Plan will incorporate measure to control the introduction and spread of weed and pest species across the Pipeline corridor.
Conclusion	The pipeline development will not result in a significant impact on the Bathurst Copper Butterfly.

7.2 Environmental Planning and Assessment Act 1979

7.2.1 State Environmental Planning Policy (Koala Habitat Protection) 2019

Although SEPP (Koala Habitat Protection) 2019 does not apply to the development (Section 2.2.2), feed tree species from the relevant koala management area have been used to inform the delineation of Koala habitat for the mine and pipeline developments. The 39 listed feed tree species for the central and southern tablelands Koala management area (KMA) were also considered when completing Koala habitat mapping for the mine and pipeline developments. Of these 39 species, *A review of Koala tree use across NSW* (OEH 2018) states that there is evidence of widespread use of Brittle Gum, Manna Gum, Broad-leaved Peppermint, Red Stringybark, Inland Scribbly Gum and Snow Gum.

Table 7.21 provides the list of feed tree species relevant to the KMA and determines which species are present in the mine and pipeline developments and their associated PCTs. It also identifies presence of the widely used species, which in combination with vegetated corridors, have been used for the purposes of defining 'important koala habitat' for the Koala species polygons in accordance with the BAM.

Table 7.21 Koala feed tree species for the central and southern tablelands KMA

Scientific name	Common name(s)	Present in mine and/or pipeline development footprint?	Associated vegetation zones where the species is dominant/co-dominant
Eucalyptus agglomerata	Blue-leaved Stringybark	Absent	-
Eucalyptus albens	White Box	Absent	-
Eucalyptus amplifolia	Cabbage Gum	Absent	-
Eucalyptus blakelyi	Blakely's Red Gum	Mine development Pipeline development	1330_High, 1330_Moderate, 1330_Poor, 1330_Other 277_Intact, 277_Moderate
Eucalyptus bosistoana	Coast Grey Box	Absent	-
Eucalyptus bridgesiana	Apple Box	Mine development Pipeline development	1330_High, 1330_Moderate, 1330_Poor, 1330_Other 727_High, 727_Moderate, 727_Intact ,1330_Intact, 727_Intact, 277_Intact, 1093_Fragments, 1093_Intact
Eucalyptus camaldulensis	River Red Gum	Absent	-
Eucalyptus conica	Fuzzy Box	Absent	-
Eucalyptus cypellocarpa	Monkey Gum	Absent	-
*Eucalyptus dalrympleana^*	Mountain Gum	Pipeline development	1197_Intact
Eucalyptus dealbata	Tumbledown Red Gum	Absent	-

Table 7.21 Koala feed tree species for the central and southern tablelands KMA

Scientific name	Common name(s)	Present in mine and/or pipeline development footprint?	Associated vegetation zones where the species is dominant/co-dominant
*Eucalyptus dives^*	Broad-leaved Peppermint	Mine development Pipeline development	727_High, 727_Medium 727_Intact, 727_Moderate, 1093_Fragments, 1093_Intact
Eucalyptus elata	River Peppermint	Absent	-
Eucalyptus eugenioides	Narrow-leaved Stringybark	Absent	-
Eucalyptus fibrosa	Broad-leaved Red Ironbark	Absent	-
Eucalyptus globoidea	White Stringybark	Absent	-
Eucalyptus goniocalyx	Bundy	Mine development Pipeline development	727_High, 727_Moderate 727_Intact, 277_Intact, 277_Moderate, 1093_Intact
*Eucalyptus macrorhyncha^*	Red Stringybark	Pipeline development	727_Intact, 1093_Intact, 1093_Fragments, 277_Intact
Eucalyptus maidenii	Maiden's Blue Gum	Absent	-
*Eucalyptus mannifera^*	Brittle Gum	Pipeline development	727_Intact, 1093_Fragment, 1093_Intact
Eucalyptus melliodora	Yellow Box	Mine development Pipeline development	1330_High, 1330_Moderate, 1330_Poor, 1330_Other 727_High, 727_Moderate 1330_Intact, 277_Intact, 277_Moderate
Eucalyptus microcarpa	Western Grey Box	Absent	-
Eucalyptus nortonii	Large-flowered Bundy	Absent	-
Eucalyptus obliqua	Messmate	Absent	-
Eucalyptus oblonga	Stringybark	Absent	-
Eucalyptus paniculata	Grey Ironbark	Absent	-
*Eucalyptus pauciflora^*	White Sally, Snow Gum	Pipeline development	1191_Intact, 1197_Intact
Eucalyptus piperita	Sydney Peppermint	Absent	-
Eucalyptus polyanthemos	Red Box	Absent	-

Table 7.21 Koala feed tree species for the central and southern tablelands KMA

Scientific name	Common name(s)	Present in mine and/or pipeline development footprint?	Associated vegetation zones where the species is dominant/co-dominant
Eucalyptus punctata	Grey Gum	Absent	-
Eucalyptus quadrangulata	White-topped Box	Absent	-
Eucalyptus radiata	Narrow leaved Peppermint	Absent	-
*Eucalyptus rossii^*	Inland Scribbly Gum	Pipeline development	1191_Intact, 1197_Intact
Eucalyptus rubida	Candlebark		
Eucalyptus sclerophylla	Hard-leaved Scribbly Gum	Absent	-
Eucalyptus sideroxylon	Mugga Ironbark	Absent	-
Eucalyptus sieberi	Silvertop Ash	Absent	-
Eucalyptus tereticornis	Forest Red Gum	Absent	-
Eucalyptus viminalis	Ribbon Gum	Mine development Pipeline development	951_poor 1191_Fragments

7.3 Biosecurity Act 2015

7.3.1 Mine development

One priority weed of the central tablelands was recorded in the mine 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.

7.3.2 Pipeline development

The following priority weeds were recorded in the pipeline development:

- Spear Thistle (*Cirsium vulgare*);
- Cotoneaster (*Cotoneaster spp.*);
- Paterson's Curse (*Echium plantagineum*);

- Blue Heliotrope (*Heliotropum amplexicaule*);
- Blackberry;
- Serrated Tussock (*Nassella trichotoma*);
- Scotch Broom (*Cytisus scoparius*); and
- African Boxthorn (*Lycium ferrocissimum*).

All plants have a general biosecurity duty, as described above in Section 7.3.1. Serrated Tussock, Scotch Broom and African Boxthorn have an additional regional recommended measure that land managers should mitigate the risk of new weeks being introduced to or spreading from their land. The plants should not be bought, sold, grown, carried or released into the environment. The biodiversity management plan for the project would directly address the control of these priority weeds.

8 Groundwater dependent ecosystem assessment

8.1 Background

An assessment was completed in the EIS, 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 numerical groundwater model development for the EIS (Appendix K of the EIS) has been updated to assess the potential impacts of the amended project. The results are provided in full in the McPhillamys Gold Project Groundwater Assessment Addendum, which forms Appendix H of the Amendment Report. This chapter provides an updated assessment of potential impacts on groundwater dependent ecosystems using the updated numerical groundwater model.

An assessment of groundwater dependent ecosystems is not provided for the pipeline development as trenching is not expected to intercept or influence groundwater access or quality. The pipeline development is therefore not considered further in this section of the report.

8.2 Method

8.2.1 Study area

The study area for the groundwater dependent ecosystem (GDE) assessment comprises the merged boundary of the mine development project area and the predicted 1 m drawdown extent (100 years after mine end), shown on Plate 4.1. This chapter assesses potential impacts of groundwater losses and gains on terrestrial GDEs, comprising terrestrial native vegetation and groundwater-dependent wetlands and/or estuarine/near shore ecosystems.

8.2.2 Spatial data review

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.

8.2.3 Groundwater model

EMM developed a numerical groundwater model to assess the potential change to the groundwater flow system because of the project. A detailed explanation of the model development and calibration is provided in the Groundwater Assessment report (Appendix K of the EIS), with detailed explanation of predictions for the amended project provided in the Groundwater Assessment Addendum report (Appendix H of the Amendment Report). The groundwater model includes simulation of the open cut mine development and a highly conservative simulation of tailings placement. It should be noted at the purpose of the groundwater model is not to estimate the potential seepage from the TSF under design operation nor the effectiveness of the TSF seepage management system, as this has been conducted by ATC Williams (2019 and 2020).

8.2.4 Groundwater interaction assessment

Predicted depth to groundwater was derived from the groundwater model for the project area (refer to Appendix H of the Amendment Report) 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 GDEs', requiring further investigation to understand their level of groundwater dependence (or otherwise). Ecosystems identified with potential for reliance on groundwater are identified in Section 8.2.5.

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, if 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 8.1.

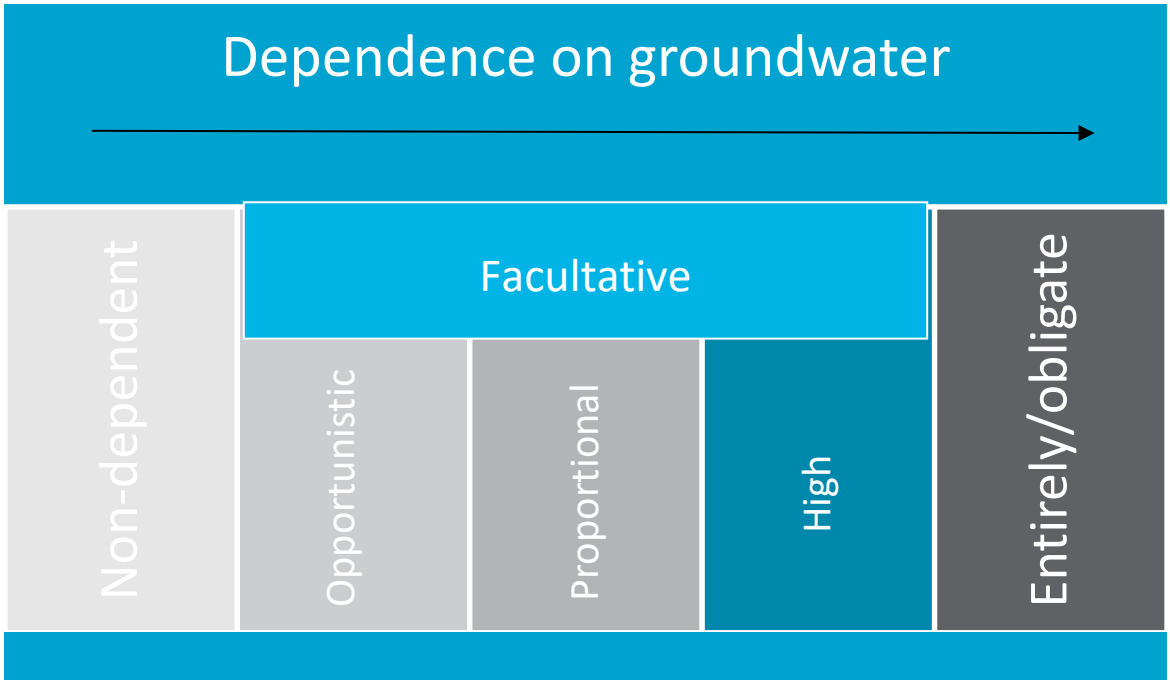


Plate 8.1 GDE categories

8.2.5 GDE identification

The proportion of each PCT with shallow groundwater access vs the proportion with no access was assessed. The proportion was combined with the level of groundwater interaction to determine the level of groundwater dependence, in accordance with the criteria in Table 8.1.

Table 8.1 Groundwater dependence categories

Dependence and risk	Proportion of PCT accessing groundwater		
	0-25% of PCT has access to shallow groundwater	**25-75% of PCT has access to shallow groundwater**	**75-100% of PCT has access to shallow groundwater**
Groundwater dependence	Non-dependent	Facultative/opportunistic GDE	Obligate/entirely-dependent GDE
Risk of impact	Low	Moderate	High

The water sharing plan for the NSW Murray-Darling Basin Fractured Rock Groundwater Sources 2020 specifies 119 high priority GDEs within the Lachlan Fold Belt Murray-Darling Basin Groundwater Source. These include 65 high priority springs/wetlands and 54 karst environments.

8.2.6 Risk assessment

Ecosystems were classified in accordance with the risk matrix in Table 8.2**Error! Reference source not found.**, following Serov et al (2012).

Table 8.2 GDE risk assessment matrix

Category	Risk category		
	1 Low	**2 Moderate**	**3 High**
1 High ecological value	A	B	C
2 Moderate ecological value	D	E	F
3 Low ecological value	G	H	I

Table 8.3 defines the ecosystems that fall within each category in Table 8.2.

Table 8.3 Ecological value definitions

1 High ecological value	2 Moderate ecological value	3 Low ecological value
GDEs where only slight changes in groundwater quantity and quality would result in their loss (ie obligate GDEs)	GDEs where a moderate change in groundwater availability would change their distribution, composition or condition	A highly modified GDE
GDEs located in a state or federal reserve system (eg National Park)	GDEs that provide ecological services to other ecosystems including rivers, wetlands and estuaries	A GDE that would involve a large cost to rehabilitate, in a catchment containing other GDEs in moderate to good condition
GDEs in relatively unaltered and good condition	GDEs in moderate to good condition	-
GDEs that are habitat for critically endangered or endangered species and/or communities listed under the BC Act, FM Act and/or EPBC Act.	GDEs that are habitat for vulnerable species and/or communities listed under the BC Act, FM Act and/or EPBC Act.	-
-	GDEs that can respond to changes in water availability and/or quality	-
-	GDEs that only play a minor role in ecosystem functioning (ie at the end of a dry season or during extreme drought)	-

8.3 Results

The GDE Atlas (BOM 2013) does not show any terrestrial GDEs as occurring in the project area. No high priority GDEs are identified in the water sharing plan for NSW Murray-Darling Basin Fractured Rock Groundwater Sources 2020.

The groundwater dependence, ecological values and risks are assessed for each GDE in Table 8.4. PCT 766 is likely to be an obligate/entirely-dependent GDE; however, this PCT will be removed by the project and it not considered further.

Table 8.4 Ecological values of and risks to GDEs

PCT	Proportion accessing shallow groundwater	Groundwater dependence	Risk of impact	Ecological value	Risk category
727	0-25%	Non-dependent	Low	Moderate (contains vulnerable species habitats)	H
951	25-75%	Facultative/opportunistic GDE	Moderate	Moderate (contains vulnerable species habitats)	E
1330	25-75%	Facultative/opportunistic GDE	Moderate	High (contains CEEC)	B

Although terrestrial GDEs are not predicted to occur in the project area, parts of PCT 951 and 1330 overlie areas of predicted shallow groundwater from 0 to 20 mbgl, and would likely range from having a very high (ie 0-2 m) to very low (5 – 20 mbgl) interaction with groundwater (Figure 8.1). Opportunistic GDEs are mainly located north and south-west of the TSF, with smaller patches south and south-east of the TSF (Figure 8.1). All other PCTs are 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, except for times of prolonged drought. The locality was in extended drought but has experienced heavy rainfall in early 2020. Where soil moisture cannot fulfil the opportunistic GDE's water requirements they would be supplemented by groundwater.

PCT 727 is classified as non-dependent as 0-25% of its occurrence within the study area has access to groundwater (9%).

8.3.1 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 951 and 1330 , 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 Addendum, Appendix H of the Amendment Report). As mentioned above, simulation of the TSF is simulated in the groundwater model using a highly conservative approach (the simulation of the TSF in the groundwater model is more comparable to a lined water storage dam rather than a tailings dam). 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. Under this unlikely scenario, this predicted change in depth to groundwater 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 8.1 shows the predicted changes in the extent of groundwater accessibility between the existing and end of mine conditions for PCTs 951 and 1330, which are deemed to have a facultative and opportunistic dependence on groundwater.

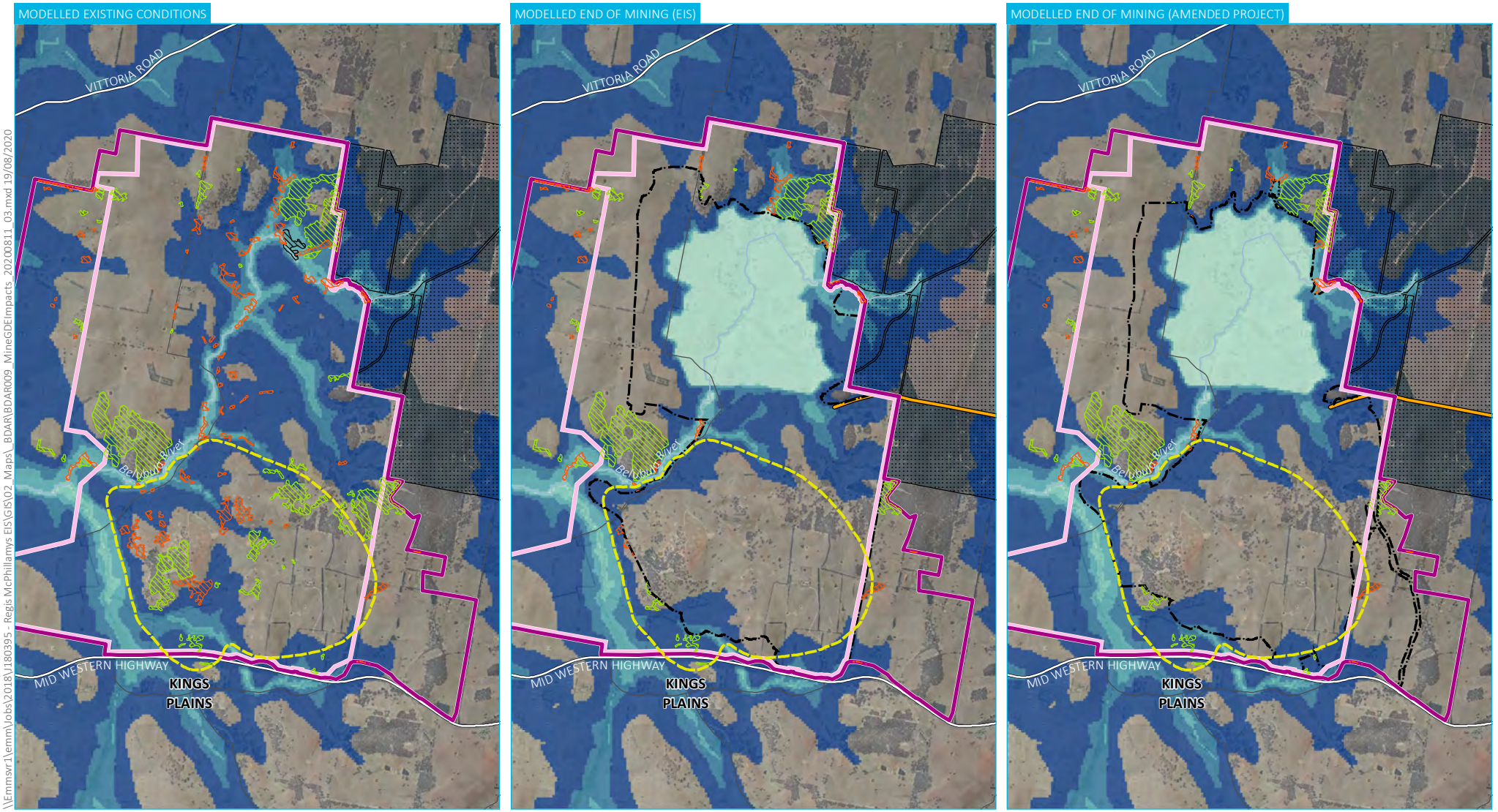
The project is predicted to result in no change to a minor increase in the extent of groundwater access for PCTs with a higher level of dependence on groundwater (ie moderate to very high groundwater interaction, or 0+ to 2 mbgl) by the end of mining and 100 years following mining (Table 8.5). This is likely to range from no impact on opportunistic GDEs in areas where no change is predicted, to a minor beneficial impact through a predicted increase to the extent of groundwater access during drought conditions under the highly conservative simulation of the TSF (eg an additional 0.69 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 (0.15 ha). Given this minor reduction in the extent of groundwater access and the very low interaction and dependence on groundwater (ie between 5 – 20 mbgl), water stress is not predicted to occur.

Accordingly, no negative groundwater access impacts are expected to occur for GDEs.

Table 8.5 Changes in access to shallow groundwater

Depth to groundwater (mbgl)	PCT 1330 (ha)				PCT 951 (ha)			
	Existing	End of mine	100 years	Change	Existing	End of mine	100 years	Change
0+ (very high interaction)	0.00	0.00	0.00	0.00	0.08	0.08	0.08	0.00
0 - 0.5 (high interaction)	0.22	0.22	0.22	0.00	2.42	2.42	2.42	0.01
0.5 - 2 (moderate interaction)	0.54	1.22	1.22	0.69	1.63	1.99	1.95	0.32
2 - 5 (low interaction)	2.65	2.73	2.94	0.29	0.90	0.66	1.14	0.24
5 - 20 (very low interaction)	20.25	20.56	22.07	1.83	2.82	2.70	2.66	-0.15



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KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Additional (post-closure) disturbance footprint
- Pipeline

- Predicted 1 m drawdown extent (100 years after mine end)

Depth to groundwater
- 0 m
- 0 - 0.5 m
- 0.5 - 2 m
- 2 - 5 m
- 5 - 20 m

Existing environment
- Major road
- Minor road
- Named watercourse
- Vittoria State Forest

Plant community types
- PCT 766 | Carex sedgeland of the slopes and tablelands
- PCT 951 | Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion
- PCT 1330 | Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

Potential impacts on groundwater availability for terrestrial vegetation

McPhillamys Gold Project
Biodiversity development assessment report
Figure 8.1

Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); ELVIS (2014)

0 1 2 km
GDA 1994 MGA Zone 55
N

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ii Groundwater quality

The Groundwater Assessment (Appendix K of the EIS) and Groundwater Assessment Addendum (Appendix H of the Amendment Report) identified the potential for groundwater quality changes because of:

- seepage from the TSF to the watertable and the Belubula River;
- seepage from stockpiles to the watertable;
- seepage from water storage ponds to the watertable; and
- introduction of varying water quality via the pipeline.

Potential impacts related to the last three hazard items have been assessed in the Groundwater Assessment (Appendix K of the EIS) and assessed to present minimal to no impacts on the water environment from a water quality perspective. The potential impacts of seepage from the TSF was also assessed in the Groundwater Assessment (Appendix K of the EIS), however as the TSF schedule has been adjusted for the amended project, this assessment has been revisited and is included in Groundwater Assessment Addendum (Appendix H of the Amendment Report).

a Multi-barrier approach to tailings seepage management

As reported in the EIS (Appendix K and ATC Williams 2020), 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 and contain all water during large rainfall events (no spill risk).

Regis has adopted several leading practices to produce a mine design that avoids and minimises impacts to water assets, which includes a multi-barrier approach as part of the design of the TSF. The multi-barrier approach is presented graphically on Plate 8.2.

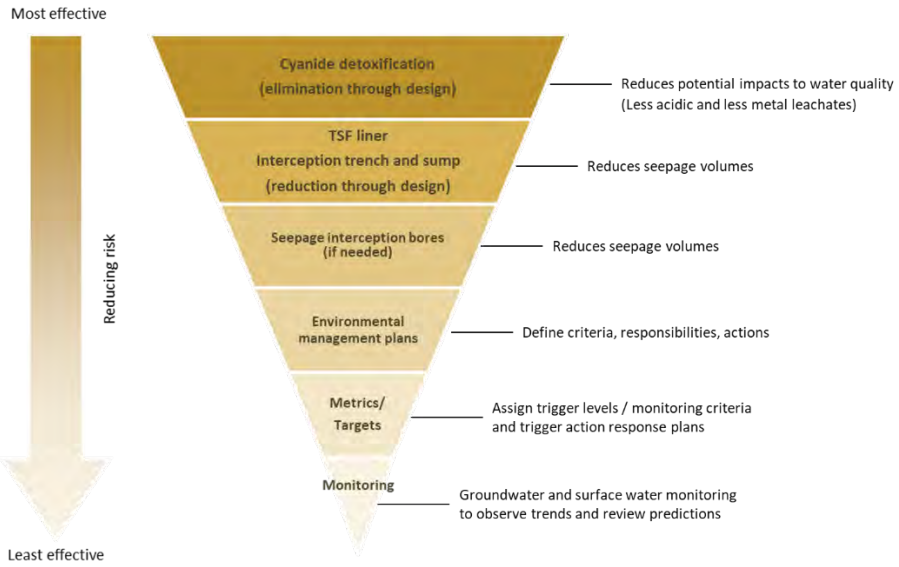

Plate 8.2 TSF multi-barrier approach

To reduce seepage volumes and rates, the TSF seepage management is proposed to comprise:

- The TSF floor will be lined using a combination of a low permeability clay liner and imported liner system. The clay liner will be constructed to a minimum 1 m thick within the existing drainage areas and a minimum 300 mm thick in areas with in-situ clay that have a permeability less than 10-9 m/sec.
- A low permeability core zone will be included as part of construction of the embankment and a deepened cut-off key extending to basement.
- A seepage interception trench located downstream of the cut-off key for the recovery of seepage and dewatering of the tailings mass.
- A downstream TSF runoff dam to intercept surface contact water from incident rainfall.
- Monitoring bores downstream to monitor groundwater quality and levels and, if required, the use of pump back bores.
- Construction of the TSF decant 770 m away from the main embankment.

b Potential TSF seepage

TSF design and assessment of the effectiveness of the TSF seepage management measures has been conducted by ATC Williams (2019 and 2020). As presented in the Groundwater Assessment (Appendix K of the EIS) and Groundwater Assessment Addendum (Appendix H of the Amendment Report), the purpose of the groundwater model is limited to assessing the potential impacts of the TSF on the groundwater flow system under an unlikely but deliberately conservative scenario (to assess potential seepage), and the purpose is not to provide an accurate estimate of TSF seepage rates. The groundwater model does not simulate the TSF embankment, cut-off key, tailings material or tailings deposition. The simulation of the TSF in the groundwater model is more comparable to a lined water storage dam rather than a tailings dam. The key difference between a lined water dam and TSF is that a TSF will consist of solid particles (eg ground and broken rock) and fluid, at a water content of around 20-30% and will therefore contain much less water than a water dam, which has 100% water content. The water held within the pore spaces between the tailings particles will drain slowly, driven by changing hydraulic pressures, the size of the tailings particles and pore space between the particles. The simulation of the TSF in the numerical groundwater model is therefore deliberately conservative.

The groundwater model predicts mounding of the watertable during and post -mining operations. The results of groundwater modelling (EIS base case and amended project) demonstrate that under a highly conservative scenario, with limited mitigation measures in place, seepage from the TSF is predicted to slowly migrate south-west and south of the TSF. Seepage from the TSF is predicted to remain within the saprock zone, flowing in a horizontal direction. Some of the seepage that migrates south from the TSF that is not intercepted by the seepage management system is predicted to seep towards the pit. Some seepage is predicted to move towards the Belubula River at a rate of approximately 50 m in 100 years.

The work completed by ATC Williams (2020) shows that during operations, seepage from the TSF is predicted to be very low at around 22 kL/day (peak; 3 mm/year/m^2), with approximately 90% captured by the interception drain. Following closure, seepage from the TSF will continue due to the low permeability liner, the nature of the geology and the tailings and is predicted to reduce to 11-15 kL/day (1.4-2.1 mm/year/m^2). This volume is very small in comparison to the Belubula River streamflow (at the gauging station downstream of the confluence with Trib A), which is estimated to have flows around 10,000 times the predicted seepage rate (during average climate conditions).

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 SO_4, Se, CN-Total, CN-WAD, Co, EC and Al within the saturated saprock, based on the predicted peak seepage rate (refer Section 6.2.1 in the Groundwater Assessment Addendum report, Appendix H of the Amendment Report).

The changed water quality (in particular: aluminium, electrical conductivity, sulphate, selenium, cyanide, cobalt) are estimated have concentrations that are:

- below or within the range of water quality concentrations currently measured in groundwater, and the Belubula River and its tributaries;
- below ANZECC (2000) livestock drinking water guideline values (with the exception of cobalt); and
- below ANZECC (2000) 95% protection level for freshwater aquatic ecosystem guideline values.

Table 8.6 Concentrations in groundwater following mixing with TSF seepage

Parameter	Calculated concentration following mixing		Current groundwater concentration range [1]	Current surface water concentration range [2]
	EIS base case	Amended project scenario		
Aluminium (mg/L)	0.03	0.02	<0.01-140	0.01-1.2
Electrical conductivity, EC (µS/cm)	931	843	499-4,817	377-1,040
Total Cyanide (mg/L)	0.057	0.039	<0.004	<0.004
Weak Acid Dissociable Cyanide (mg/L)	0.04	0.024	<0.004	<0.004
Cobalt (mg/L)	9.4	6.3	<0.001-0.31	<0.004
Selenium (mg/L)	0.006	0.004	<0.001-0.01	0.001-0.01
Sulphate (mg/L)	213	157	7-3,000	1-190

Notes:

1. Water quality measured from samples collected from bores monitoring groundwater in the Anson Formation.
2. Water quality measured from samples collected from WED4061A (27 samples), which is a Belubula River monitoring location in the TSF area.

The opportunistic groundwater users (PCT 1330 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 potential seepage predicted 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 8.1). Although to a lesser extent, the groundwater model conservatively predicts 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.

As outlined in the Groundwater Assessment Addendum (Appendix H of the Amendment Report), the groundwater model will be upgraded over time and with additional baseline data and data from active mining. In order to further assess potential impacts of the TSF from a hydrogeochemical perspective as part of future improvements, Regis will consider revision of the how the tailings placement is simulated to refine seepage estimates and include a geochemical assessment to refine estimates of leachate concentrations.

8.4 Required mitigation

As negative impacts on groundwater access are not predicted, mitigation is not required. Impacts on water quality will be managed in accordance with the TSF seepage management system (Section 8.3.1ii).

9 Conclusion

This BDAR has been prepared in accordance with the BAM, biodiversity-related SEARs issued by DPIE and the associated agency-specific assessment requirements. A separate assessment has been completed in accordance with the FBA for the purposes of assessment by the Department of Agriculture, Water and Environment.

Regis has carried out annual biodiversity surveys within the mine project area since acquiring Exploration Licence 5760 in 2012 and biodiversity surveys between 2018 and 2020 in the pipeline corridor. These surveys have been carried out in parallel with, and have informed the evolution of, the mine and pipeline design. This process has ensured the avoidance and minimisation of biodiversity constraints as far as practicable.

The mine development requires 2,541 ecosystem credits to compensate for impacts on native PCTs and ecosystem credit species. In addition to ecosystem credits, the project also requires 2,431 species credits for the Koala and 2,651 species credits for the Squirrel Glider. The pipeline development requires a total of 363 ecosystem credits (southern option) or 331 ecosystem credits (northern option) to compensate for impacts on native PCTs and ecosystem credit species. In addition to ecosystem credits, the project also requires 833 species credits to offset the residual impacts of the pipeline development (northern option) and 968 to offset the pipeline development (southern option). Regis will compensate for these residual impacts through the implementation of a biodiversity offset strategy.

The BDAR has also considered impacts on species and ecological communities listed under the EPBC Act. The mine development is expected to result in significant impacts on Box Gum Woodland and the Koala, while the pipeline development is not. 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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Appendix A

Vegetation integrity assessment field datasheets

A.1 Mine development

entered into 5123 PLOT 1 PCT 727

-This document has not been endorsed or approved by Office of Environment and Heritage or Muddy Boots Environmental Training-

400 m² plot: Sheet 1 of 1	Survey Name	Plot Identifier	Recorders
Date 12/3/19	McPhillamys	727/MG/Poor 1	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 tenuius	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	Dactylis glomeratus	E	0.1	3		
F	Einadia nutans	N	<0.1	1		
F	Desmodium varians	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 : JA80395	Proposal Name:	Zone ID:
Veg Type: 722 MG - POOR		
Coordinates: Start Transect Easting/Northing : -33.48843, 149.31964		
Coordinates: End Transect Easting/Northing : -33.88335, 149.319 294		

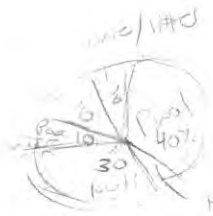
50 m Transect (every 5 m)	5	10	15	20	25	30	35	40	45	50	Avg (%)
Canopy Cover (% - see Specht)	40	15	20	0	10	60	40	15	5	55	0
Mid Storey Cover (shrubs > 1m)	—	—	—	—	—	—	—	—	—	—	0

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)	1			1	1		1	1	1	1				1	1	1	1			1	1					1		1				1	1	1			1														0
Exotic grasses																																																				0
Ground Cover (other)									1			1																								1								1		1		1				0
Exotic other																																																			0

Notes

Hollow-bearing trees - 1

Logs - 71



~~Ready to enter~~ Entered into 3123

Plot 2

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400 m² plot: Sheet 1 of 1	Survey Name	Plot Identifier	Recorders
Date 12/3/19	McPhillamys	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	Eucalyptus melliodora	N	40	2		
GG	Phalaris aquatica	E	40	40,000		
GG	Rytidosperma tenuius	N	30	30,000		
GG	Bromus sp. (dead)	E	<0.1	50		
FG	Einadia nutans	N	0.3	200		
GG	Bothriochloa macra	N	0.1	7		
FG	Desmodium varians	N	0.3	800		
FG	Chondrilla juncea	E	0.1	7		
GG	Carex sp. -(seed decomposed)	N	0.5	100		
GG	Poa sieberiana var. sieberiana	N	5	5,000		
FG	Cirsium vulgare	E	0.1	19		
FG	Oxalis perenens	N	<0.1	3		
GG	Anthosachne scaber	N	5	10,000		
FG	Hypochaeris radicata	E	0.1	9		
FG	Convolvulus angustissimus	N	<0.1	2		
GG	Dactylis glomeratus	E	<0.1	2		
FG	Modiola caroliniana	E	<0.1	2		
FG	Lactuca serriola	E	<0.1	1		
FG	Rumex sp -no seedhead	E	<0.1	1		
SG	Rosa rubiginosa	HTE	<0.1	1		
GG	Microlaena stipoides	N	<0.1	40		
FG	Dichondra species A	N	<0.1	5		
GG	Themeda triandra	N	<0.1	5		
GG	Cynosurus echinatus	E	<0.1	9		
GG	Juncus usitatus	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: J180395	Proposal Name:	Zone ID:
Veg Type: 654 MB 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 Specht)	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)																																																			0
Exotic shrubs (<1m)																																																				0
Ground Cover (grasses)				1	1			1					1	1			1			1	1	1	1		1					1	1	1	1		1				1	1		1	1			1			1	0
Exotic grasses	1	1	1	1	1							1		1	1	1		1	1	1								1														1			1	1			1	1		
Ground Cover (other)							1											1					1					1														1									0
Exotic other																																																			0

Notes

Hollow-bearing trees: 0
Logs: 39

Ready to enter
Entered into S123 PLOT 3 PCT 727

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400 m² plot: Sheet 1 of 1	Survey Name	Plot Identifier	Recorders
Date 12-03-2019	McPHILLAMYS	727-MEG-HIGH 3	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
T	EUCALYPTUS DIVES	N	30	20		
G	RYTIDOSPERMA PALLIDUM	N	20	150		
F	HIBBERTIA OBTUSIFOLIA	N	.2	5		
G	POA SIEBERIANA	N	5	50		
F	OXALIS PERRENANS	N	.1	1		
G	RYTIDOSPERMA TENUIUS	N	.3	50		
G	VULPIA BROMOIDES	E	.1	10		
T	EUCALYPTUS GONIOCALYX	N	25	10		
T	EUCALYPTUS MANNIFERA	N	.3	1		

	NATIVE RICHNESS	NATIVE COVER
TG	3	55.3
FG	2	0.3
GG	3	25.3

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 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, 149.34549		

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)																																																				0
Exotic shrubs (<1m)																																																				
Ground Cover (grasses)				1	1		1								1			1	1		1							1	1		1		1	1		1	1	1		1	1		1			1		1			0
Exotic grasses																																																			
Ground Cover (other)																																																			0
Exotic other																																																			0

Notes

Hollow-bearing trees – 1

Logs – 58

~~READ TO ENTER~~
ENTERED INTO S123

PCT 727-MG-ROR

-This document has not been endorsed or approved by Office of Environment and Heritage or Muddy Boots Environmental Training-

400 m² plot: Sheet 1 of 1	Survey Name	Plot Identifier	Recorders
Date: 13-03-2019	J180315	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 MELLIODORA	N	70	7		
TG	EUCALYPTUS BRIDGESIANA	N	5	1		
FG	CIRSIUM VULGARE	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	RYTIDOSPERMA TENUIUS	N	.1	10		
GG	ELEUSINE TRISTACHYA	E	.1	5		
GG	DACTYLIS GLOMERATUS	E	.2	20		
FG	POLYGONUM PLEBEIUM	N	.1	2		
FG	SINADIA NUTANS	N	.1	2		
FG	SOLANUM NIGRUM	E	.1	1		
	NATIVE RICHNESS	NATIVE COVER				
	TG - 2	- 75				
	FG - 2.2	- 0.2				
	GG - 1.1	- 0.1				
	HTE RICHNESS	NATIVE 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, ...

)4 4 13/3/19

Biobanking Plot Sheet - Transect

Proposal ID : 1190595	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)																																																				
Ground Cover (grasses)																																																			0
Exotic grasses				1																																														
Ground Cover (other)																																																			0
Exotic other																																																			0

Notes

Mostly background flora
Hollow bearing trees: 0
Logs: 1m

READY TO ENTER
ENTERED INTO SURVEY 123

-This document has not been endorsed or approved by Office of Environment and Heritage or Muddy Boots Environmental Training-

400 m² 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	CIRSIUM 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 SERRIOLA	E	.1	2		
FG	TARAXICUM OFFICINALE	E	.1	2		
GG	POACEAE INDETERMINATE	-	40	5000		
GG	JUNCUS USITATUS	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)																																																			
Ground Cover (grasses)																																																			0
Exotic grasses																																																			
Ground Cover (other)																																																			0
Exotic other																																																			0

Notes

READY TO ENTER.
ENTERED INTO S123 PCT 654

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400 m² plot: Sheet 1 of 1	Survey Name	Plot Identifier	Recorders
Date 13/03/19	J180315	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	.1	200		
GG	ANTHOSACHNE SCABER	N	.1	1000		
GG	MICROLAENA STIPOIDES	N	.8	1600		
GG	VULPIA SP	E	.2	1600		
GG	JUNCUS SP	N	.1	1		
GG	CAREX SP	N	.1	30		
FG	CHONDRILLA JUNCEA	E	.1	4		
GG	LOMANDRA FILIFORMIS	N	.1	2		
GG	PHALARIS AQUATICA	E	.1	3		
FG	POLYGONUM PLEBEIUM	N	.1	2		
GG	BROMUS CATHARTICUS	E	.1	400		
	NATIVE RICHNESS SUM NATIVE COVER					
	TG = 2 26					
	GG = 4 1.1					
	FG = 1 .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, 9, ..., 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 : VI80595	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)												1																																							0
Exotic grasses								1																																							1					
Ground Cover (other)																																																			0
Exotic other																																																			0

Notes

mostly litter & bare ground.
Hollows – 1
Logs – 42

READY TO ENTER ENTERED INTO SIS
PCT GSW

-This document has not been endorsed or approved by Office of Environment and Heritage or Muddy Boots Environmental Training-

400 m² 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 MELIODORA	N	22	1		
GG	RYTIDOSPERMA TENUIUS	N	8	2000		
FG	HYPOCHAERIS RADICATA	E	8	3000		
GG	MICROLAENA STIPOIDES	N	4	2000		
GG	EUCHITON SPHAERICUS	N	.1	10		
GG	ELEUSINE TRISTACHYA	E	.1	1		
GG	PHALARIS AQUATICA	E	1	60		
FG	RUBUS FRUTICOSA AGGREGATE	HTE	.1	1		

NATIVE RICHNESS	SUM OF NATIVE COVER
TG - 1	22
GG - 3	13
FG - 0	0

HTE RICHNESS	SUM OF HTE COVER
FG - 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

SGW + RP

PLOT 7

Biobanking Plot Sheet - Transect

Proposal ID: 1180395	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 Specht)	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)	1						1	1	1					1	1	1		1		1	1	1	1			1		1	1				1								1			1				1			1	0
Exotic grasses																																																				
Ground Cover (other)																																																			0
Exotic other																																																	1			0

Notes

MOSTLY BARE GROUND + LITTER.

Hollow Bearing trees — 0

Logs — 4

PLOT 8 PCT 654

Ready to entered into 5123

-This document has not been endorsed or approved by Office of Environment and Heritage or Muddy Boots Environmental Training-

400 m² plot: Sheet 1 of 1	Survey Name	Plot Identifier	Recorders
Date 14/3/17	McPhillamys	8	RP & SGL

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 melliodora	N	45	7		
G	Agrostis stolonifera	E	10	>10,000		
G	Microlaena stipoides	N	<0.1	15		
G	Holcus lanatus	E	2.5	43		
F	Desmodium varians ✓	N	0.1	9		
G	Rytidosperma tenuius	N	<0.1	10		
G	Lomandra filiformis	N	0.1	13		
F	Einadia nutans subsp. nutans	N	0.6	19		
G	Carex bichenoviana	N	0.3	50		
G	Poa sp -no seed head.	N	0.1	35		
G	Austrostipa sp.	N	<0.1	8		
S	Rubus fruticosus agg.	HTE	<0.1	4		
G	Rytidosperma racemosum	N	<0.1	3		
F	Dichondra repens	N	<0.1	1		
S	Acacia dealbata subsp. dealbata	N	<0.1	1		
F	Chondrilla juncea	E	<0.1	1		
	NATIVE RICHNESS NATIVE COVER					
	T = 1 = 45					
	F = 2 = 0.7					
	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, ...

SGW + 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 Specht)	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	%
Ground Cover (shrubs < 1m)																																																			0
Exotic shrubs (<1m)																																																				
Ground Cover (grasses)			1			1																						1																							1		0
Exotic grasses	1	1			1										1															1	1																	1	1			
Ground Cover (other)																					1				1																											0
Exotic other																																																			0

Notes

Hollow-bearing trees - 0

Logs - 0

~~Eucalyptus melliodora~~

READY TO ENTER
ENTERED INTO 3123

PLOT
PCT 727

-This document has not been endorsed or approved by Office of Environment and Heritage or Muddy Boots Environmental Training-

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 19/3/14	McPhillamys	9	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	Euca gomiocalyx	N	39	13		
T	Euca dives	N	18	6		
G	Vulpia sp	E	1	200		
G	Rytidosperma tenuius	N	6.3	1000		
G	Anthosachne scabra	N	<0.1	7		
G	Lolium perenne	E	<0.1	2		
G	Cynosurus echinatus	E	<0.1	1		
G	Lomandra filiformis (20=0.1)	N	0.4	127		
G	Poa sp - no seed head	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 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 9 1/3/19

Biobanking Plot Sheet - Transect

EMM
EMGA Mitchell McLennan

Proposal ID : J180395	**Proposal Name:**	**Zone ID:**
Veg Type: E. Goniocalyx & E. dives		
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)	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)																																																			
Ground Cover (grasses)																																																			0
Exotic grasses																																																			
Ground Cover (other)																																																			0
Exotic other																																																			0

Notes

No mid storey
Very little groundlayer.

Hollow bearing trees – 5
Logs – 191

READY TO ENTER

PLOT 10 ENTERED INTO S123 PCT 054

-This document has not been endorsed or approved by Office of Environment and Heritage or Muddy Boots Environmental Training-

400 m² plot: Sheet 1 of 1	Survey Name	Plot Identifier	Recorders
Date 14/3/19	McPhillamys	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	Eucalyptus bridgesiana	N	10	2		
G	Chloris gayana	HTE	15	6000		
G	Rytidosperma carphoides	N	5	2000		
G	Lolium perenne	E	0.2	500		
F	Einadia nutans	N	0.1	1		
F	Hypochaeris radicata	E	0.1	2		
G	Ehrharta erecta	E	0.1	20		
G	Anthosachne scabra	N	0.1	1		
F	Poa labillardieri var. labillardieri	N	0.1	4		
G	Austrostipa scabra	N	0.1	3		
G	Rytidosperma tenuius	N	5	1900		
G	Phalaris aquatica	E	0.1	20		
G	Juncus usitatus	E	0.1	3		
	NATIVE RICHNESS	NATIVE COVER%				
	T – 1	10	HTE	15	6000	
	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 : J190395	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	
Mid Storey Cover (shrubs > 1m)	–	–	–	–	–	–	–	–	–	–	0
											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)																																																			0
Ground Cover (grasses)																																																			
Exotic grasses	1		1	1	1	1	1						1	1	1																				1																0
Ground Cover (other)																																																			
Exotic other																																																			0
																																																		0

Notes

Hollow-bearing trees – 1

Logs – 53

PCT 727

PLOT 11

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V80395

400 m² plot: Sheet 1 of 1	Survey Name	Plot Identifier	Recorders
Date 15/3/19	McPhillamys	11	RP & SN

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 goniocalyx	N	10	1		
Go	Rytidosperma - tenuiusc	N	7	4000		
G	Anthosachne scaber	N	1	4000		
G	Microlaena stipoides	N	1.5	800		
F	Chandnla juncea	E	<0.1	1		
F	Oxalis perrans	EN	<0.1	1		
G	Lomandra filiformis	N	<0.1	4		
G	Vulpia 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 sp.+ - Same as Lomandra sp.		<0.1	10		
S	Rubus fruticosa aggregate	HTE	<0.1	1		
F	Erodium sp.	N	<0.1	3		
F	Polygonum plebeium	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

J190395 15/3/19

Biobanking Plot Sheet - Transect

Proposal ID :	Proposal Name:	Zone ID:
Veg Type: E. Goniocalyx & dives		
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	
Mid Storey Cover (shrubs > 1m)	—	—	—	—	—	—	—	—	—	—	0
											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)																																																			0
Ground Cover (grasses)	1							1		1		1					1			1				1		1	1	1	1																							
Exotic grasses																																								1				1			1	1	1	0
Ground Cover (other)																																																		
Exotic other																																																		0
																																																	0

Notes

Hollow-bearing trees — 9

Logs — 142

A.2 Pipeline development

400 m² plot: Sheet _ of _		Survey Name	Plot Identifier	Recorders
Date			277 DNG1	40 x 10

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
	1* Phalaris sp.		1	500		
	2* Hypochaeris radicata		5	2000		
	3 Plantago gaudichaudii		0.2	200		
	4 Minuartia stipoides		0.2	100		
	5* Trifolium sp		0.4	1000		
	6 Panicum effusum		0.1	50		
	7 Rhytidosperma sp.		10	4000		
	8 Austrostipa scabra		2	1000		
	9* Hypericum perforatum		0.1	2		
	10 Lomandra filiformis		0.1	50		
	11 Aspercula conferta		0.1	2		
	12 Acaena ovalbata		0.2	3		
	13* Pinus radiata		0.2	1		
	14 Chloris truncata		0.1	50		
	15* Soleirolia Soleirolii		0.1	1		
	16 Oxalis perennans		0.1	1		
	17 Bothriochloa macra		0.1	2		
	18* Lysimachia arvensis		0.1	1		
	19					
	20					
	21					
	22					
	23					
	24					
	25					
	26					
	27					
	28					
	29					
	30					
	31					
	32					
	33					
	34					
	35					
	36					
	37					
	38					
	39					
	40					

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, ...

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400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date		727 – Intact 1	

	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
1		Eucalyptus fastigata		45	30		
2		E. dalrympleana		1	1		
3		Acacia melanoxylon		0.7	4		
4		Veronica plebeia		0.1	8		
5		Poa sieberiana		8	600		
6		Microlaena stipoides		2	200		
7		Solenogyne ~~bellidioides~~ sp.		0.1	2		
8		Cyanthillium cinereum		4	2000		
9		Polyscias sambucifolia		0.1	5		
10		Pteridium esculentum		5	150		
11		Cyperus tenuiculmis		0.1	4		
12		Lomandra longifolia		2	30		
13		Viola betonicifolia		0.2	80		
14		Stellaria pungens		0.1	20		
15		Asplenia ?	vendetta?	0.2	40		
16		Senecio cunninghamii		0.1	4		
17		Hydrocotyle	lanceolate	0.2	30		
18		Clematis aristata		0.1	3		
19		Acacia dealbata		1	15		
20		Ceramium		0.1	4		
21		Viola sp.		0.1	20		
22		Glycine clandestina		0.1	2		
*		Rubus fruticosus		0.1	4		
24		Acaena sp.		0.1	1		
25		Dichondra repens		0.1	1		
26		Ozothamnus diosmifolius		0.1	1		
27		Austrostipa sp.	whorl	0.1	20		
*		Hypochaeris radicata		0.1	10		
29		Dichondra leptophylla		0.1	1		
30		Dichelachne sp.		0.1	30		
31		Coronidium ?	yellow	0.1	2		
32		Lagenifera		0.1	4		
33		Rhytidosperma sp.		0.1	50		
34		Stackhousia linarifolia		0.1	2		
35		Platylobium formosum		0.2	10		
36							
37							
38							
39							
40							

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, ...

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date	__/__/__	727 - Shrubland 1	

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
	1 Pteridium esculentum		2	150		
	2 Lomandra longifolia		5	250		
	3 Microlaena stipoides		40	10000		
	4 Angophora floribunda / costata			~~500~~		
	5 Poa sieberiana		5	1500		
	6 Selaginella bifrons		1	300		
	7 Hibbertia aspera / linearis		0.6	50		
	8 Rhytidosporea sp.		0.2	400		
	9 Hardenbergia violacea		0.1	2		
*	10 Hypochaeris radicata		0.3	250		
*	11 Hypericum perforatum		0.1	4		
	12 Cyperidium scariosoides		4	2000		
*	13 Anthoxanthum odoratum		0.1	50		
*	14 Acetosella vulgaris		0.6	150		
*	15 Rubus fruticosus		0.1	3		
	16 Daviesia latifolia		0.2	3		
	17 Cassinia sp. / Olearia ?		0.1	2		
	18 Acaena agnipila		0.1	2		
	19 Oxalis perennans		0.1	4		
	20 Cymbopogon refractus		0.1	3		
	21 Veronica calycina		0.1	20		
	22 * Pinus radiata		0.2	2		
	23 Acacia melanoxylon		2	5		
	24 Astrotricha hamiltonii ?		0.1	2		
	25 Eucalyptus sp.		0.1	10		
	26 Dianella revoluta		0.1	1		
	27 Eucalyptus delegatensis		3	4		
	28 Polyscias sambucifolia		0.1	1		
	29 Stackhousia viminea		0.1	8		
	30 Platylobium formosum		0.5	10		
	31 Geranium		0.1	20		
	32 Styphelia sp. viridus?		0.2	1		
	33 Lomandra 3-4mm		0.1	8		
	34 * Trifolium sp.		0.1	2		
	35 Epilobium ~~sp~~ hirtigerum		0.1	1		
	36 Brachyscome sp.		0.1	1		
	37 Dichopogon sp.		0.1	2		
	38 Monotoca scoparia		0.1	1		
	39 Luzula sp.		0.1	20		
	40 Dichondra repens		0.1	1		
	Cheilanthes austrotenuifolia		0.1	1		
	Austrostipa sp.		0.3	50		
	Centaurium sp.		0.1	2		

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, ...

400 m² plot: Sheet _ of _		Survey Name	Plot Identifier	Recorders
Date	__/__/__		1191 - Spare 1	5 x 80 m

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
	1 Eucalyptus parviflora		4	8		
	2 Acacia melanoxylon		1	15		4
	3 Poa sp		15	~~2800~~ 5000		
	4 Cassinia sifton		0.4	15		1
	5 Eucalyptus delegatensis		1	2		
	6 Rhytidosperma big		2	30		
	7 Pteridium esculentum		0.4	40		
	8 Hydrocotyle small		1	500		
	9 Veronica		0.1	20		
	10* Hypochaeris radicata		2	700		
	11 Poranthera microphylla		0.1	20		
	12 Coronidium scorpioides ?		0.6	200		
	13 Themeda australis		0.2	20		
	14 Hydrocotyle laxiflora		0.1	3		
	15* Rubus fruticosus		0.1	3		
	16* Anthoxanthum grass		0.1	20		
	17 Stylidium graminifolium		0.1	6		
	18* Conyza sp		0.1	1		
	19* Pinus radiata		0.2	20		
	20 Daviesia thin phyll		6.4	30		
	21 Hibbertia . obtusifolia		0.1	2		
	22 Lissanthe sapida		0.1	1		
	23 Viola betonicifolia		0.1	5		
	24 Cheilanthes austrotenuifolia		0.1	1		
	25 Gonocarpus tetragynus		0.1	2		
	26 Microlaena stipoides		4	3000		
	27 Wahlenbergia sp.		0.1	1		
	28 Dianella sp. (tasmanica?)		0.1	1		
	29 Eragrostis brownii		0.1	2		
	30					
	31					
	32					
	33					
	34					
	35					
	36					
	37					
	38					
	39					
	40					

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

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400 m² plot: Sheet _ of _		Survey Name	Plot Identifier	Recorders
Date		1197 DNG	1	5×80

	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
1		Poa labillardieri?		15	1500		
2		Cassinia aftoni		5	200		
3		Acacia melanoxylon		0.7	12		
4		Pinus radiata		1	4		
5		Senecio gunnii		0.2	20		
6	*	Plantago lanceolata		0.7	300		
7		Rytidosperma sp.		5	4200		
8	*	Rubus fruticosus		0.5	3		
9		Microlaena stipoides		1	1000		
10		Oxalis perrenans		0.2	80		
11		Geranium rosette		0.1	2		
12	*	Cirsium vulgare		0.2	20		
13	*	Conyza aspera		0.1	10		
14		Hardenbergia violacea		0.2	4		
15		Lomandra ~~sp~~ 3-4m		0.8	100		
16	*	Hypochoeris radicata		2	800		
17	*	Lysimachia arvensis		0.4	200		
18		Lomandra longifolia		0.1	2		
19		Xerochrysum broad hairy		0.2	6		
20		Dichondra		0.2	8		
21		Veronica plebeia		0.2	20		
22		H. hederifolia obtusifolia?		0.1	2		
23		Senecio quadridentatus		0.2	30		
24	*	Phalaris sp.		0.2	50		
25		Lythrum hyssopifolia		0.1	1		
26		Euchiton sp!		0.1	6		
27	*	Hypericum perforatum		0.1	10		
28	*	Acetosella vulgaris		0.2	40		
29	*	Conyza sp.		0.1	3		
30		Solanum nigrum?		0.1	4		
31	*	Solanum nigrum		0.1	10		
32	*	Trifolium sp.		0.1	50		
33							
34							
35							
36							
37		~~Scattered~~					
38							
39		Scattered surface rock					
40							

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, ...

Ivanhoe 2

00 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date	1197 – Shrub 1		

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
	1 Acacia dealbata			10	~~70~~		
	2 A. melanoxylon			1	5		
*	3 Rubus fruticosus			25	400		
	4 Poa labillardieri	huge tussocks		10	300		
	5 Dillwynia	retorta?		0.1	1		
	6 Rhytidosperma sp.			5	~~3000~~	3000	
	7 Austrostipa	aristiglumis?		4	~~300~~	200	
	8 Microlaena stipoides			0.6	200		
	9 Oxalis perennans			0.2	100		
*	10 Lysimachia arvensis			0.3	80		
	11 Senecio sp.	purple		0.1	10		
	12 Geranium			0.1	4		
	13 Hydrocotyle	laxiflora		0.1	2		
*	14 Acetosella vulgaris			0.1	30		
*	15 Pinus radiata			2	2		
	16 Lomandra	flat, 3–4mm		0.1	1		
*	17 Solanum nigrum			0.2	40		
*	18 Cirsium vulgare			0.4	30		
*	19 Plantago lanceolata			4	2000		
	20 Senecio quadridentatus			0.1	4		
	21 Eucalyptus pauciflora			0.7	1		
*	22 Sonchus asper			0.2	20		
*	23 Senecio sp.			0.1	7		
*	24 ~~Plantago lanceolata~~						
	25 Tritolium sp.			0.2	300		
	26 Hypochaeris radicata			3	2000		
	27						
	28						
	29						
	30						
	31						
	32						
	33						
	34						
	35						
	36						
	37						
	38						
	39						
	40						

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, ...

Site ID:	1197-Sparse 1	Survey type: Quadrat 20m x 20m 40 x 10

Species	Cover	Abund.	Species	Cover	Abund.
1 E. dalrympleana	6	4	41		
2 E. dives	6	7	42		
3 E. melliodora	2	1	43		
4 Cassinia sifton	1	20	44		
5 Poa labillardieri ?	15	500	45		
6 * Hypochaeris radicata	1	300	46		
7 Senecio gunnii	0.1	2	47		
8 Lepidium sp.	0.1	1	48		
9 Daucus glochidiatus	0.1	1	49		
10 Rhytidosporme sp.	2	1000	50		
11 ** Phalaris sp.	0.1	20	51		
12 Centaurium cynubosum	0.1	2	52		
13 Xerochrysum sp.	0.4	30	53		
14 Lomandra sum	0.2	40	54		
15 Microlaena stipoides	8	30000	55		
16 Viola betonicifolia	0.1	2	56		
17 Lomandra longifolia	0.1	1	57		
18 x Rubus fruticosus	0.2	4	58		
19 Coronidium	0.1	1	59		
20 Gonocarpus tetragynus	0.1	3	60		
21 Austrostipa scabra	0.2	50	61		
22 Rhytidosperma laeve	1	30	62		
23 Hovea sp.	0.1	1	63		
24 Daviesia corymbosa	0.1	1	64		
25 Eucalyptus sp.	0.1	1	65		
26 Poa sieberiana	2	2000	66		
27			67		
28			68		
29			69		
30			70		
31			71		
32			72		
33			73		
34			74		
35			75		
36			76		
37			77		
38			78		
39			79		
40			80		

Sp. Richness	Native	Exotic
Tree		
Shrub		
Grass (annual)		
Grass (perennial)		
Other (annual)		
Other (perennial)		

Ground layer % 1x1 plots	Q1	Q2	Q3	Q4	Q5
Native perennial grass					
Native other grass					
Native forb & other					
Native shrub (<1m)					
Exotic grass					
Exotic forb & other					
Leaf & stick litter					
Rocks					
Bare ground					
Cryptogams					
Total	100	100	100	100	100

Cover abundance scale
Modified Braun-blanquet 6 scale

1	<5% - rare
2	<5% - common
3	5 - 25%
4	25 - 50%
5	50 - 75%
6	75 - 100%

Plot Disturbance	
Clearing (inc. logging):	Fire damage:
Cultivation (inc. pasture):	Storm damage:
Soil erosion:	Trampling:
Firewood collection:	Flood damage:
Stock grazing:	Feral herbivores:
	Other:

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400 m² plot: Sheet _ of _		Survey Name	Plot Identifier	Recorders
Date		1330 — fragments 1		46 x 10

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
	1 Eucalyptus blakelyi		15	8		
*	2 Paspalum dilatatum		4	250		
*	3 Phalaris sp. aquatica		26	3000		
	4 Digitaria brownii		0.4	80	4h	
	5 Austrostipa scabra		0.2	30		
	6 Calotis lappulacea yellow burr		0.1	#2		
*	7 Trifolium/Medicago sp.		0.2	7000		
*	8 Trifolium arvense		0.2	2000		
*	9 Verbena bonariensis		0.1	1		
	10 Lomandra longifolia		2	30		
	11 Hydrocotyle peltata		0.3	200		
*	12 Cynodon sp. transvaalensis		2	400		
*	13 Eragrostis curvula		0.3	20		
*	14 Brassica sp.		0.2	20		
*	15 Setaria ~~parviflora~~ gracilis		0.1	30		
*	16 Lepidium sp.		0.1	6		
*	17 Plantago lanceolata		0.2	30		
*	18 Vicia arvensis		0.1	5		
	19 Eragrostis leptostachya		0.1	20		
*	20 Chloris virgata		4	8000		
	21 carex appressa		0.7	20		
	22 Cynodon dactylon		0.2	3		
	23 Sporobolus creber		0.1	10		
*	24 Bromus catharticus		0.1	7		
	25 Panicum effusum		0.1	3		
	26 Cynodon ld. hybrid		0.1	4		
	27 Bothriochloa macra		0.2	50		
	28 Rhytidosperma sp.		0.1	40		
*	29 Taraxacum officinale		0.1	1		
	30 Microlaena stipoides		0.2	80		
	31 ~~Cynodon dactylon~~					
*	32 Cyperus eragrostis		0.1	1		
	33 Oxalis perennans		0.1	3		
	34 Chloris ~~ventricosa~~ truncata		0.2	70		
*	35 Echium vulgare		0.2	20		
*	36 Modiola caroliniana		0.1	3		
	37 Euphorbia drummondii		0.1	4		
	38 Crassula sieberiana		0.2	6000		
*	39 Rhodes ciliatum		0.1	100		
*	40 Acetosella vulgaris		0.1	3		

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, ...

* Cynodon sp. Carex gunnii

c	0.1	3
	0.1	8

400 m² plot: Sheet _ of _		Survey Name	Plot Identifier	Recorders
Date	__/__/__	1330 Shrub	1	

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
	1 Acacia decalbata		8	20		
	2 Bothriochloa macra		4	300		
	3 Digitaria brownii		6	600		
	* Eragrostis curvula		3	100		
	* Hyparrhenia rudicata		6	2000		
	* Echium plantagineum		3	1000		
	* Rubus fruticosus		0.6	2		
	8 Austrostipa scabra		0.7	250		
	9 Rhytidosperma sp.		0.4	150		
	* Paspalum dilatatum		5	600		
	* Acetosella vulgaris		0.8	300		
	12 Cynodon dactylon		0.2	20		
	13 Cassinia sifton		2	20		
	14 Brachyloma daphnoides		0.1	1		
	15 Aristida ramosa		0.6	250		
	* Plantago lanceolata		2	700		
	17 Panicum effusum		0.1	6		
	18 Eragrostis leptostachya		0.4	100		
	19 Chloris ~~truncata~~ ventricosa		0.1	8		
	20 Rumex brownii		0.1	2		
	* Sonchus asper		0.1	4		
	22 Microlaena stipoides		0.3	60		
	23 ~~Aristida~~ sp.					
	* Potentilla sp.		0.1	4		
	25 D. pseudo		0.1	1		
	* Phalaris sp.		20	5000		
	27 Oxalis perennans		0.1	20		
	28 Acaena sp.		0.1	2		
	29 Senecio quadridentatus		0.2	8		
	30 Cirsium / polygonoides		0.2	2		
	* Brassica sp.		0.1	6		
	* Verbascum sp.		0.2	20		
	* Trifolium sp.		0.1	20		
	* Conyza sp.		0.1	8		
	35 Cheilanthes austrotenuifolia		0.1	1		
	* Stanum nigrum		0.1	1		
	* Setaria gracilis		0.2	30		
	38					
	39					
	40					

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, ...

-This document has not been endorsed or approved by Office of Environment and Heritage or Muddy Boots Environmental Training-

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date		1330 – spare 1	40 x 10

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
	1 E. melliodora		7	2		
	2 E. goniocalyx		1	4		
	3 Acacia implexa		1	1		
	4 Rhytidosperma sp.		4	2000		
	5 Bothriochloa macra		0.2	50		
*	6 Phalaris aquatica		0.2	100		
	7 Wahlenbergia sp.		0.3	200		
	8 Calotis lappulacea		0.1	20		
*	9 Trifolium arvense		0.2	2000		
*	10 Plantago lanceolata		0.1	10		
*	11 Paspalum dilatatum		0.2	50		
	12 Geranium retorta		0.1	2		
*	13 Foeniculum vulgare		0.1	1		
	14 Microlaena stipoides		0.1	20		
*	15 Lolium perenne		10	4000		
	16 Echium vulgare		4	500		
	17 Lomandra cylindrical		0.1	1		
	18 Chrysocephalum apiculatum		0.1	3		
	19 Austrostipa scabra		0.1	30		
*	20 Taraxacum officinale		0.1	10		
*	21 Brassica sp.		4	80		
*	22 Sonchus oleraceus		0.1	1		
	23 Einadia polygonoides		0.1	5		
	24 Lepidium africanum?		0.1	20		
	25 Lepidium lobed lower		0.1	1		
*	26 Crepis capillaris ?		0.1	60		
*	27 Trifolium sp.		0.3	1000		
	28 Digitaria brownii		3	150		
	29 Ovobanche sp. weed?		0.1	32		
*	30 Skeleton weed		0.1	10		
	31 Panicum effusum		0.1	3		
*	32 Bidens subalternans		0.1	4		
	33 Erodium weed?		0.1	2		
*	34 Eragrostis cilianensis		0.3	200		
	35 Eragrostis leptostachya		0.2	50		
	36 Eragrostis parviflora		0.1	10		
	37 Acaena sp. spike		0.1	2		
	38 Dysphania pumilio		0.1	50		
*	39 Solanum nigrum		0.1	1		
	40 Cynodon dactylon		0.3	10		

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, ...

	Cheilanthes austrotenuifolia	0.1	1
	Tribulus terrestris	0.1	3
	Avena sterilis	0.1	8
	Modiola caroliniana	0.1	2

400 m² plot: Sheet 1 of 1	Survey Name	Plot Identifier	Recorders
Date __ / __ / __	J180395	R01DNG	PR

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
	1 Bothriochloa macra			8	500	
	2 Cynodon dactylon			8	500	
	3 Dactylis glomerata			0.4	500	
	4 Digitaria brownii			0.3	400	
	5 Dysphania pumilio			0.2	300	
	6 Echium vulgare			0.1	10	
	7 Enteropogon acicularis			0.2	400	
	8 Eragrostis cilianensis			3	800	
	9 Eragrostis parviflora			0.1	100	
	10 Eragrostis spp.			10	500	
	11 Erodium cicutarium			0.1	30	
	12 Haloragis heterophylla			0.1	50	
	13 Hypocheris radicata			0.3	300	
	14 Juncus spp.			0.1	2	
	15 Oxalis perennans			0.1	100	
	16 Panicum effusum			5	2000	
	17 Portulaca oleracea			0.1	1	
	18 Rytidosperma spp.			0.1	50	
	19 Setaria pumilio			0.1	100	
	20 Sporobolus creber			2	250	
	21 Taraxacum officionale			0.2	250	
	22 Trifolium spp.			0.2	300	
	23 Wahlenbergia communis			0.1	1	
	24					
	25					
	26					
	27					
	28					
	29					
	30					
	31					
	32					
	33					
	34					
	35					
	36					
	37					
	38					
	39					
	40					

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, …

400 m² plot: Sheet 1 of 1	Survey Name	Plot Identifier	Recorders
Date __ / __ / __	J180395	R02 DNG	PR

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
	1 Aristida ramosa		0.1	1		
	2 Conyza bonariensis		0.1	1		
	3 Digitaria brownii		0.2	150		
	4 Dysphania pumilio		0.1	10		
	5 Echium vulgare		0.2	20		
	6 Eragrostis cilianensis		0.2	100		
	7 Eragrostis curvula		3	60		
	8 Eragrostis parviflora		0.1	100		
	9 Eragrostis spp.		40	6000		
	10 Hypochaeris radicata		0.2	250		
	11 Panicum effusum		0.2	400		
	12 Setaria gracilis		0.1	100		
	13 Sporobolus creber		2	100		
	14 Tribulus terrestris		0.1	1		
	15 Trifolium repens		5	4000		
	16					
	17					
	18					
	19					
	20					
	21					
	22					
	23					
	24					
	25					
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	36					
	37					
	38					
	39					
	40					

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, …

BAM Plot - Field Survey Sheet

Date 29/1/19	Survey Name Mt Williams		
Recorders JC		Plot ID # 29011901	Zone ID ~~1147~~ 731 Poor
Photo # 29011901		Plot dimensions 20x50	
Datum GDA94	Zone 56	Plot bearing along midline 92	
Easting 276423	Northing 6304609	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type ~~1147~~ 731	Condition state Poor

Floristics plot is centred on the midline, at 0 m point, 10 m either side

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x (20) m; 10 x 40 m

		Sum values*
Native Richness (count of native species)	Trees	0
	Shrubs	1
	Grasses etc	1
	Forbs	0
	Ferns	0
	Other	0
Cover (sum of cover of natives species)	Trees	0
	Shrubs	0.1
	Grasses etc	95
	Forbs	0
	Ferns	0
	Other	0
High threat weed cover		0.6

*These values summarise the floristic data for input into BAM calculator

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20x(50)m; 10 x 100 m

Tree stem DBH (cm)		Notes on function attributes:
>80	(#) –	Stem size class records # large trees (cf. benchmark)
50 - 79	(#) –	Record stems for living trees only, and for all species
30 - 49	(+/-) –	For multistemmed trees, record only the largest stem
20 - 29	(+/-) –	Presence of <5cm stems records regeneration
10 - 19	(+/-) –	Record # trees with hollows, not number of hollows
5 - 9	(+/-) –	Count as one stem where tree is multistemmed
< 5	(+/-) –	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows	<20cm	Total # 0
	>20cm**	
Length of logs		Total (m) 0

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots)

Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	100	95	90	95	100	96
	Bare ground	-	-	-	-	-	0
	Cryptogam	-	-	-	-	-	0
	Rock	0	5	5	10	0	4

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	3	NR	Microrelief
Cultivation	0		Slope Plains
Grazing (native / stock)	0		Aspect East
Soil erosion	0		Soil surface texture Rehab material from coal mine
Firewood removal	0		Soil colour Black
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage run off
Storm damage	0		Distance to nearest water
Weediness	1	R	Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes Coal mine rehabilitation area

BAM Plot - Field Survey Sheet

Date 29/1/2019	Survey Name McPhillamys				
Recorders		Plot ID # 29011901		Zone ID 11977 East	
GF code	*Genus species* (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
GG	Poa labillardieria	95		N	L
FG	Lactuca serriola	0.1	20	E	L
SG	Cassinia laevis	0.1	5	N	M
FG	Hypericum perforatum	0.5	50	HTE	L
FG	Onopordum acanthium	0.5	50	E	L
FG	Hypochaeris glabra	0.1	50	E	L
FG	Brassica tournefortii	0.1	10	HTE	L
FG	Conyza sp	0.1	10	E	L
FG	Geranium solanderi	0.1	5	E	L

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)

Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).

Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems

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

All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc

Identify top 3 dominants in each stratum (use own stratum definitions) Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 29/1/19	Survey Name McMillans		
Recorders JC		Plot ID # 29011902	Zone ID 731 Good
Photo # 29011902		Plot dimensions 20x50	
Datum GDA94	Zone 56	Plot bearing along midline 90	
Easting 223568	Northing 6304157	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type 731	Condition state Good

Floristics plot is centred on the midline, at 0 m point, 10 m either side

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x 20 m | 10 x 40 m

		Sum values*
Native Richness (count of native species)	Trees	3
	Shrubs	4
	Grasses etc	8
	Forbs	4
	Ferns	0
	Other	0
Cover (sum of cover of natives species)	Trees	45
	Shrubs	31.5
	Grasses etc	30.7
	Forbs	0.8
	Ferns	0
	Other	0
High threat weed cover		1.5

*These values summarise the floristic data for input into BAM calculator

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20 x 50 m | 10 x 100 m

Tree stem DBH (cm)		Notes on function attributes:
>80	(#) 1	Stem size class records # large trees (cf. benchmark)
50 - 79	(#) 3	Record stems for living trees only, and for all species
30 - 49	(+/-) ✓	For multistemmed trees, record only the largest stem
20 - 29	(+/-) ✓	Presence of <5cm stems records regeneration
10 - 19	(+/-) ✓	Record # trees with hollows, not number of hollows
5 - 9	(+/-) —	Count as one stem where tree is multistemmed
< 5	(+/-) ✓	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows	<20cm	Total #
0	>20cm**	0

Length of logs	Total (m)
~~HH~~ 1	6

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots)

Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	90	95	90	80	90	89
	Bare ground	-	-	-	-	-	0
	Cryptogam	-	-	-	-	-	0
	Rock	-	-	-	-	-	0

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	1	0	Microrelief
Cultivation	0		Slope Mid Slope
Grazing (native / stock)	0		Aspect West
Soil erosion	0		Soil surface texture Clay - loam
Firewood removal	0		Soil colour Grey/Brown
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage run off.
Storm damage	0		Distance to nearest water
Weediness	1	R	Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes

BAM Plot - Field Survey Sheet

Date 29/1/19	Survey Name M. Williams				
Recorders JK		Plot ID # 29011902		Zone ID	
GF code	*Genus species* (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
GG	*Austrodanthonia scabra*	5		N	L
GG	*Poa sieberiana*	20		N	L
GG	*Themeda triandra*	5		N	L
SG	*Cassinia laevis*	20		N	M
SG	*Rosa rubiginosa*	0.5	5	HTE	M
SG	*Leptospermum myrtifolium*	10		N	M
GG	*Dianella revoluta*	0.5	20	N	L
FG	*Hypochaeris glabra*	0.1	50	E	L
FG	*Plantago lanceolata*	0.1	50	E	L
GG	*Panicum effusum*	0.1	5	N	L
GG	*Lomandra filiformis*	0.1	20	N	L
FG	*Gonocarpus tetragynus*	0.1	20	N	L
SG	*Rubus fruticosus*	1	5	HTE	M
GG	*Rytidosperma pallidum*	0.5	50	N	L
GG	*Aristida* sp.	0.5	20	N	L
TG	*Eucalyptus pauciflora*	25		N	U
TG	*Eucalyptus macrorhyncha*	10		N	U
SG	*Bursaria spinosa*	0.5	10	N	M
SG	*Acacia dealbata*	1	2	N	M
FG	*Dichondra repens*	0.5	100	N	L
FG	*Oxalis perennans*	0.1	20	N	L
TG	*Eucalyptus ~~robusta~~ delegatensis*	10		N	U
FG	*Gamochaeta* sp.	0.1	10	E	L
FG	*Bulbine bulbosa*	0.1	5	N	L

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)

Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).

Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems

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

All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc

Identify top 3 dominants in each stratum (use own stratum definitions)

Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 29/1/19	Survey Name Mt Phillamuyi		
Recorders JC		Plot ID # 29011903	Zone ID 731 Poor
Photo # 29011903		Plot dimensions ~~20x50~~ 10x100	
Datum GDA 94	Zone 56	Plot bearing along midline 253	
Easting 223456	Northing 6304085	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type 731	Condition state Poor

Floristics plot is centred on the midline, at 0 m point, 10 m either side

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x 20 m; 10 x 40 m

		Sum values*
Native Richness (count of native species)	Trees	1
	Shrubs	5
	Grasses etc	7
	Forbs	7
	Ferns	0
	Other	0
Cover (sum of cover of natives species)	Trees	25
	Shrubs	41.5
	Grasses etc	41.6
	Forbs	~~36~~ 6
	Ferns	0
	Other	0
High threat weed cover		10.1

*These values summarise the floristic data for input into BAM calculator

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20 x 50 m; 10 x 100 m

Tree stem DBH (cm)		
>80	(#) –	Stem size class records # large trees (cf. benchmark)
50 - 79	(#) –	Record stems for living trees only, and for all species
30 - 49	(+/-) ✓	For multistemmed trees, record only the largest stem
20 - 29	(+/-) ✓	Presence of <5cm stems records regeneration
10 - 19	(+/-) ✓	Record # trees with hollows, not number of hollows
5 - 9	(+/-) ✓	Count as one stem where tree is multistemmed
< 5	(+/-) ✓	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows		
0	<20cm	Total # 0
	>20cm**	
Length of logs		Total (m) 2

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots)

Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	80	70	95	75	80	80
	Bare ground	20	10	0	25	5	12
	Cryptogam	–	–	–	–	–	0
	Rock	0	10	0	0	15	5

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	3	NR	Microrelief
Cultivation	0		Slope
Grazing (native / stock)	0		Aspect
Soil erosion	0		Soil surface texture
Firewood removal	0		Soil colour
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage
Storm damage	0		Distance to nearest water
Weediness	1	R	Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes Existing Pipeline easement and mine rehabilitation.

BAM Plot - Field Survey Sheet

Date 29/1/19	Survey Name McWilliams				
Recorders JC		Plot ID # 29011903		Zone ID	
GF code	*Genus species* (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
SG	*Acacia dealbata*	10		N	M
SG	*Cassinia leavis*	25		N	M
FG	*Hypericum graminiceum*	5		N	L
GG	*Lomandra filiformis*	0.5		N	L
GG	*Rytidosperma pallidum*	15		N	L
TG	*Eucalyptus dalrympleana*	25		N	U
SG	*Callistemon sieberi*	1	25	N	M
SG	*Dillwynia cinerascens*	5		N	M
FG	*Onopordum acanthium*	0.5	10	E	L
FG	*Plantago lanceolata*	5		E	L
FG	*Wahlenbergia gracilenta*	0.1	10	N	L
FG	*Cerastium tetragynum*	0.1	20	N	L
FG	*Senecio sp*	0.1	10	N	L
FG	*Coronidium rutidolepsis*	0.1	20	N	L
GG	*Panicum effusum*	0.1	100	N	L
FG	*Echium plantagineum*	0.1	10	E	L
SG	*Rubus fruticosus*	5		HTE	M
FG	*Cullen tenax*	0.1	5	N	L
GG	*Eragrostis curvula*	5		HTE	L
FG	*Lysimachia arvensis*	0.1	50	E	L
FG	*Hypochaeris glabra*	0.1	200	E	L
GG	*Themeda triandra*	5		N	L
GG	*Aristida ramosa*	0.5	20	N	L
GG	*Austrostipa scabra*	10		N	L
FG	*Oxalis perennans*	0.5		N	L
SG	*Leptospermum myrtifolia*	0.5	5	N	M
GG	*Lomandra longifolia*	0.5	5	N	L
FG	*Hypericum perforatum*	0.1	30	HTE	L

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)
Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).
Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems
N=native, E=exotic, HTE=high threat exotic
All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc
Identify top 3 dominants in each stratum (use own stratum definitions) Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 30/1/2019	Survey Name McPhillamys		
Recorders SK		Plot ID # 30011901	Zone ID 732 Poor
Photo # 30011901		Plot dimensions 20x50	
Datum GDA 94	Zone 55	Plot bearing along midline 266	
Easting 223895	Northing 6304150	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type 732	Condition state Poor

Floristics plot is centred on the midline, at 0 m point, 10 m either side

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x 20 m (circled) | 10 x 40 m

		Sum values*
Native Richness (count of native species)	Trees	2
	Shrubs	3
	Grasses etc	3
	Forbs	1
	Ferns	0
	Other	0
Cover (sum of cover of natives species)	Trees	35
	Shrubs	20.6
	Grasses etc	5.2
	Forbs	0.1
	Ferns	0
	Other	0
High threat weed cover		0.2

*These values summarise the floristic data for input into BAM calculator

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20 x 50 m (circled) | 10 x 100 m

Tree stem DBH (cm)		Notes on function attributes:
>80	(#) —	Stem size class records # large trees (cf. benchmark)
50 - 79	(#) —	Record stems for living trees only, and for all species
30 - 49	(+/-) —	For multistemmed trees, record only the largest stem
20 - 29	(+/-) ✓	Presence of <5cm stems records regeneration
10 - 19	(+/-) ✓	Record # trees with hollows, not number of hollows
5 - 9	(+/-) ✓	Count as one stem where tree is multistemmed
< 5	(+/-) ✓	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows		Total #
0	<20cm	0
	>20cm**	

Length of logs	Total (m)
	3

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots) Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	10	90	80	60	95	67
	Bare ground	-	-	-	5	-	1
	Cryptogam	-	-	5	-	-	1
	Rock	90	10	10	35	5	30

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	3	NR	Microrelief
Cultivation	0		Slope Upper slope
Grazing (native / stock)	0		Aspect West
Soil erosion	0		Soil surface texture gravelly sand
Firewood removal	0		Soil colour Grey
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage
Storm damage	0		Distance to nearest water
Weediness	1	R	Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes Rehabilitated mine site and powerline easement adjacent remnant veg.

BAM Plot - Field Survey Sheet

Date 30/1/19	Survey Name McWilliams				
Recorders JC		Plot ID # 30011901		Zone ID	
GF code	*Genus species* (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
SG	Acacia nana	20		N	M
TG	Eucalyptus melanophera	25		N	U
TG	Eucalyptus bicostata	10		N	U
SG	Cassinia laevis	0.5	10	N	M
GG	Rytidosperma pallidum	5		N	L
FG	Hypericum perforatum	0.1	10	HTE	L
FG	Hypericum gramineum	0.1	25	N	L
FG	Oxalis perennans	0.1	10	N	L
FG	Brachyscome rigidula	0.1	5	N	L
FG	Hypochaeris glabra	0.1	10	E	L
GG	Eragrostis parviflora	0.1	10	N	L
GG	Aristida ramosa	0.1	5	N	L
FG	Lysimachia arvensis	0.1	50	E	L
SG	Rosa rubiginosa	0.1	1	HTE	M
SG	Acacia dealbata	0.1	1	N	M

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)

Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).

Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems

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

All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc

Identify top 3 dominants in each stratum (use own stratum definitions)

Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 30/1/19	Survey Name McPhillamys		
Recorders		Plot ID # 30011902	Zone ID 1093 Good
Photo #		Plot dimensions 20x50	
Datum 223568	Zone 56 6304159	Plot bearing along midline 150	
Easting -33.36630	Northing 150.02907	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type 1093	Condition state Good

Floristics plot is centred on the midline, at 0 m point, 10 m either side

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x 20 m (circled) | 10 x 40 m

		Sum values*
Native Richness (count of native species)	Trees	4
	Shrubs	6
	Grasses etc	4
	Forbs	9
	Ferns	0
	Other	0
Cover (sum of cover of natives species)	Trees	65
	Shrubs	15.4
	Grasses etc	16.1
	Forbs	1.9
	Ferns	0
	Other	0
High threat weed cover		0

*These values summarise the floristic data for input into BAM calculator

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20 x 50 m (circled) | 10 x 100 m

Tree stem DBH (cm)

>80	(#) –	Stem size class records # large trees (cf. benchmark)
50 - 79	(#) -	Record stems for living trees only, and for all species
30 - 49	(+/-) ✓	For multistemmed trees, record only the largest stem
20 - 29	(+/-) ✓	Presence of <5cm stems records regeneration
10 - 19	(+/-) ✓	Record # trees with hollows, not number of hollows
5 - 9	(+/-) ✓	Count as one stem where tree is multistemmed
< 5	(+/-) ✓	Hollow bearing stem may be a dead stem (incl. stag)

Notes on function attributes:

# Trees with hollows 0	<20cm	Total # 0
	>20cm**	
Length of logs ~~HH~~		Total (m) 5

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots)

Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	90	80	100	90	100	92
	Bare ground	0	0	0	0	0	0
	Cryptogam	0	0	0	0	0	0
	Rock	0	20	0	0	0	4

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	2	O	Microrelief
Cultivation	0		Slope Hill crest
Grazing (native / stock)	0		Aspect North
Soil erosion	0		Soil surface texture Clay loam
Firewood removal	0		Soil colour Brown
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage run off
Storm damage	0		Distance to nearest water 200m
Weediness	0		Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes ~~Previously~~ Historically cleared (no large trees) adjacent powerlation easements and rehab land.

BAM Plot - Field Survey Sheet

Date 30/1/19	Survey Name McPhillamys				
Recorders		Plot ID # 3901902		Zone ID	
GF code	Genus species (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
TG	Euc 1. E. mannifera	50			
TG	Euc 2. Eucalyptus macrorhyncha	5			
TG	Euc 3. (B-L. Peppermint?)	5			
SG	Casuarina cunninghamiana	10			
GG	Lomandra filiformis	10			
FG	~~Daisy 1~~ Brachyscome decipiens	0.1	5		
GG	Poa sieberiana labillardieri	5	100		
GG	Rhytidosperma sp	1	100		
SG	Poa / Bossiaea prostrata	0.1	200		
FG	Viola hent.	0.1	200		
FG	Xerochrysum sp (like golden everlasting)	0.1	200		
FG	Daisy 2 Leptorhynchos squamatus	0.1	50		
FG	~~Hardenbergia~~ Hypericum gramineum	0.1	50		
GG	Dianella revoluta	0.1	10		
	3901901 Acacia 1	5	5		
	Grass 1	0.5	100		
SG	Epacrid sp 1	5			
FG	Oxalis perennans	0.1	50		
~~OG~~	Hyacinth orchid? (glass & dead stem)	0.1	1		
	3901901 Forb 1	0.1	50		
SG	Acacia dealbata	0.1	10		
FG	Acaena sp. echinata	0.1	200		
FG	Viola hederacea sp	0.1	5		
FG	Goodenia sp	0.1	1000		
SG	Acacia buxifolia	0.1			
SG	Hovea sp.	0.1	20		
FG	Helichrysum from 3901901	0.1	1000		
	Hypochaeris glabra	0.1	20		
SG	Hardenbergia violacea	0.1	1		
TG	Euc 4? Eucalyptus cannonii	5	1		
	TG 4 68				
	SG 6 15.4				
	GG 4 16.1				
	FG 9 1.9				
	St. Pardalote				
	B.F. Cuckoo Shrike				

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)

Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).

Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems

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

All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc

Identify top 3 dominants in each stratum (use own stratum definitions) Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

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BAM Plot - Field Survey Sheet

Date 30/1/19	**Survey Name**		
Recorders		**Plot ID #** 30011903	**Zone ID** 1093 Poor
Photo #		**Plot dimensions** 20x50	
Datum	**Zone**	**Plot bearing along midline** 224	
Easting -33.36091/223456	**Northing** 150.02780/6304085	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type As 30011902 1093	**Condition state** Poor

Floristics plot is centred on the midline, at 0 m point, 10 m either side

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x (20) m; 10 x 40 m

		Sum values*
Native Richness (count of native species)	**Trees**	1
	Shrubs	4
	Grasses etc	5
	Forbs	5
	Ferns	1
	Other	0
Cover (sum of cover of natives species)	**Trees**	0.5
	Shrubs	50.6
	Grasses etc	21.2
	Forbs	0.5
	Ferns	0.1
	Other	0
High threat weed cover		2.1

*These values summarise the floristic data for input into BAM calculator

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20 x (50) m; 10 x 100 m

Tree stem DBH (cm)		Notes on function attributes:
>80	(#) –	Stem size class records # large trees (cf. benchmark)
50 - 79	(#) –	Record stems for living trees only, and for all species
30 - 49	(+/-) –	For multistemmed trees, record only the largest stem
20 - 29	(+/-) –	Presence of <5cm stems records regeneration
10 - 19	(+/-) –	Record # trees with hollows, not number of hollows
5 - 9	(+/-) –	Count as one stem where tree is multistemmed
< 5	(+/-) ✓	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows	<20cm	Total #
0	>20cm**	0
Length of logs		Total (m) 7

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots)

Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	**Litter**	70	50	70	60	80	66
	Bare ground	5	0	5	10	0	4
	Cryptogam	10	15	10	5	0	8
	Rock	5	5	5	10	5	6

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	3	R	Microrelief
Cultivation	0		Slope Lower slope
Grazing (native / stock)	0		Aspect
Soil erosion	0		Soil surface texture Clay loam
Firewood removal	0		Soil colour Brown
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage Run on
Storm damage	0		Distance to nearest water 100m
Weediness	2	R	Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes Cleared powerline easement

BAM Plot - Field Survey Sheet

Date 30/1/19	Survey Name McPhillamys				
Recorders		Plot ID # 30011903		Zone ID	
GF code	Genus species (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
GG	30011902 Rhytidosperma	10			
GG	Lomandra filiformis	10			
SG	Cassinia laevis	25			
SG	Leptospermum sp	25			
EG	Cheilanthes sp.	0.1	100		
SG	30011902 Epacrid 1	0.5	20		
~~FG~~	30011902 Wort sp Hypericum	0.1	200		
FG	Small st Johns Wort Hypericum gramineum	0.1	300		
	Hypochaeris glabra	0.1	500		
	~~St Johns Wort~~ Hypericum perforatum	0.1	200	HTE	
FG	30011902 Haloragis	0.1	100		
GG	Panicum effusum	1 ~~05~~	~~3~~00		
	Common wheat grass	0.1	20		
GG	Poa sieberiana	0.1	30		
	Pink fob (photo)	0.1	100		
FG	30011902 Daisy 2 Coronidium rutidolepis	0.1	50		
	30011901 Eragrostis ~~sp~~ curvula	~~0~~ 1.	300	HTE	
GG	Austrostipa scabra	0.~~1~~	100		
	Blueberry	1		HTE	
SG	Acacia dealbata	0.1	10		
	Scalet pimpernel	0.1	100		
	30011901 Forb 1	0.1	10		
FG	Wahlenbergia sp	0.1	5		
	Blue forb (photo)	0.1	5		
SG	30011902 Poa 1	0.1	10		
TG	~~30011902 Euc~~ 1 Eucalyptus mannifera	0.5	5		
FG	Viola bent.	0.1	5		
	TG 1 0.5				
	SG 4 80.6				
	GG 5 21.2				
	FG 5 0.5				
	EG 1 0.1				
	HTW 1.1				
	Wombat				
	Pig & Grey Kang				

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)
Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).
Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems
N=native, E=exotic, HTE=high threat exotic
All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc
Identify top 3 dominants in each stratum (use own stratum definitions) Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 30/1/19	Survey Name McPhillamys		
Recorders		Plot ID # 30011904	Zone ID 1093 Good
Photo #		Plot dimensions 20x50	
Datum 223246	Zone 56 6303812	Plot bearing along midline 317	
Easting -33.36937	Northing 150.02552	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type 1093	Condition state Good

Floristics plot is centred on the midline, at 0 m point, 10 m either side

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size)

20 x (20) m   10 x 40 m

		Sum values*
Native Richness (count of native species)	Trees	3
	Shrubs	5
	Grasses etc	8
	Forbs	12
	Ferns	1
	Other	0
Cover (sum of cover of natives species)	Trees	70
	Shrubs	2.3
	Grasses etc	26.2
	Forbs	65
	Ferns	0.1
	Other	0
High threat weed cover		0.3

*These values summarise the floristic data for input into BAM calculator

BAM Function plot (1000m²)

Dimensions (circle applicable size)

20 x (50) m   10 x 100 m

Tree stem DBH (cm)		Notes on function attributes:
>80	(#)	Stem size class records # large trees (cf. benchmark)
50 - 79	(#) ///	Record stems for living trees only, and for all species
30 - 49	(+/-) ✓	For multistemmed trees, record only the largest stem
20 - 29	(+/-) ✓	Presence of <5cm stems records regeneration
10 - 19	(+/-) ✓	Record # trees with hollows, not number of hollows
5 - 9	(+/-) ✓	Count as one stem where tree is multistemmed
< 5	(+/-) ✓	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows 𝍸 //// 9	<20cm 𝍸 //	Total # 12
	>20cm** 𝍸	
Length of logs		Total (m) 95

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots) Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	100	90	90	80	80	88
	Bare ground	0	0	10	0	10	4
	Cryptogam	0	0	0	0	0	0
	Rock	0	0	0	0	0	0

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform	
Clearing (incl. logging)	1	O	Microrelief	
Cultivation	0		Slope	upper slope
Grazing (native / stock)	0		Aspect	NW.
Soil erosion	0		Soil surface texture	Sandy clay loam
Firewood removal	0		Soil colour	brown
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage	run off
Storm damage	0		Distance to nearest water	200m
Weediness	0		Distance to nearest rock outcrop /cave	

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes Yellow-faced HE
E. Spinebill
Thornbill
YR.
S. Thornbill

BAM Plot - Field Survey Sheet

Date 30/1/19	Survey Name				
Recorders		Plot ID # 30011904		Zone ID	
GF code	*Genus species* (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
TG	Euc 1 (smooth bark) ~~(or mannifera)~~	60			
FG	Dichondra repens	5			
FG	Viola ~~hed~~. betonicifolia	0.1	200		
FG	Acaena sp (photo) novae-zealandiae	0.1	200		
FG	Pennywort sp (photo) Hydrocotyle laxiflora	0.1	200		
FG	Forb 1 Gonocarpus tetragynus	0.1	100		
	Poa 1	0.1	10		
	Hypochaeris glabra	0.1	50		
FG	Glycine sp clandestina	0.1	50		
HTW	St Johns wort	0.1	100	HTE	
GG	30011702 Rhytidosperma pallida	5			
GG	~~Grass~~ 1 Echinopogon ovatus	~~5~~	~~300~~		
GG	Poa sieberiana	5			
GG	Austrostipa scabra	5			
SG	Exocarpos cupressiformis	1	0		
HTW	Sweet briar	0.1	1	HTE	
SG	Cassinia laevis	0.1	1		
SG	30011902 Epacrid 2	1	10		
GG	Lomandra phots	0.1	10		
SG	Dicceia dealbata	0.1	10		
	Echium sp	0.1	20		
GG	Dianella revoluta	1	100		
GG	Lomandra filiformis	5			
EG	Cheilanthes sp	0.1	50		
HTW	Blackberry	0.1	1	HTW	
FG	Wahlenbergia sp.	0.1	5		
FG	Oxalis perennans	0.1	50		
	Forb 2	0.1	10		
SG	30011902 Poa 1	0.1			
	~~Unknown (Gonocarpus?)~~	1	100		
FG	Acrotriche Honey Pots	0.1	5		
GG	Poa labillardieri	0.1	5		
TG	Euc 2 Eucalyptus cannonii	5			
FG	Acaena sp 2 (photo) echinata	0.5	100		
FG	Glycine sp2 microphylla	0.1	10		
FG	Yellow lily (photo)	0.1	20		
TG	Eucalyptus dives	5			
	TG 3 70	FG	12	6.5	
	SG 5 2.3	EG	1	0.1	
	GG 8 26.2	HTW	0.3		

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)

Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).

Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems

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

All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc

Identify top 3 dominants in each stratum (use own stratum definitions) Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 30/1/19	Survey Name McPhillamys		
Recorders		Plot ID # 30011905	Zone ID 731 Poor
Photo #		Plot dimensions 20 x 50	
Datum 122854	Zone 56	Plot bearing along midline 202	
Easting -33.37116	Northing 150.02123 6303600	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type	As mapping (pink) 731 — Condition state Poor

Floristics plot is centred on the midline, at 0 m point, 10 m either side

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x 20 m | 10 x 40 m

		Sum values*
Native Richness (count of native species)	Trees	1
	Shrubs	3
	Grasses etc	4
	Forbs	3
	Ferns	0
	Other	0
Cover (sum of cover of natives species)	Trees	0.1
	Shrubs	21
	Grasses etc	36.5
	Forbs	0.3
	Ferns	0
	Other	0
High threat weed cover		0.1

*These values summarise the floristic data for input into BAM calculator

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20 x 50 m | 10 x 100 m

Tree stem DBH (cm)		Notes on function attributes:
>80	(#)	Stem size class records # large trees (cf. benchmark)
50 - 79	(#)	Record stems for living trees only, and for all species
30 - 49	(+/-)	For multistemmed trees, record only the largest stem
20 - 29	(+/-)	Presence of <5cm stems records regeneration
10 - 19	(+/-)	Record # trees with hollows, not number of hollows
5 - 9	(+/-)	Count as one stem where tree is multistemmed
< 5	(+/-) ✓	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows		Total #
0	<20cm	0
	>20cm**	

Length of logs — Total (m): 90

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots)

Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	10	60	50	15	90	45
	Bare ground	30	10	0	80	0	24
	Cryptogam	0	0	0	0	0	0
	Rock	60	50	50	6	5	33

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	3	R	Microrelief
Cultivation	0		Slope mid slope
Grazing (native / stock)	0		Aspect west
Soil erosion	0		Soil surface texture clay loam
Firewood removal	0		Soil colour brown
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage run off
Storm damage	0		Distance to nearest water 0
Weediness	1		Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes Cleared powerline easement

BAM Plot - Field Survey Sheet

Date 30/1/19	Survey Name				
Recorders		Plot ID # 30011905		Zone ID	
GF code	*Genus species* (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
TG	Eucl 30011904 marmifera	0·1	5		
SG	Cassinia Laevis	20			
SG	30011902 Acacia 1	0·5	1		
SG	Acacia dealbata	0·5	1		
GG	Austrostipa scabra	25			
	Hypochaeris glabra	0·5	100		
	Senecio hieracioides (photo)	0·5	100		
GG	Panicum effusum	0·5	50		
GG	Rhytidosperma (other sites) pallida	10			
FG	Oxalis perennans	0·1	100		
EG	Cheilanthes sp.	0·1	100		
	Echium sp	5			
	30011904 forb 1	0·1	20		
FG	Small S. Johns wort fly.	0·1	100		
	S. Pimpernel	0·1	200		
	Dysphania sp	0·1	10		
GG	Lomandra filiformis	1			
	Blueberry	0·1	5	HTE	
	Pennywort photo	0·1	100		
	30011903 pink forb	0·1	100		
FG	Acaena sp	0·1	50		
	TG 1 0·1				
	SG 3 21				
	GG 4 36·5				
	FG 3 0·3				
	HTW 0·01				

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)
Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).
Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems
N=native, E=exotic, HTE=high threat exotic
All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc
Identify top 3 dominants in each stratum (use own stratum definitions) Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 30/1/19	Survey Name		
Recorders		Plot ID # 30011906	Zone ID 731 Good
Photo #		Plot dimensions 20x50	
Datum 22770	Zone 56 6303424	Plot bearing along midline 263	
Easting ~35,37768	Northing 180.01991	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type 731	Condition state Good

Floristics plot is centred on the midline, at 0 m point, 10 m either side

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x 20 m (circled) | 10 x 40 m

		Sum values*
Native Richness (count of native species)	Trees	3
	Shrubs	3
	Grasses etc	6
	Forbs	7
	Ferns	1
	Other	0
Cover (sum of cover of natives species)	Trees	60
	Shrubs	2.1
	Grasses etc	22
	Forbs	6.4
	Ferns	0.1
	Other	0
High threat weed cover		0

*These values summarise the floristic data for input into BAM calculator

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20 x 50 m (circled) | 10 x 100 m

Tree stem DBH (cm)		Notes on function attributes:
>80	(#) –	Stem size class records # large trees (cf. benchmark)
50 - 79	(#) // 2	Record stems for living trees only, and for all species
30 - 49	(+/-) ✓	For multistemmed trees, record only the largest stem
20 - 29	(+/-) ✓	Presence of <5cm stems records regeneration
10 - 19	(+/-) ✓	Record # trees with hollows, not number of hollows
5 - 9	(+/-) ✓	Count as one stem where tree is multistemmed
< 5	(+/-) ✓	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows 2		Total #
	<20cm ###	8
	>20cm** ///	
Length of logs		Total (m) 8

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots)

Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	100	100	80	90	90	92
	Bare ground	5	0	10	5	0	4
	Cryptogam	0	0	0	0	0	0
	Rock	0	0	0	0	0	0

1s 30011904

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)			Microrelief
Cultivation			Slope
Grazing (native / stock)			Aspect
Soil erosion			Soil surface texture
Firewood removal			Soil colour
Fire (ground stratum, mid, canopy burnt?)			Site drainage
Storm damage			Distance to nearest water
Weediness			Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes

BAM Plot - Field Survey Sheet

Date	Survey Name				
Recorders		Plot ID # 3001906		Zone ID	
GF code	*Genus species* (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
	Ground plants in for 3001904				
SG	Hibbertia obtusa	0.1	5		
FG	Forb 1 Gonocarpus tetragynus	0.1	5		
SG	Epacrid 1	1	10		
TG	Scribbly gum rossii	5	1		
SG	Acacia dealbata	1	2		
TG	~~Tree 2~~ Tr Euc. dives	10			
TG	E. mannifera ~~Tree 3 Smooth bark scribbly~~	45			
	Forb 2	1			
FG	Wahlenbergia	0.1	5		
FG	Dichondra repens	5			
FG	Viola betonicifolia	0.1			
FG	Araeina novae-zealandiae	1			
GG	Rytidosperma pallida	5			
GG	Echinopogon ovatus	5			
GG	Austrostipa scabra	1			
GG	Poa Labillardieri	5			
GG	Dianella revoluta	1			
GG	Lomandra filiformis	5			
FG	Wahlenbergia sp	0.1			
EG	Cheilanthes sp.	0.1			
FG	Arostriche	1			
	TG 3 60				
	SG 3 2.1				
	FG 7 6.4				
	GG 6 22				
	EG 1 0.1				

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)

Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).

Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems

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

All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc

Identify top 3 dominants in each stratum (use own stratum definitions) Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 30/1/19	Survey Name		
Recorders		Plot ID # 30011907	Zone ID 679 Poor
Photo #		Plot dimensions 20x50	
Datum 222534	Zone 56 6303070	Plot bearing along midline 224	
Easting ~~333758~~	Northing ~~5501761~~	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type 679	Condition state Poor

Floristics plot is centred on the midline, at 0 m point, 10 m either side

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x 20 m | 10 x 40 m

		Sum values*
Native Richness (count of native species)	Trees	1
	Shrubs	1
	Grasses etc	4
	Forbs	4
	Ferns	0
	Other	0
Cover (sum of cover of natives species)	Trees	25
	Shrubs	5
	Grasses etc	11.2
	Forbs	0.4
	Ferns	0
	Other	0
High threat weed cover		10.1

*These values summarise the floristic data for input into BAM calculator

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20 x 50 m | 10 x 100 m

Tree stem DBH (cm)		Notes on function attributes:
>80	(#) —	Stem size class records # large trees (cf. benchmark)
50 - 79	(#) 2	Record stems for living trees only, and for all species
30 - 49	(+/-) ✓	For multistemmed trees, record only the largest stem
20 - 29	(+/-) ✓	Presence of <5cm stems records regeneration
10 - 19	(+/-) ✓	Record # trees with hollows, not number of hollows
5 - 9	(+/-) ✓	Count as one stem where tree is multistemmed
< 5	(+/-) ✓	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows 2	<20cm 3	Total # 4
	>20cm** 1	
Length of logs		Total (m) 137

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots)

Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	90	90	80	90	90	88
	Bare ground	5	10	0	0	5	4
	Cryptogam	0	0	5	0	0	5
	Rock	5	0	10	0	5	4

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	3	O NR	Microrelief
Cultivation	0		Slope lower slope.
Grazing (native / stock)	0		Aspect SE
Soil erosion	0		Soil surface texture clay loam
Firewood removal	0		Soil colour brown
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage run off
Storm damage	0		Distance to nearest water 100m
Weediness	2	R	Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes Historic coal mining clearing + rehab

BAM Plot - Field Survey Sheet

Date	Survey Name				
Recorders		Plot ID # 30011907		Zone ID	
GF code	*Genus species* (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
SG	Acacia dealbata	5			
FG	Oxalis perennans	0.1	100		
FG	Acaena sp * novae-zelandiae	0.1	1000		
	Blackberry	10		HTE	
	Cocks Foot	1 ~~5~~	100		
	Plantago sp. patisia				
GG	Rhytidosperma (~~thom~~)	10			
	Hypochaeris glabra	0.1	500		
TG	E. pauciflora	25			
	~~E~~	50			
FG	St Johns Wort	0.1	50	HTE	
GG	Austrostipa scabra	1	50		
	Shrub 1	5			
GG	Lomandra longifolia	0.1	10		
GG	Lomandra filiformis	0.1	20		
	~~Forb~~ 1	0.8	30		
FG	~~Trailing Pea~~	0.1	50		
	Desmodium (see list)				
	TG 1 25				
	SG 1 5				
	GG 4 11.2				
	FG 4 0.4				
	NTW ~~10~~				
	R.B. Finch				
	Grey Fantail				
	F. Wren				
	W.T. Treecreeper				
	Silvereye				

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)
Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).
Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems
N=native, E=exotic, HTE=high threat exotic
All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc
Identify top 3 dominants in each stratum (use own stratum definitions) Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 31/1/19	Survey Name	McPhillamys	
Recorders		Plot ID # 31011901	Zone ID 679 Poor
Photo #		Plot dimensions 20x50	
Datum 822472	Zone 56 6302959	Plot bearing along midline 226	
Easting ~~-33.37682~~	Northing ~~150.01689~~	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type 679	Condition state Poor

Floristics plot is centred on the midline, at 0 m point, 10 m either side

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x 20 m (circled) | 10 x 40 m

		Sum values*
Native Richness (count of native species)	Trees	2
	Shrubs	0
	Grasses etc	2
	Forbs	3
	Ferns	0
	Other	6
Cover (sum of cover of natives species)	Trees	6
	Shrubs	0
	Grasses etc	30
	Forbs	5.6
	Ferns	0
	Other	0
High threat weed cover		5.2

*These values summarise the floristic data for input into BAM calculator

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20 x 50 m (circled) | 10 x 100 m

Tree stem DBH (cm)		
>80	(#)	-
50 - 79	(#)	-
30 - 49	(+/-)	-
20 - 29	(+/-)	-
10 - 19	(+/-)	-
5 - 9	(+/-)	✓
< 5	(+/-)	✓

Notes on function attributes:

- Stem size class records # large trees (cf. benchmark)
- Record stems for living trees only, and for all species
- For multistemmed trees, record only the largest stem
- Presence of <5cm stems records regeneration
- Record # trees with hollows, not number of hollows
- Count as one stem where tree is multistemmed
- Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows	<20cm	Total #
0	>20cm**	0
Length of logs		Total (m) 2

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots) Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	80	90	90	80	70	82
	Bare ground	0	0	0	0	0	0
	Cryptogam	0	0	0	0	0	0
	Rock	0	0	0	0	0	0

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform	
Clearing (incl. logging)	3	O	Microrelief	
Cultivation	0		Slope	lower slope
Grazing (native / stock)	1	R	Aspect	~~East~~ West
Soil erosion	0		Soil surface texture	loam
Firewood removal	0		Soil colour	grey
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage	run off
Storm damage	0		Distance to nearest water	200m
Weediness	2	R	Distance to nearest rock outcrop /cave	300m

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes

Cleared farmland adjacent native veg. Pipeline alignment follows forest edge. Clearing in farmland.

BAM Plot - Field Survey Sheet

Date 31/1/19	Survey Name McPhillamys				
Recorders		Plot ID # 31011901		Zone ID	
GF code	Genus species (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
	Poplar	5			
TG	E. pauciflora (or blackbutt?)	5			
HTEW	Blackberry	5		HTE	
	30011907 Shrub1	0.5	1		
TG	Euc phots (opposite leaves, smooth bark)	1	4		
GG	Poa sieberiana	25			
	Cocks Foot	5			
HTEW	St Johns Wort	0.1	100	HTE	
	Plantago sp (photo)	60			
	Hypochaeris glabra	5			
	Thistle (photo)	0.1	30		
FG	Acaena (sheep burr) (grey flower head)	~~5~~ 5	~~100~~		
FG	Geranium solanderi	0.1	50		
	Trifolium repens	5			
FG	Oxalis perennans	0.5	300		
	Scarlet pimpernel	0.1	300		
	Pink forb (photo)	0.1	300		
GG	Poa labilladieria	5			
HTEW	Sweet briar	0.1	5	HTE	
	TG 2 6				
	SG 0				
	GG 2 30				
	FG 3 5.6				
	HTEW 5.2				
	DB Finch WT Treecreeper				
	Silvereye Pig				
	Currawong Rabbit				
	YF Honeyeater A- Raven				
	Grey Fantail YT Black Cockatoo				

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)

Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).

Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems

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

All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc

Identify top 3 dominants in each stratum (use own stratum definitions) Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

Possibly PCT 679? check distribution

BAM Plot - Field Survey Sheet

Date 31/1/19	Survey Name McPhillamys		
Recorders		Plot ID # 3101**9**03	Zone ID 679 Good
Photo #		Plot dimensions 20x50	
Datum	Zone 56	Plot bearing along midline 331	
Easting 222162	Northing 6303022	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type Green PCT on map. 679	Condition state Good

Floristics plot is centred on the midline, at 0 m point, 10 m either side

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Composition / Structure plot (400m^2)

Dimensions (circle applicable size): 20 x 20 m / 10 x 40 m

		Sum values*
Native Richness (count of native species)	Trees	3
	Shrubs	2
	Grasses etc	4
	Forbs	7
	Ferns	0
	Other	6
Cover (sum of cover of natives species)	Trees	55
	Shrubs	1.1
	Grasses etc	15.1
	Forbs	20.7
	Ferns	0
	Other	0
High threat weed cover		5.7

*These values summarise the floristic data for input into BAM calculator

BAM Function plot (1000m^2)

Dimensions (circle applicable size): 20 x 50 m / 10 x 100 m

Tree stem DBH (cm)		Notes on function attributes:
>80	(#) —	Stem size class records # large trees (cf. benchmark)
50 - 79	(#) 2	Record stems for living trees only, and for all species
30 - 49	(+/-) ✓	For multistemmed trees, record only the largest stem
20 - 29	(+/-) ✓	Presence of <5cm stems records regeneration
10 - 19	(+/-) ✓	Record # trees with hollows, not number of hollows
5 - 9	(+/-) ✓	Count as one stem where tree is multistemmed
< 5	(+/-) ✓	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows		Total #
2	<20cm ////	6
	>20cm** //	
Length of logs		Total (m) 137

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots)

Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	95	90	95	80	90	90
	Bare ground	0	5	0	0	0	1
	Cryptogam	0	0	0	0	0	0
	Rock	0	0	0	5	5	2

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	1	O	Microrelief
Cultivation	0		Slope Lower slope
Grazing (native / stock)	0		Aspect SE
Soil erosion	0		Soil surface texture loam
Firewood removal	0		Soil colour grey
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage run off
Storm damage	0		Distance to nearest water 100m
Weediness	1	R	Distance to nearest rock outcrop /cave 100m

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes

BAM Plot - Field Survey Sheet

Date 31/1/19	Survey Name Mt Phillips				
Recorders		Plot ID # 31011903		Zone ID	
GF code	Genus species (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
SG	Bursaria spinosa	0.1	1		
TG Euc. stellulata	Black Sallee ? (31011901 sample)	5			
TG	Euc 1 Eucalyptus nitida?	25			
FG	Geranium solanderi	5			
GG check ID Phalaris brizoides	Poa sieberiana	5			
TG	Euc 2 Eucalyptus pauciflora	25			
FG E. rostrata ?	Sheep burr (round flower) Acaena novae-zelandiae	5			
FG ? rubi	Sheep burr (long flower) Acaena echinata	5			
FG	Oxalis perennans	0.5	1000		
HTW	Blackberry	5		HTE	
HTW	Sweet briar	0.5	5	HTE	
	Plantago sp (31011901)	5			
	Hypochaeris glabra	0.5	500		
	31011901 pink forb	0.1	50		
GG	Grass 1 Aristida vagans	5			
	Trifolium repens	1 ~~0~~	500		
	Cocks Foot	1			
SG	Native raspberry (photo) Rubus parvifolius	1	5		
	St Johns wort	0.1	30	HTE	
FG	Dichondra repens	5			
	Echium	0.1	20		
GG	Poa Labilladieri a	5			
GG	Aristida sp ramosa	0.1	10		
FG	Forb 1 Asperula scoparia	0.5	500		
	Forb 2	0.1	20		
	Blue Forb photo	0.1	10		
	Sheep sorrell	0.1	50	HTE	
FG	Chrysocephalum semipapposum	0.1	5		
	TG 3 55				
	SG 2 1.1				
	GG 4 15.1				
	FG 7 20.7				

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)
Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).
Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems
N=native, E=exotic, HTE=high threat exotic
All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc
Identify top 3 dominants in each stratum (use own stratum definitions) Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 31/1/19	Survey Name	McMillans	
Recorders		Plot ID # 31011904	Zone ID 1093 Mod.
Photo #		Plot dimensions 20 x 50	
Datum 721415	Zone 56 6303341	Plot bearing along midline 245	
Easting 33.373 09	Northing 150.005 65	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type 1093	Condition state Moderate

Floristics plot is centred on the midline, at 0 m point, 10 m either side

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x 20 m / 10 x 40 m

		Sum values*
Native Richness (count of native species)	Trees	2
	Shrubs	2
	Grasses etc	6
	Forbs	2
	Ferns	0
	Other	0
Cover (sum of cover of natives species)	Trees	50
	Shrubs	0.6
	Grasses etc	10.4
	Forbs	5.1
	Ferns	0
	Other	0
High threat weed cover		0.0

*These values summarise the floristic data for input into BAM calculator

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20 x 50 m / 10 x 100 m

Tree stem DBH (cm)		Notes on function attributes:
>80	(#) 1	Stem size class records # large trees (cf. benchmark)
50 - 79	(#) –	Record stems for living trees only, and for all species
30 - 49	(+/-) ✓	For multistemmed trees, record only the largest stem
20 - 29	(+/-) ✓	Presence of <5cm stems records regeneration
10 - 19	(+/-) ✓	Record # trees with hollows, not number of hollows
5 - 9	(+/-) ✓	Count as one stem where tree is multistemmed
< 5	(+/-) ✓	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows		Total #
1	<20cm III	5
	>20cm** II	
Length of logs		Total (m) 13

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots) Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	100	90	85	85	90	90
	Bare ground	0	0	5	10	0	3
	Cryptogam	0	0	0	0	0	0
	Rock	0	0	0	0	0	0

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	2	0	Microrelief
Cultivation	0		Slope lower slope
Grazing (native / stock)	0		Aspect north
Soil erosion	0		Soil surface texture loam
Firewood removal	0		Soil colour grey
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage run off
Storm damage	0		Distance to nearest water 150m
Weediness	3	R	Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes

BAM Plot - Field Survey Sheet

Date 31/1/19	Survey Name McPhillamys			
Recorders		Plot ID # 31011904	Zone ID	

GF code	Genus species (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
SG	Cassinia laevis	0.1	2		
	St Johns Wort	0.1	100	HTE	
	Plantago sp	5	~~500~~		
	Echium	1	100		
SG	Acacia dealbata	0.5	10		
GG	Rhytidosperma (from 30/1/19) pallida	5			
GG	Themeda triandra	0.1	5		
GG	Panicum effusum	0.1	5		
HTW	Sweet briar	0.1	1	HTE	
GG	Poa sieberiana	5			
	Grass (photo)	5			
Veronica?	Blue forb (31014103)	0.1	10		
	Senecio (3001119)	0.1	5		
HTW	Blackberry	0.5	1	HTE	
	Phalaris sp	~~1~~ 0.5	100		
FG	Acaena (long flower) echinata	5			
	Paspalum sp	1	100		
GG	Austrostipa scabra	0.1	20		
GG	Lomandra filiformis	0.1	5		
FG	Oxalis perennans	0.1	50		
	Hypochaeris glabra	0.1	20		
TG	E. pauciflora	20			
	~~Fruit (smooth bark juvenile phs)~~				
TG	E. rossii	30			
	TG 2 50				
	SG 2 0.6				
	GG 6 10.4				
	FG 2 5.1				
	HTW 0.6				

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)

Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).

Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems

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

All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc

Identify top 3 dominants in each stratum (use own stratum definitions)

Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

Rytidosperma

BAM Plot - Field Survey Sheet

Date 31/1/19	Survey Name McWilliams		
Recorders		Plot ID # 2011905	Zone ID 1093 Poor
Photo #		Plot dimensions 20x50	
Datum	Zone 55	Plot bearing along midline 65	
Easting 758708	Northing 6295121	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type 1093	Condition state Poor

Floristics plot is centred on the midline, at 0 m point, 10 m either side

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20x20 m | 10 x 40 m

		Sum values*
Native Richness (count of native species)	Trees	1
	Shrubs	11
	Grasses etc	6
	Forbs	2
	Ferns	1
	Other	0
Cover (sum of cover of natives species)	Trees	5
	Shrubs	9.5
	Grasses etc	51.6
	Forbs	0.2
	Ferns	0.1
	Other	0
High threat weed cover		0

*These values summarise the floristic data for input into BAM calculator

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20x50 m | 10 x 100 m

Tree stem DBH (cm)		
>80	(#)	0
50 - 79	(#)	0
30 - 49	(+/-)	-
20 - 29	(+/-)	-
10 - 19	(+/-)	-
5 - 9	(+/-)	-
< 5	(+/-)	✓

Notes on function attributes:
- Stem size class records # large trees (cf. benchmark)
- Record stems for living trees only, and for all species
- For multistemmed trees, record only the largest stem
- Presence of <5cm stems records regeneration
- Record # trees with hollows, not number of hollows
- Count as one stem where tree is multistemmed
- Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows	<20cm	Total # 0
	>20cm**	
Length of logs		Total (m) 5

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots) Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	50	80	80	80	60	70
	Bare ground	40	15	0	10	40	21
	Cryptogam	5	5	15	0	0	5
	Rock	0	0	0	0	0	0

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	3	NR	Microrelief
Cultivation	0		Slope Midslope
Grazing (native / stock)	0		Aspect SW
Soil erosion	0		Soil surface texture Sandy loam
Firewood removal	0		Soil colour grey
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage run off
Storm damage	0		Distance to nearest water 200m
Weediness	1	R	Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes Riverine remnant and road corridor.

BAM Plot - Field Survey Sheet

Date 31/1/19	Survey Name McPhillamys				
Recorders		Plot ID #3101905		Zone ID	
GF code	*Genus species* (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
GG	Themeda triandra	40		N	L
SG	Epacrid 1 Brachyloma daphnoides	5		N	L
SG	Epacrid 2 Melichrus urceolatus	1	20	N	L
SG	Acrotriche sp ramosa	28		N	L
SG	~~Epacrid 3~~ Styphelia triflora Styphelia tubiflora	0.1	5	N	M
GG	Dianella sp revoluta	1	50	N	L
GG	Yellow lily (photos) Hypoxis vaginata	0.1	100	N	L
EG	Cheilanthes sp	0.1	50	N	L
SG	Cassinia ~~sp~~ aculeata	1	5	N	
TG	Euc 1 (Long-leaved Box)	5		N	
GG	Poa ~~labillardieri~~ sieberiana	10		N	
	~~Stipa~~	~~0.1~~	~~5~~		
SG	Acacia doalbeta	0.1	5	N	
SG	Pea 1 Dillwynia phylicoides	0.5	20	N	
Rhodanthe stricklandii	~~Orchid sp1 Caladenia carnea~~	0.1	20	E	
SG	Astroloma sp (photo) humifusum	1	30	N	
SG	Bursaria spinosa	0.1	1	N	
SG	Olearia sp. (photo)	0.5	20	N	
FG	Goodenia ~~sp1~~ hederacea	0.1	30	N	
FG	Chrysocephalum apiculatum	0.1	30	N	
FG	Hypochaeris glabra	0.1	10	E	
SG	Epacrid 3 Leucopogon virgatus	0.1	1	N	
SG	Hibbertia obtusifolia	0.1	5	N	
GG	Lomandra filiformis	0.5	50	N	

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)

Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).

Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems

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

All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc

Identify top 3 dominants in each stratum (use own stratum definitions)

Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 14/8/18	Survey Name McPhillamy's		
Recorders Jesse Carpenter.		Plot ID # MAC01	Zone ID 654 ~~Moderate~~ Poor
Photo # MAC01		Plot dimensions 20x50	
Datum GDA 94	Zone 55	Plot bearing along midline	98°
Easting 737872	Northing 6293936	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	South Eastern Highlands
Subregion	Bathurst
Likely Vegetation Class	Southern Tablelands Grassy Woodlands
Plant Community Type	654
Condition state	~~Moderate~~ Poor

Floristics plot is centred on the midline, at 0 m point, 10 m either side

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x 20 m | 10 x 40 m

		Sum values*
Native Richness (count of native species)	Trees	1
	Shrubs	0
	Grasses etc	1
	Forbs	1
	Ferns	0
	Other	1
Cover (sum of cover of natives species)	Trees	30
	Shrubs	0
	Grasses etc	5
	Forbs	0.1
	Ferns	0
	Other	0.5
High threat weed cover		5.1

*These values summarise the floristic data for input into BAM calculator

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20 x 50 m | 10 x 100 m

Tree stem DBH (cm)		Notes on function attributes:
>80	(#) 0	Stem size class records # large trees (cf. benchmark)
50 - 79	(#) 0	Record stems for living trees only, and for all species
30 - 49	(+/-) ✓	For multistemmed trees, record only the largest stem
20 - 29	(+/-) ✓	Presence of <5cm stems records regeneration
10 - 19	(+/-) –	Record # trees with hollows, not number of hollows
5 - 9	(+/-) –	Count as one stem where tree is multistemmed
< 5	(+/-) ✓	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows	<20cm	Total #
0	>20cm**	0

Length of logs	Total (m)
	0

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots) Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	60	60	80	40	80	64
	Bare ground	20	5	<5	50	0	15.6
	Cryptogam	0	0	0	0	0	0
	Rock	0	0	0	0	0	0

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	2	O	Microrelief
Cultivation	0		Slope
Grazing (native / stock)	3	R	Aspect
Soil erosion	0		Soil surface texture
Firewood removal	2	R	Soil colour
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage
Storm damage	0		Distance to nearest water
Weediness	2	R	Distance to nearest rock outcrop / cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes Very dry. Grasses / forbs difficult to identify due to climatic conditions and grazing impact. No mid-layer present.

BAM Plot - Field Survey Sheet

Date 14/8/18	**Survey Name** McPhillamys				
Recorders JESSE CARPENTER		**Plot ID #** MACO1		**Zone ID**	
GF code	***Genus species*** (tick if photographed or sample taken)	**Cover %**	**Abund** (count)	**N, E, HTE**	Stratum
TG	Eucalyptus bridgesiana	30		N	U.
FG	Plantago lanceolata	5		E	L
GG	Bothriochloa macra	5		N	L
FG	Chrysocephalum apiculatum	0·1	20	N	L
FG	Brassica tournefortii	5		HTE	L
FG	Verbascum virgatum	0·1	1	E	L
FG	Echium plantagineum	0·5	20	E	L
FG	Erodium cicutarium	10		E	L
OG	Amyema sp.	0·5	5	N	U.
FG	Hypericum perforatum	0·1	30	HTE	L

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)

Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).

Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems

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

All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc

Identify top 3 dominants in each stratum (use own stratum definitions)   Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 14/8/18	Survey Name Mr Williams.		
Recorders JC.		Plot ID # MAC02	Zone ID Non-native
Photo # MAC02		Plot dimensions 20x50	
Datum GDA 94	Zone 55	Plot bearing along midline 255°	
Easting 738582	Northing 6293807	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	STH. CASTERN HIGHLANDS
Subregion	BATHURST
Likely Vegetation Class	STH. TABLELANDS GRASSY WOODLAND
Plant Community Type	Non-native — Condition state —

Floristics plot is centred on the midline, at 0 m point, 10 m either side

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x 20 m | 10 x 40 m

		Sum values*
Native Richness (count of native species)	Trees	0
	Shrubs	0
	Grasses etc	2
	Forbs	0
	Ferns	0
	Other	0
Cover (sum of cover of natives species)	Trees	0
	Shrubs	0
	Grasses etc	5-3
	Forbs	0
	Ferns	0
	Other	0
High threat weed cover		10-1

*These values summarise the floristic data for input into BAM calculator

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20 x 50 m | 10 x 100 m

Tree stem DBH (cm)

>80	(#)	—
50 - 79	(#)	—
30 - 49	(+/-)	—
20 - 29	(+/-)	—
10 - 19	(+/-)	—
5 - 9	(+/-)	—
< 5	(+/-)	—

Notes on function attributes:

- Stem size class records # large trees (cf. benchmark)
- Record stems for living trees only, and for all species
- For multistemmed trees, record only the largest stem
- Presence of <5cm stems records regeneration
- Record # trees with hollows, not number of hollows
- Count as one stem where tree is multistemmed
- Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows: 0	<20cm	Total # 0
	>20cm**	
Length of logs		Total (m) 0

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots)

Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	90	85	85	30	20	61
	Bare ground	0	5	5	20	0	6
	Cryptogam	0	0	0	0	0	0
	Rock	0	0	0	0	0	0

Litter / groundcover plots are located at 5, 1S, 2S, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	3	O	Microrelief
Cultivation	0		Slope
Grazing (native / stock)	3	R	Aspect
Soil erosion	0		Soil surface texture
Firewood removal	0		Soil colour
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage
Storm damage	0		Distance to nearest water
Weediness	3	R	Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes Very dry, but new growth of exotic forbs and grasses present. Few native species /prevalence of tussocks. High grazing pressure.

BAM Plot - Field Survey Sheet

Date 14/8/18	Survey Name McPhillamys				
Recorders JC		Plot ID # MPC02		Zone ID Non-native	
GF code	***Genus species*** (tick if photographed or sample taken)	**Cover %**	**Abund** (count)	**N, E, HTE**	**Stratum**
FG	Lactuca serriola	70		E	L
FG	Brassica tournefortii	10		~~HTE~~	L
GG	Eragrostis leptostachya	0.5	50	N	L
SG	Rosa rubiginosa	0.1	2	~~HTE~~	M
GG	Bothriochloa macra	5		N	L
FG	Onopordum acanthium	1	50	E	L
GG	Phalaris aquatica	20		E	L
FG	Echium plantagineum	0.3	50	E	L
GG	Avena barbata	5		E	L

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)

Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).

Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems

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

All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc

Identify top 3 dominants in each stratum (use own stratum definitions)

Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 14/8/18	**Survey Name** Mt Hillaman's		
Recorders JC		**Plot ID #** MAC03	**Zone ID** 85 Poor
Photo # MAC03		**Plot dimensions** 20x50	
Datum GDA94	**Zone** 55	**Plot bearing along midline** 188°	
Easting 742728	**Northing** 6294271	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	Sth East Highlands
Subregion	Bathurst
Likely Vegetation Class	Eastern Riverine Forests
Plant Community Type	85 **Condition state** Poor

Floristics plot is centred on the midline, at 0 m point, 10 m either side

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x 20 m | 10 x 40 m

		Sum values*
Native Richness (count of native species)	**Trees**	1
	Shrubs	0
	Grasses etc	3
	Forbs	0
	Ferns	0
	Other	0
Cover (sum of cover of natives species)	**Trees**	5
	Shrubs	0
	Grasses etc	45.1
	Forbs	0
	Ferns	0
	Other	0
High threat weed cover		0.6

*These values summarise the floristic data for input into BAM calculator

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20x50 m | 10 x 100 m

Tree stem DBH (cm)

>80	(#)	—
50 - 79	(#)	—
30 - 49	(+/-)	—
20 - 29	(+/-)	1
10 - 19	(+/-)	—
5 - 9	(+/-)	—
< 5	(+/-)	—

Notes on function attributes:
- Stem size class records # large trees (cf. benchmark)
- Record stems for living trees only, and for all species
- For multistemmed trees, record only the largest stem
- Presence of <5cm stems records regeneration
- Record # trees with hollows, not number of hollows
- Count as one stem where tree is multistemmed
- Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows 0	<20cm	Total # 0
	>20cm**	
Length of logs		Total (m) 0

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots) Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	**Litter**	90	70	80	100	90	86
	Bare ground	5	20	0	—	0	5
	Cryptogam	0	0	0	—	0	0
	Rock	0	0	0	—	0	0

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	3	0	Microrelief
Cultivation	1	R	Slope
Grazing (native / stock)	0		Aspect
Soil erosion	0		Soil surface texture
Firewood removal	0		Soil colour
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage
Storm damage	0		Distance to nearest water
Weediness	2	R	Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes Very sparse over storey and no mid-storey present. Native grasses dominate lower storey. Disturbed by vehicles / public use / grazing.

BAM Plot - Field Survey Sheet

Date 14/8/18	Survey Name McWilliams				
Recorders JC		Plot ID # MAC 03		Zone ID 85 Poor	
GF code	***Genus species*** (tick if photographed or sample taken)	**Cover %**	**Abund** (count)	**N, E, HTE**	**Stratum**
TG	*Casuarina cunninghamii*	5	1	N	L
FG	*Rumex crispus*	0.1	10	E	L
FG	*Marrubium vulgare*	0.1	3	E	L
FG	*Brassica tournefortii*	0.5	50	HTE	L
GG	*Phragmites sp.*	5		N	L
GG	*Poa labillardieri*	40		N	L
FG	*Onopordum acanthium*	0.1	5	E	L
FG	*Scolymus hispanicus*	0.1	5	E	L
GG	*Phalaris aquatica*	20		E	L
GG	*Juncus sp.*	0.1	5	N	L
FG	*Acetosella vulgaris*	0.1	50	HTE	L
FG	*Lactuca serriola*	0.5	100	E	L

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)

Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).

Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems

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

All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc

Identify top 3 dominants in each stratum (use own stratum definitions) Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 14/8/18	Survey Name McPhillamys		
Recorders JC		Plot ID # MAC04	Zone ID 1093 Poor
Photo # MAC04		Plot dimensions 20x50	
Datum GDA 94	Zone 55	Plot bearing along midline 98	
Easting 707909	Northing 6295189	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	STIM EASTERN HIGHLANDS
Subregion	HILL END
Likely Vegetation Class	TEMPERATE MONTANE GRASSLANDS.
Plant Community Type	1093 — Condition state Poor

Floristics plot is centred on the midline, at 0 m point, 10 m either side

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x 20 m | 10 x 40 m

		Sum values*
Native Richness (count of native species)	Trees	0
	Shrubs	1
	Grasses etc	5
	Forbs	1
	Ferns	1
	Other	0
Cover (sum of cover of natives species)	Trees	0
	Shrubs	10
	Grasses etc	23
	Forbs	0.1
	Ferns	0.1
	Other	0
High threat weed cover		0.5

*These values summarise the floristic data for input into BAM calculator

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20 x 50 m | 10 x 100 m

Tree stem DBH (cm)		Notes on function attributes:
>80	(#) –	Stem size class records # large trees (cf. benchmark)
50 - 79	(#) –	Record stems for living trees only, and for all species
30 - 49	(+/-) –	For multistemmed trees, record only the largest stem
20 - 29	(+/-) –	Presence of <5cm stems records regeneration
10 - 19	(+/-) –	Record # trees with hollows, not number of hollows
5 - 9	(+/-) –	Count as one stem where tree is multistemmed
< 5	(+/-) –	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows	<20cm	Total # 0
	>20cm**	
Length of logs		Total (m) 17

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots) Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	80	60	80	50	65	63
	Bare ground	5	30	15	10	25	17
	Cryptogam	10	0	5	30	0	9
	Rock	0	0	0	0	0	0

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	3	O	Microrelief
Cultivation	0		Slope
Grazing (native / stock)	1	R	Aspect
Soil erosion	0		Soil surface texture
Firewood removal	0		Soil colour
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage
Storm damage	0		Distance to nearest water
Weediness	1	R	Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes

Mixture of native not exotic grasses/ forbs. Sparse native mid-layer. No upper layer present.

BAM Plot - Field Survey Sheet

Date 14/8/18	Survey Name McMillans				
Recorders JC		Plot ID # MAC04		Zone ID	
GF code	*Genus species* (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
SG	Acacia dealbata	10		N	M
FG	Plantago sp.	5		E	L
GG	Avena barbata	0.1	100	E	L
FG	Hypochaeris glabra	5		E	L
GG	Bothriochloa macra	10		N	L
TG	Malus pumila	25		E	M
GG	Rytidosperma pallidum	1	100	N	L
EG	Cheilanthes sp.	0.1	10	N	L
GG	Cynodon dactylon	1	300	E	L
GG	Bidbeda ramosa	1	10	N	L
GG	Panicum effusum	1	5	N	L
FG	Erodium botrys	0.1	5	E	L
FG	Wahlenbergia sp	0.1	10	N	L
FG	Hypericum perforatum	0.5	100	HTE	L

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)

Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).

Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems

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

All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc

Identify top 3 dominants in each stratum (use own stratum definitions)

Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 15/8/18	Survey Name McPhillamys		
Recorders JC		Plot ID # MAC05	Zone ID 1093 Good
Photo # MAC05		Plot dimensions 10x100	
Datum GDA 94	Zone 55	Plot bearing along midline 85	
Easting 758984	Northing 6295194	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	STH. EAST HIGHLANDS
Subregion	HILL END
Likely Vegetation Class	STHN TABLELANDS DRY SCLEROPHYLL FOREST
Plant Community Type	1093 Condition state Good

Floristics plot is centred on the midline, at 0 m point, 10 m either side

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x 20 m; 10 x (40) m

		Sum values*
Native Richness (count of native species)	Trees	3
	Shrubs	4
	Grasses etc	6
	Forbs	4
	Ferns	0
	Other	1
Cover (sum of cover of natives species)	Trees	70
	Shrubs	15.6
	Grasses etc	20.9
	Forbs	1.2
	Ferns	0
	Other	5
High threat weed cover		0.6

*These values summarise the floristic data for input into BAM calculator

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20 x 50 m; 10 x (100) m

Tree stem DBH (cm)		Notes on function attributes:
>80	(#) –	Stem size class records # large trees (cf. benchmark)
50 - 79	(#) 1	Record stems for living trees only, and for all species
30 - 49	(+/-) ✓	For multistemmed trees, record only the largest stem
20 - 29	(+/-) ✓	Presence of <5cm stems records regeneration
10 - 19	(+/-) ✓	Record # trees with hollows, not number of hollows
5 - 9	(+/-) ✓	Count as one stem where tree is multistemmed
< 5	(+/-) ✓	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows		Total #
1	<20cm 2	2
	>20cm** 0	

Length of logs	Total (m)
	0

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots) Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	80	95	90	70	90	85
	Bare ground	5	5	0	20	0	6
	Cryptogam	5	0	0	0	0	1
	Rock	0	0	0	0	0	0

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	2	O	Microrelief
Cultivation	0		Slope
Grazing (native / stock)	1	R	Aspect
Soil erosion	0		Soil surface texture
Firewood removal	0		Soil colour
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage
Storm damage	0		Distance to nearest water
Weediness	1	R	Distance to nearest rock outcrop / cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes All vegetation layers present. Grasses + Forbs difficult to identify due to dry climatic condition.

BAM Plot - Field Survey Sheet

Date 15/8/18	Survey Name McKellars				
Recorders JC		Plot ID # MAC05		Zone ID	
GF code	Genus species (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
SG	Cassinia arcuata	10		N	M
SG	Acacia deanii	5		N	M
GG	Phalaris sp	15		E	L
GG	Lomandra longifolia	10		N	L
SG	Styphelia triflora	0.1	2	N	M
GG	Dianella revoluta	0.5	50	N	L
SG	Brachyloma daphnoides	0.5	5	N	M
GG	Poa sieberiana	0.2	200	N	L
FG	Erodium cicutarium	5		E	L
FG	Linum marginale	0.1	50	N	L
SG	Rosa rubiginosa	0.5	10	HTE	M
TG	Eucalyptus goniocalyx	50		N	U
FG	Geranium granuticola	0.1	10	N	L
FG	Plantago lanceolata	0.5	200	E	L
SG	Rubus fruticosus	0.1	1	HTE	M
GG	Eragrostis sp	10		N	L
OG	Amygema miquelii	5		N	U
GG	Panicum effusum	0.1	2	N	L
FG	Aerotriche semulata	0.5	50	N	L
TG	Eucalyptus mannifera	5		N	U
TG	Eucalyptus sp.	15		N	U

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)

Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).

Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems

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

All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc

Identify top 3 dominants in each stratum (use own stratum definitions) Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 15/8/18	Survey Name McPhillamys		
Recorders JC		Plot ID # MAC07	Zone ID 1093 Good
Photo # MAC07		Plot dimensions 20x50	
Datum GDA 94	Zone 55	Plot bearing along midline 255	
Easting 758988	Northing 6296050	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	SYM EASTERN HIGHLANDS
Subregion	HILL END
Likely Vegetation Class	SYM TABLELANDS DRY SCLEROPHYLL FORESTS
Plant Community Type	1093 — Condition state Good

Floristics plot is centred on the midline, at 0 m point, 10 m either side

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20x20 m (circled) | 10 x 40 m

		Sum values*
Native Richness (count of native species)	Trees	2
	Shrubs	7
	Grasses etc	2
	Forbs	4
	Ferns	0
	Other	1
Cover (sum of cover of natives species)	Trees	95
	Shrubs	54.2
	Grasses etc	10.5
	Forbs	0.4
	Ferns	0
	Other	5
High threat weed cover		0.1

*These values summarise the floristic data for input into BAM calculator

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20x50 m (circled) | 10 x 100 m

Tree stem DBH (cm)

>80	(#)	0
50 - 79	(#)	1
30 - 49	(+/-)	0
20 - 29	(+/-)	✓
10 - 19	(+/-)	✓
5 - 9	(+/-)	✓
< 5	(+/-)	✓

Notes on function attributes:

- Stem size class records # large trees (cf. benchmark)
- Record stems for living trees only, and for all species
- For multistemmed trees, record only the largest stem
- Presence of <5cm stems records regeneration
- Record # trees with hollows, not number of hollows
- Count as one stem where tree is multistemmed
- Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows: 1	<20cm	2	Total # 3
	>20cm**	1	
Length of logs: 11			Total (m) 3

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots) Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	100	90	90	95	60	87
	Bare ground	0	0	5	0	40	9
	Cryptogam	0	5	1	0	0	1.2
	Rock	0	0	0	0	0	0

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	2	O	Microrelief
Cultivation	0		Slope
Grazing (native / stock)	1	R	Aspect
Soil erosion	0		Soil surface texture
Firewood removal	0		Soil colour
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage
Storm damage	0		Distance to nearest water
Weediness	1	R	Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes All vegetation layers present. Small patch surrounded by Pines plantation. Higher diversity / cover of mid/shrub layer than most sites.

BAM Plot - Field Survey Sheet

Date 15/8/19	Survey Name Mc Phillamys				
Recorders JC		Plot ID # MAC07		Zone ID	
GF code	Genus species (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
TG	Eucalyptus mannifera	40		N	C
TG	Eucalyptus goniocalyx	55		N	C
SG	Cassinia arcuata	35		N	M
SG	Acacia dealbata	10		N	M
SG	Acrotriche serrulata	3	2	N	L
FG	Senecio sp	0.1	5	N	L
SG	Brachyloma daphnoides	5		N	M
GG	Dianella revoluta	0.5	50	N	L
TG	Pinus radiata	0.1	5	~~HTE~~	M
OG	Amyema miquelii	5		N	C
SG	Acacia gunnii	0.1	1	N	M
SG	Dillwynia phylicoides	0.1	2	N	M
SG	Leucopogon fletcheri	~~1~~	1 ~~3~~	N	M
FG	Euchiton japonicus	0.1	30	N	L
FG	Geranium graniticola	0.1	1	N	L
GG	Poa sieberiana	10		N	L
FG	Viola ~~sieb~~ betonicifolia	0.1	1	N	L

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)

Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).

Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems

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

All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc

Identify top 3 dominants in each stratum (use own stratum definitions) Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 15/8/18	**Survey Name** Mt Phillamungs		
Recorders JC		**Plot ID #** MAC08	**Zone ID** 727 ~~Moderate~~ Good
Photo # MAC 08		**Plot dimensions** 20x50	
Datum GDA 94	**Zone** 55	**Plot bearing along midline** 27°	
Easting 760691	**Northing** 6297634	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	STH EASTERN HIGHLANDS
Subregion	HILL END
Likely Vegetation Class	
Plant Community Type	727 **Condition state** ~~Moderate~~ Good

Floristics plot is centred on the midline, at 0 m point, 10 m either side

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x (20) m; 10 x 40 m

		Sum values*
Native Richness (count of native species)	**Trees**	2
	Shrubs	3
	Grasses etc	4
	Forbs	9
	Ferns	1
	Other	0
Cover (sum of cover of natives species)	**Trees**	75
	Shrubs	7
	Grasses etc	95
	Forbs	3
	Ferns	15
	Other	0
High threat weed cover		6.1

*These values summarise the floristic data for input into BAM calculator

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20 x (50) m; 10 x 100 m

Tree stem DBH (cm)		Notes on function attributes:
>80	(#) 0	Stem size class records # large trees (cf. benchmark)
50 - 79	(#) 1	Record stems for living trees only, and for all species
30 - 49	(+/-) –	For multistemmed trees, record only the largest stem
20 - 29	(+/-) –	Presence of <5cm stems records regeneration
10 - 19	(+/-) ✓	Record # trees with hollows, not number of hollows
5 - 9	(+/-) ✓	Count as one stem where tree is multistemmed
< 5	(+/-) ✓	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows	<20cm	Total # 0
	>20cm**	
Length of logs		Total (m) 4

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots) Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	**Litter**	70	100	50	80	100	80
	Bare ground	0	–	–	–	–	0
	Cryptogam	0	–	5	–	–	1
	Rock	0	–	–	–	–	0

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	3	O	Microrelief
Cultivation	0		Slope
Grazing (native / stock)	1	R	Aspect
Soil erosion	1	R	Soil surface texture
Firewood removal	0		Soil colour
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage
Storm damage	0		Distance to nearest water
Weediness	2	R	Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes

Almost no mature upper layer present. Regenerating tree species. Site disturbed by public access, vehicles, bikes.

BAM Plot - Field Survey Sheet

Date 15/8/18	Survey Name McPhillamys				
Recorders SC		Plot ID # M4E08		Zone ID	
GF code	**Genus species** (tick if photographed or sample taken)	**Cover %**	**Abund** (count)	**N, E, HTE**	**Stratum**
SG	Lomatia myricoides	1	2	N	M
FG	Veronica calycina	0.1	50	N	L
EG	Pteridium esculentum	15		N	L
SG	Cytisus scoparius	5		HTE	M
SG	Rubus fruticosus	1	10	HTE	M
FG	Linum marginale	0.5	50	N	L
GG	Lomandra longifolia	5		N	L
FG	Acrotriche serrulata	0.1	10	N	L
SG	Acacia falciformis	5		N	M
TG	Eucalyptus mannifera	50		N	L1
TG	Eucalyptus dives	25		N	M
GG	Poa sieberiana	50		N	L
FG	Geranium granitiasla	0.5	50	N	L
FG	Chrysocephalum apiculatum	0.5	50	N	L
GG	Joycea pallida	20		N	L
FG	Minuartia mediterranea	0.1	5	E	L
SG	Cassinia aculeata	1	3	N	M
TG	Pinus radiata	0.1	2	HTE	M
FG	Dichondra repens	0.1	200	N	L
FG	Acaena novae-zelandiae	0.1	300	N	L
FG	Hypochaeris glabra	0.1	100	E	L
FG	Viola betonicifolia	0.1	2	N	L

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)

Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).

Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems

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

All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc

Identify top 3 dominants in each stratum (use own stratum definitions)

Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 15/8/18	Survey Name McPhillamys		
Recorders JC		Plot ID # MAC09	Zone ID 727 Poor
Photo # MAC09		Plot dimensions 20x50	
Datum GDA 94	Zone	Plot bearing along midline 105	
Easting 761016	Northing 6297427	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	STH EASTERN HIGHLANDS
Subregion	HILL END
Likely Vegetation Class	
Plant Community Type	727
Condition state	Poor

Floristics plot is centred on the midline, at 0 m point, 10 m either side

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x 20 m / 10 x 40 m

		Sum values*
Native Richness (count of native species)	Trees	1
	Shrubs	4
	Grasses etc	4
	Forbs	10
	Ferns	1
	Other	0
Cover (sum of cover of natives species)	Trees	85
	Shrubs	1.3
	Grasses etc	95.1
	Forbs	9.9
	Ferns	5
	Other	0
High threat weed cover		0.5

*These values summarise the floristic data for input into BAM calculator

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20 x 50 m / 10 x 100 m

Tree stem DBH (cm)		Notes on function attributes:
>80	(#)	Stem size class records # large trees (cf. benchmark)
50 - 79	(#)	Record stems for living trees only, and for all species
30 - 49	(+/-)	For multistemmed trees, record only the largest stem
20 - 29	(+/-)	Presence of <5cm stems records regeneration
10 - 19	(+/-) ✓	Record # trees with hollows, not number of hollows
5 - 9	(+/-)	Count as one stem where tree is multistemmed
< 5	(+/-) ✓	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows		Total #
0	<20cm	
	>20cm**	0

Length of logs	Total (m)
	0

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots) Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	85	90	90	90	60	83
	Bare ground	0	0	0	0	5	1
	Cryptogam	5	0	5	5	20	7
	Rock	0	0	0	0	0	0

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	3	NR	Microrelief
Cultivation	0		Slope
Grazing (native / stock)	3	R	Aspect
Soil erosion	0		Soil surface texture
Firewood removal	0		Soil colour
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage
Storm damage	0		Distance to nearest water
Weediness	0		Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes

BAM Plot - Field Survey Sheet

Date 15/8/18	Survey Name M. Williams				
Recorders JC		Plot ID # M4C09		Zone ID	
GF code	*Genus species* (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
SG	Acacia falciformis	1	0	N	M
EG	Pteridium esculentum	2	150	N	L
GG	Lomandra longifolia	10		N	L
SG	Rubus fruticosus	0.5	6	HTE	M
FG	Senecio quadridentatus	0.1	25	N	L
GG	Poa sieberiana	5		N	L
GG	Rytidosperma pallidum	80		N	L
SG	Cassinia sp.	0.1	1	N	M
FG	Wahlenbergia sp.	0.1	50	N	L
SG	Leucopogon virgatus	0.1	1	N	M
GG	Lomandra multiflora	0.1	50	N	L
FG	Acrotriche serrulata	1	70	N	L
FG	Hypochaeris glabra	0.1	50	E	L
FG	Acaena novae-zelandiae	0.1	100	N	L
FG	Minuartia mediterranea	0.1	50	E	L
FG	Geranium graniticola	0.1	100	N	L
FG	Linum marginale	0.5	100	N	L
SG	Hibbertia obtusifolia	0.1	1	N	M
TG	Eucalyptus macrorhyncha	5		N	U
FG	Dichondra repens	5		N	L
FG	Viola betonicifolia	1	200	N	L
FG	Veronica calycina	1	200	N	L
FG	Chrysocephalum apiculatum	1	10	N	L

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)

Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).

Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems

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

All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc

Identify top 3 dominants in each stratum (use own stratum definitions)

Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 15/8/18	**Survey Name** McMillans		
Recorders JC		**Plot ID #** MAC10	**Zone ID** Non-native
Photo # MAC10		**Plot dimensions** 20x50	
Datum GDA 94	**Zone** 55	**Plot bearing along midline** 78	
Easting 761920	**Northing** 6297937	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	STH EASTERN HIGHLANDS
Subregion	HILL END
Likely Vegetation Class	
Plant Community Type	Non-native. **Condition state**

Floristics plot is centred on the midline, at 0 m point, 10 m either side

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x 20 m (circled) | 10 x 40 m

		Sum values*
Native Richness (count of native species)	**Trees**	0
	Shrubs	0
	Grasses etc	1
	Forbs	0
	Ferns	1
	Other	0
Cover (sum of cover of natives species)	**Trees**	0
	Shrubs	0
	Grasses etc	0.1
	Forbs	0
	Ferns	0.5
	Other	0
High threat weed cover		105

*These values summarise the floristic data for input into BAM calculator

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20 x 50 m (circled) | 10 x 100 m

Tree stem DBH (cm)		Notes on function attributes:
>80	(#) 0	Stem size class records # large trees (cf. benchmark)
50 - 79	(#) 0	Record stems for living trees only, and for all species
30 - 49	(+/-) –	For multistemmed trees, record only the largest stem
20 - 29	(+/-) ✓	Presence of <5cm stems records regeneration
10 - 19	(+/-) ✓	Record # trees with hollows, not number of hollows
5 - 9	(+/-) –	Count as one stem where tree is multistemmed
< 5	(+/-) –	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows 0	<20cm	Total # 0
	>20cm**	
Length of logs ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ II		Total (m) 57

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots) Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	**Litter**	100	100	100	100	100	100
	Bare ground	–	–	–	–	–	0
	Cryptogam	–	–	–	–	–	0
	Rock	–	–	–	–	–	0

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	3	R	Microrelief
Cultivation	3	R	Slope
Grazing (native / stock)	0		Aspect
Soil erosion	0		Soil surface texture
Firewood removal	0		Soil colour
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage
Storm damage	0		Distance to nearest water
Weediness	3	R	Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes Pinus radiata plantation.

BAM Plot - Field Survey Sheet

Date 15/8/18	Survey Name McPhillamys			
Recorders JC		Plot ID # MAC10		Zone ID Non-woodland

GF code	*Genus species* (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
TG	*Pinus radiata*	25		HTE	U
SG	*Rubus fruticosus*	10		HTE	M
EG	*Pteridium esculentum*	0.5	50	N	L
FG	*Plantago lanceolata*	0.1	3	E	L
GG	*Lomandra longifolia*	0.1	3	N	L

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)

Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).

Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems

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

All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc

Identify top 3 dominants in each stratum (use own stratum definitions)

Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% = 2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 15/8/18	**Survey Name** Mt Philemon		
Recorders JC		**Plot ID #** MAC 11	**Zone ID** 765 Moderate
Photo # MAC 11		**Plot dimensions** 20x50	
Datum GDA94	**Zone** 55	**Plot bearing along midline** 197	
Easting 763094	**Northing** 6298435	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	SOUTH EASTERN HIGHLANDS
Subregion	
Likely Vegetation Class	
Plant Community Type	~~765~~ E 765 **Condition state** Moderate

Floristics plot is centred on the midline, at 0 m point, 10 m either side

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x (20) m; 10 x 40 m

		Sum values*
Native Richness (count of native species)	**Trees**	0
	Shrubs	0
	Grasses etc	6
	Forbs	1
	Ferns	1
	Other	0
Cover (sum of cover of natives species)	**Trees**	0
	Shrubs	0
	Grasses etc	56.1
	Forbs	70
	Ferns	0.1
	Other	0
High threat weed cover		5

*These values summarise the floristic data for input into BAM calculator

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20 x (50) m; 10 x 100 m

Tree stem DBH (cm)

>80	(#)	0
50 - 79	(#)	–
30 - 49	(+/-)	–
20 - 29	(+/-)	✓
10 - 19	(+/-)	✓
5 - 9	(+/-)	–
< 5	(+/-)	✓

Notes on function attributes:

- Stem size class records # large trees (cf. benchmark)
- Record stems for living trees only, and for all species
- For multistemmed trees, record only the largest stem
- Presence of <5cm stems records regeneration
- Record # trees with hollows, not number of hollows
- Count as one stem where tree is multistemmed
- Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows	<20cm	Total # 0
	>20cm**	
Length of logs		Total (m) 2

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots) Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	100	100	100	100	95	90
	Bare ground	–	–	–	–	–	0
	Cryptogam	–	–	–	–	–	0
	Rock	–	–	–	–	–	0

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	2	O	Microrelief
Cultivation	0		Slope
Grazing (native / stock)	0		Aspect
Soil erosion	0		Soil surface texture
Firewood removal	0		Soil colour
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage
Storm damage	0		Distance to nearest water
Weediness	1	R	Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes Wetland area / creek crossing amid Pines plantation. Native ground layer. Only exotic mid upper layer.

BAM Plot - Field Survey Sheet

Date 15/8/18	Survey Name McWilliams.				
Recorders JC		Plot ID # MAC17		Zone ID	
GF code	***Genus species*** (tick if photographed or sample taken)	**Cover %**	**Abund** (count)	**N, E, HTE**	Stratum
FG	Hydrocotyle sibthorpioides	70		N	L
GG	Juncus effusus	5		E	L
GG	Carex appressa	30		N	L
GG	Carex fascicularis	0.1	20	N	L
GG	Phalaris aquatica	0.3	100	E	L
GG	Lomandra sp.	1	10	N	L
EG	Blechnum sp.	0.1	5	N	L
GG	Eleocharis acuta	15		N	L
SG	Rubus fruticosus	5		HTE	M
GG	Shoenus apogon	5		N	L
TG	Pinus radiata	5		E	U

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)

Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).

Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems

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

All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc

Identify top 3 dominants in each stratum (use own stratum definitions)

Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 15/8/18	**Survey Name** Mt Williams		
Recorders JC		**Plot ID #** MAC12	**Zone ID** 1197 Poor
Photo # MAC12		**Plot dimensions** 10x100	
Datum GDA 94	**Zone** 55	**Plot bearing along midline** 125	
Easting 765279	**Northing** 6298330	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	Sth Eastern Highlands
Subregion	Hill End
Likely Vegetation Class	
Plant Community Type	1197 — **Condition state** Poor

Floristics plot is centred on the midline, at 0 m point, 10 m either side

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x 20 m; 10 x (40) m

		Sum values*
Native Richness (count of native species)	**Trees**	0
	Shrubs	2
	Grasses etc	3
	Forbs	4
	Ferns	0
	Other	0
Cover (sum of cover of natives species)	**Trees**	0
	Shrubs	0.2
	Grasses etc	0.1
	Forbs	0.4
	Ferns	0
	Other	0
High threat weed cover		5.7

*These values summarise the floristic data for input into BAM calculator

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20 x 50 m; 10 x (100) m

Tree stem DBH (cm)

>80	(#)	–
50 - 79	(#)	–
30 - 49	(+/-)	–
20 - 29	(+/-)	–
10 - 19	(+/-)	–
5 - 9	(+/-)	✓
< 5	(+/-)	✓

Notes on function attributes:
- Stem size class records # large trees (cf. benchmark)
- Record stems for living trees only, and for all species
- For multistemmed trees, record only the largest stem
- Presence of <5cm stems records regeneration
- Record # trees with hollows, not number of hollows
- Count as one stem where tree is multistemmed
- Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows 0	<20cm	Total # 0
	>20cm**	
Length of logs IIII I		Total (m) 9

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots) Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	**Litter**	85	70	90	90	100	87
	Bare ground	5	15	10	–	–	6
	Cryptogam	5	–	–	–	–	1
	Rock	0	–	–	–	–	0

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	3	R	Microrelief
Cultivation	–		Slope
Grazing (native / stock)	2		Aspect
Soil erosion	–		Soil surface texture
Firewood removal	–		Soil colour
Fire (ground stratum, mid, canopy burnt?)	–		Site drainage
Storm damage	–		Distance to nearest water
Weediness	1	R	Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes Location of waterbody RF?

BAM Plot - Field Survey Sheet

Date 15/8/18	Survey Name McPhillamys				
Recorders K		Plot ID # MAC 12		Zone ID	
GF code	Genus species (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
GG	Themeda triandra	1	25	N	L
FG	Plantago lanceolata	0.1	150	E	L
FG	Chrysocephalum apiculatum	0.1	5	N	L
SG	Rubus fruticosus	0.1	5	HTE	M
TG	Pinus radiata	0.1	1	HTE	U
SG	Cassinia aculeata	0.1	3	N	M
FG	Hypericum perforatum	0.1	50	HTE	L
GG	Poa sieberiana	5	~~500~~	N	L
FG	Cnopordum acanthium	0.1	3	E	L
SG	Lomatia ilicifolia	0.1	1	N	L
GG	Lomandra filiformis	0.1	30	N	L
FG	Conyza sp.	0.1	50	E	L
FG	Acrotriche serrulata	0.1	5	N	L
GG	Phalaris sp.	0.5	300	E	L
FG	Wahlenbergia stricta	0.1	20	N	L
SG	Cytisus scoparius	5		HTE	M
FG	Acetosella vulgaris	0.5		HTE	L

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)

Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).

Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems

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

All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc

Identify top 3 dominants in each stratum (use own stratum definitions)

Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 20/6/18	Survey Name M Phillamps		
Recorders Kate Hammil		Plot ID # MAC13	Zone ID 654 ~~55~~ ~~Good~~ Moderate
Photo # MAC13		Plot dimensions 20x50	
Datum GDA 94	Zone 55	Plot bearing along midline 260	
Easting 737667	Northing 6293982	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	Sth Eastern Highlands
Subregion	Bathurst
Likely Vegetation Class	Sthn Tableland Grassy Woodland
Plant Community Type	654
Condition state	~~Good~~ ~~Bad~~ Moderate

Floristics plot is centred on the midline, at 0 m point, 10 m either side

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x (20) m | 10 x 40 m

		Sum values*
Native Richness (count of native species)	Trees	1
	Shrubs	0
	Grasses etc	~~5~~ 7
	Forbs	4
	Ferns	0
	Other	1
Cover (sum of cover of natives species)	Trees	15
	Shrubs	0
	Grasses etc	~~12.85~~
	Forbs	~~7.15~~
	Ferns	0
	Other	0.5
High threat weed cover		5.1

*These values summarise the floristic data for input into BAM calculator

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20 x (50) m | 10 x 100 m

Tree stem DBH (cm)

>80	(#)	0
50 - 79	(#)	2
30 - 49	(+/-)	✓
20 - 29	(+/-)	–
10 - 19	(+/-)	–
5 - 9	(+/-)	–
< 5	(+/-)	✓

Notes on function attributes:
- Stem size class records # large trees (cf. benchmark)
- Record stems for living trees only, and for all species
- For multistemmed trees, record only the largest stem
- Presence of <5cm stems records regeneration
- Record # trees with hollows, not number of hollows
- Count as one stem where tree is multistemmed
- Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows: 1	<20cm	1	Total # 1
	>20cm**	0	
Length of logs: 15.5 + 30			Total (m) 45.5

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots)

Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	80	100	95	95	90	92
	Bare ground	10	0	5	5	10	6
	Cryptogam	–	–	–	–	–	0
	Rock	–	–	–	–	–	0

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)			Microrelief
Cultivation			Slope
Grazing (native / stock)			Aspect
Soil erosion			Soil surface texture
Firewood removal			Soil colour
Fire (ground stratum, mid, canopy burnt?)			Site drainage
Storm damage			Distance to nearest water
Weediness			Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes Very dry with regenerating forbs/grasses. Old cement post present on site. Bike tracks. Grazing from Kangaroos, Rabbits.

BAM Plot - Field Survey Sheet

Date 20/6/18	Survey Name M. Williamsys				
Recorders JC		Plot ID # MAC 13		Zone ID	
GF code	*Genus species* (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
TG	Eucalyptus melliodora	15		N	M
FG	Plantago lanceolata	2	100	E	L
FG	Marrubium vulgare	1	10	E	L
SG	Lycium ferocissimum	2	5	HTE	M
FG	Einadia nutans	5	50	N	L
GG	Bothriochloa macra	2	50	N	L
GG	Eragrostis parviflora	0.5	10	N	L
GG	Panicum effusum	0.1	5	N	L
GG	Austrostipa scabra	10	-	N	L
SG	Cotoneaster	1	1	E	M
GG	Avena fatua	1	30	E	L
GG	Cynodon dactylon	10	-	E	L
FG	Erodium cicutarium	10	-	E	L
GG	Eragrostis leptostachya	0.1	1	N	L
FG	Brassica tournefortii	0.1	10	HTE	L
OG	Myema mizuellii	0.5	1	N	M
FG	Echium plantagineum	0.1	5	E	L
FG	Portulaca oleracea	0.05	3	N	L
FG	Tribulus terrestris	0.1	1	E	L
GG	Lomandra cylindrica	0.05	4	N	L
GG	Carex sp	0.05	3	N	L
FG	Einadia hastata	2	15	N	L
GG	Phalaris aquatica	0.1	10	E	L
SG	Rosa rubiginosa	1	2	HTE	M
SG	Rubus fruticosus	0.1	1	HTE	M
FG	Erodium malacoides	0.5	25	E	L
FG	Oxalis perennans	0.05	5	N	L

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)
Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).
Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems
N=native, E=exotic, HTE=high threat exotic
All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc
Identify top 3 dominants in each stratum (use own stratum definitions) Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 18/10/18	**Survey Name** McPhillamys		
Recorders JC, EG		**Plot ID #** MAC65	**Zone ID**
Photo #		**Plot dimensions** 20150	
Datum	**Zone**	**Plot bearing along midline** 74	
Easting 720248	**Northing** 6293604	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type	**Condition state**

Floristics plot is centred on the midline, at 0 m point, 10 m either side

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Composition / Structure plot (400m²)		
Dimensions (circle applicable size) 20 x 20 m 10 x 40 m		**Sum values***
Native Richness (count of native species)	**Trees**	2
	Shrubs	0
	Grasses etc	0
	Forbs	1
	Ferns	0
	Other	1
Cover (sum of cover of natives species)	**Trees**	50
	Shrubs	0
	Grasses etc	0
	Forbs	0.1
	Ferns	0
	Other	5
High threat weed cover		0

*These values summarise the floristic data for input into BAM calculator

BAM Function plot (1000m²)		
Dimensions (circle applicable size) 20 x 50 m 10 x 100 m		
Tree stem DBH (cm)		Notes on function attributes:
>80	(#) 1	Stem size class records # large trees (cf. benchmark)
50 - 79	(#) 1	Record stems for living trees only, and for all species
30 - 49	(+/-) -	For multistemmed trees, record only the largest stem
20 - 29	(+/-) -	Presence of <5cm stems records regeneration
10 - 19	(+/-) -	Record # trees with hollows, not number of hollows
5 - 9	(+/-) -	Count as one stem where tree is multistemmed
< 5	(+/-) -	Hollow bearing stem may be a dead stem (incl. stag)
# Trees with hollows 0	<20cm	Total # 0
	>20cm**	
Length of logs		Total (m) 2

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots) Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	**Litter**	50	40	80	80	50	60
	Bare ground	5	0	0	0	0	1
	Cryptogam	0	0	0	0	0	0
	Rock	0	0	0	0	0	0

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	3	O	Microrelief
Cultivation	3	NR	Slope Mid slope
Grazing (native / stock)	3	R	Aspect
Soil erosion	0		Soil surface texture Clay loam
Firewood removal	3	R	Soil colour Grey
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage Run off
Storm damage	0		Distance to nearest water 200 m
Weediness	3	R	Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes

BAM Plot - Field Survey Sheet

Date 18/10/18	Survey Name				
Recorders JC EG		Plot ID # MAC65		Zone ID	
GF code	*Genus species* (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
TG	E. ~~[illegible]~~ *melliodora*	25		N	
TG	E. Apple Box	25		N	
	Carex	5		E	
	Trifolium repens	~~4~~ 10		E	
	Cape Weed	25		E	
	Rumex sp (photo)	0.1	20	E	
	Grass 1 ~~B. [illegible]~~	30			
	Grass 2 B. macra	5			
	Golden thistle	0.1	5	E	
	Smooth Cutleaf	0.5	100	E	
	Medicago sp.	0.1	200	E	
FG	Stinging nettle Urtica incisa	0.1	50	~~E~~	
	Pholaris sp	0.1	20		
OG	mistletoe sp. Amyema m.	5			
	forb 1 (MAC66)	0.1	50		

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)
Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).
Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems
N=native, E=exotic, HTE=high threat exotic
All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc
Identify top 3 dominants in each stratum (use own stratum definitions) Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 18/10/2018	Survey Name		
Recorders JC, EG		Plot ID # MAC66	Zone ID
Photo #		Plot dimensions 20×50	
Datum 94 GDA	Zone 55H	Plot bearing along midline 102°	
Easting 718253	Northing 6293971	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type Non-native	Condition state

Floristics plot is centred on the midline, at 0 m point, 10 m either side

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x 20 m / 10 x 40 m

		Sum values*
Native Richness (count of native species)	Trees	0
	Shrubs	1
	Grasses etc	1
	Forbs	1
	Ferns	0
	Other	0
Cover (sum of cover of natives species)	Trees	0
	Shrubs	0.1
	Grasses etc	5
	Forbs	0.1
	Ferns	0
	Other	0
High threat weed cover		85

*These values summarise the floristic data for input into BAM calculator

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20 x 50 m / 10 x 100 m

Tree stem DBH (cm)	
>80	(#)
50 - 79	(#)
30 - 49	(+/-)
20 - 29	(+/-)
10 - 19	(+/-)
5 - 9	(+/-)
< 5	(+/-)

Notes on function attributes:
- Stem size class records # large trees (cf. benchmark)
- Record stems for living trees only, and for all species
- For multistemmed trees, record only the largest stem
- Presence of <5cm stems records regeneration
- Record # trees with hollows, not number of hollows
- Count as one stem where tree is multistemmed
- Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows	<20cm	Total # 0
	>20cm**	
Length of logs		Total (m) 22

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots) Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	90	95	100	80	80	89
	Bare ground	0	0	0	0	5	1
	Cryptogam	0	0	0	20	0	4
	Rock	0	0	0	0	0	0

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	3	O	Microrelief
Cultivation	3	R	Slope lower slope
Grazing (native / stock)	3	R	Aspect west
Soil erosion	0		Soil surface texture clay loam
Firewood removal	0		Soil colour Brown-grey
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage run on
Storm damage	0		Distance to nearest water 0
Weediness	2	R	Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes Recorded frogs here at the dam

BAM Plot - Field Survey Sheet

Date 18/10/2018	Survey Name				
Recorders		Plot ID # Mac 66		Zone ID	
GF code	*Genus species* (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
TG	Pinus radiata	80		HTE	
FG	Oxalis perenans	0.1	50		
	Plantago sp.	0.1	50		
GG	grass 1	5			
FG	forb 1	0.1	100		
	Smooth cats ears	0.1			
	& Cynodon dactylon	0.1			
GG	Phalaris sp.	1	100		
SG	Blackberry	5		HTE	
SG	~~Shrub~~ Cassinia laevis	0.1	2		

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)
Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).
Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems
N=native, E=exotic, HTE=high threat exotic
All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc
Identify top 3 dominants in each stratum (use own stratum definitions) Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

18/10 - 19/10 FIELD WORK

BAM Plot - Field Survey Sheet

Date 18/10/18	**Survey Name** Mt Phillamps		
Recorders JC EG		**Plot ID #** MAC67	**Zone ID** 1330 Poor
Photo #		**Plot dimensions** 20x50	
Datum	**Zone** 55	**Plot bearing along midline** 73	
Easting 720422	**Northing** 6293623	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type 1330.	**Condition state** Rubbish trees Poor

Floristics plot is centred on the midline, at 0 m point, 10 m either side

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x 20 m | 10 x 40 m

		Sum values*
Native Richness (count of native species)	**Trees**	1
	Shrubs	0
	Grasses etc	1
	Forbs	2
	Ferns	0
	Other	0
Cover (sum of cover of natives species)	**Trees**	50
	Shrubs	0
	Grasses etc	10
	Forbs	0.6
	Ferns	0
	Other	0
High threat weed cover		0.5

*These values summarise the floristic data for input into BAM calculator

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20 x 50 m | 10 x 100 m

Tree stem DBH (cm)

		Notes on function attributes:
>80	(#) 2	Stem size class records # large trees (cf. benchmark)
50 - 79	(#) —	Record stems for living trees only, and for all species
30 - 49	(+/-) —	For multistemmed trees, record only the largest stem
20 - 29	(+/-) —	Presence of <5cm stems records regeneration
10 - 19	(+/-) —	Record # trees with hollows, not number of hollows
5 - 9	(+/-) —	Count as one stem where tree is multistemmed
< 5	(+/-) —	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows 1	<20cm 1/	Total # 2
	>20cm**	
Length of logs		Total (m) 3

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots)

Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	**Litter**	70	50	60	60	10	50
	Bare ground	0	0	5	5	5	3
	Cryptogam	0	0	0	0	0	0
	Rock	0	0	0	0	0	0

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)			Microrelief
Cultivation			Slope
Grazing (native / stock)			Aspect
Soil erosion			Soil surface texture
Firewood removal			Soil colour
Fire (ground stratum, mid, canopy burnt?)			Site drainage
Storm damage			Distance to nearest water
Weediness			Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes

BAM Plot - Field Survey Sheet

Date	Survey Name				
Recorders		Plot ID #		Zone ID	
GF code	*Genus species* (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
TG	Apple box	50			
	Smooth cats ear	0.1	100		
FG	Oxalis ~~sp~~ Perennans	0.1			
	Rumex (max 65)	0.1			
	trifolium sp.	10			
GG	grass 1	~~S~~ 10			
GG	grass 2	~~S~~ 10			
GG	grass 1 (max 65) B. minor	~~S~~ 10			
GG	kikuyu	~~S~~ 10			
	Phalaris sp.	~~S~~ 10			
	Medicago Polycadon	0.1	100		
	cape weed				
	Thistle (Photo)	0.1	20		
	erodium sp.	1	100		
	Canola	1	30		
FG	Hypericum corbata ~~P. meteo sp~~	0.5	60		
	Sheep Sorrel Acetosa vulgaris	0.5	300	MTE	
	Plantago sp.	0.5	30		

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)
Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).
Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems
N=native, E=exotic, HTE=high threat exotic
All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc
Identify top 3 dominants in each stratum (use own stratum definitions) Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 18/10/2018	**Survey Name** mcfillanys		
Recorders JC and EG		**Plot ID #** MAC 68	**Zone ID** 1360 Poor
Photo #		**Plot dimensions** 20 x 50	
Datum 94gda	**Zone** 55H	**Plot bearing along midline** 105°	
Easting 721005	**Northing** 6293615	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type ~~1350~~ Non-reactive	**Condition state** ~~B~~ Poor (Pine Plantation)

Floristics plot is centred on the midline, at 0 m point, 10 m either side

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x 20 m | 10 x 40 m

		Sum values*
Native Richness (count of native species)	**Trees**	1
	Shrubs	1
	Grasses etc	3
	Forbs	1
	Ferns	0
	Other	0
Cover (sum of cover of natives species)	**Trees**	0.1
	Shrubs	0.1
	Grasses etc	0.3
	Forbs	0.1
	Ferns	0
	Other	0
High threat weed cover		~~3~~ 31

*These values summarise the floristic data for input into BAM calculator

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20 x 50 m | 10 x 100 m

Tree stem DBH (cm)

		Notes on function attributes:
>80	(#)	Stem size class records # large trees (cf. benchmark)
50 - 79	(#)	Record stems for living trees only, and for all species
30 - 49	(+/-)	For multistemmed trees, record only the largest stem
20 - 29	(+/-)	Presence of <5cm stems records regeneration
10 - 19	(+/-)	Record # trees with hollows, not number of hollows
5 - 9	(+/-)	Count as one stem where tree is multistemmed
< 5	(+/-) 1	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows	<20cm	Total # 0
	>20cm**	
Length of logs 25.5 + 27		Total (m) 52.5

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots) Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	**Litter**	100	95	100	100	100	99
	Bare ground	0	0	0	0	0	0
	Cryptogam	0	0	0	0	0	0
	Rock	0	0	0	0	0	0

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform	
Clearing (incl. logging)	3	O	Microrelief	
Cultivation	3	R	Slope	upper slope
Grazing (native / stock)	1		Aspect	North
Soil erosion	0		Soil surface texture	clay loam
Firewood removal	0		Soil colour	greybrown
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage	run off
Storm damage	0		Distance to nearest water	
Weediness	3	R	Distance to nearest rock outcrop /cave	

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes

BAM Plot - Field Survey Sheet

Date	Survey Name				
Recorders		Plot ID #		Zone ID	
GF code	*Genus species* (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
	Pinus radiata	5		HTE	
	Blackberry	25		HTE	
SG	Acacia dealbata	0.1	1		
TG	Eucalyptus ~~sp~~ bridgesiana	0.1	1		
	Phalarus sp. (Mac 67)	5			
	Smooth cats ear Hypochaeris glabra	5			
	Sheep Sorrell Acetosa vulgare	1	200	HTE	
	golden thistle	1	10		
	trifolium repens	0.1	50		
FG	Oxalis Perennans	0.1			
	grass 1 Eleusine tristachya	20		E	
Lamarckia aurea?	grass 2	0.5			
	forb 1 St. Johns Wort	0.1	5		
	forb 2 (photo)	0.1	20		
GG	Carex bilhenoviana ~~Sedge sp~~	0.1	20		
GG	Juncus sp ~~Rush sp~~	0.5	~~8~~ 10		
SG	Cassinia sp. laevis	0.1	3		
GG	Cyperus sp	0.1	50		

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)

Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).

Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems

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

All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc

Identify top 3 dominants in each stratum (use own stratum definitions)

Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 18/10/2018	**Survey Name** McFillamys MAC78		
Recorders JC and EG		**Plot ID #** ~~Mac69~~	**Zone ID** 287 Good
Photo #		**Plot dimensions** 20 x 50	
Datum 94gda	**Zone** 55H	**Plot bearing along midline** 131°	
Easting 721357	**Northing** 6293493	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type 287	**Condition state** ~~Intact~~ Good

Floristics plot is centred on the midline, at 0 m point, 10 m either side

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x 20 m | 10 x 40 m

		Sum values*
Native Richness (count of native species)	**Trees**	3
	Shrubs	3
	Grasses etc	3
	Forbs	4
	Ferns	0
	Other	0
Cover (sum of cover of natives species)	**Trees**	60
	Shrubs	0.3
	Grasses etc	11.1
	Forbs	0.4
	Ferns	0
	Other	0
High threat weed cover		5

*These values summarise the floristic data for input into BAM calculator

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20 x 50 m | 10 x 100 m

Tree stem DBH (cm)		Notes on function attributes:
>80	(#)	Stem size class records # large trees (cf. benchmark)
50 - 79	(#) ~~TTH~~ 1	Record stems for living trees only, and for all species
30 - 49	(+/-) +	For multistemmed trees, record only the largest stem
20 - 29	(+/-)	Presence of <5cm stems records regeneration
10 - 19	(+/-) +	Record # trees with hollows, not number of hollows
5 - 9	(+/-)	Count as one stem where tree is multistemmed
< 5	(+/-) +	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows ~~TTH~~ 3	<20cm TTN 1	Total # 10
	>20cm** IIII	
Length of logs 42 + 32		Total (m) 74

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots)

Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	**Litter**	80	60	5	95	90	66
	Bare ground	20	30	95	5	10	32
	Cryptogam	0	0	0	0	0	0
	Rock	0	0	0	0	0	0

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)			Microrelief
Cultivation			Slope
Grazing (native / stock)			Aspect
Soil erosion			Soil surface texture
Firewood removal			Soil colour
Fire (ground stratum, mid, canopy burnt?)			Site drainage
Storm damage			Distance to nearest water
Weediness			Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes

BAM Plot - Field Survey Sheet

Date	Survey Name				
Recorders		Plot ID #		Zone ID	
GF code	*Genus species* (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
TG	Eucalyptus 1 (red stringy bark)	25	1 tree		U
TG	Long leaf box	25	1 tree		U
TG	Apple box	10	1 tree		U
	Smooth cats ear	0.1	150		L
	Blackberry	5		HTE	M
	trifolium sp.	0.1	50		L
GG	Poa sieberi	1	10		L
GG	bothriochloa decipiens	10			L
FG	Senecio ~~sp.~~ pterophoroides	0.1	10		L
FG	oxalis perennans	0.1	100		L
	shrub 1	0.1	1		M
GG	Austrodanthonia racemosa ~~grass 1 (MC 45)~~	5			L
	forb 1	0.1	10		L
FG	geranium ~~sp.~~ solandri	0.1	10		L
	forb 2	0.1	10		L
	Plantago sp.	0.5	50		L
SG	Cassinia leevis ~~shrub 2~~	0.1	1		M
GG	Lamandra ~~sp.~~ filiformis	0.1	50		L
SG	Acacia dealbata	0.1	0		M
SG	Cassinia ~~sp.~~ aculeata	0.1	2		L
	grass 1	0.1	50		L
FG	~~Daisy 1~~ Cymbonotus preissianus	0.1	5		L
GG	~~grass 2~~ Echinopogon ovatus	0.5	50		L

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)

Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).

Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems

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

All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc

Identify top 3 dominants in each stratum (use own stratum definitions)

Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 19/10/2018	**Survey Name** McFillamys		
Recorders JC and EG		**Plot ID #** MAC71	**Zone ID**
Photo #		**Plot dimensions**	
Datum gda94	**Zone** 55H	**Plot bearing along midline** 131°	
Easting 721635	**Northing** 6293317	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type 287	**Condition state** Good

Floristics plot is centred on the midline, at 0 m point, 10 m either side

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x 20 m | 10 x 40 m

		Sum values*
Native Richness (count of native species)	**Trees**	3
	Shrubs	2
	Grasses etc	2
	Forbs	8
	Ferns	0
	Other	0
Cover (sum of cover of natives species)	**Trees**	70
	Shrubs	2
	Grasses etc	10.1
	Forbs	2.5
	Ferns	0
	Other	0
High threat weed cover		5.1

*These values summarise the floristic data for input into BAM calculator

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20 x 50 m | 10 x 100 m

Tree stem DBH (cm)		Notes on function attributes:
>80	(#)	Stem size class records # large trees (cf. benchmark)
50 - 79	(#) IIII	Record stems for living trees only, and for all species
30 - 49	(+/-) +	For multistemmed trees, record only the largest stem
20 - 29	(+/-) +	Presence of <5cm stems records regeneration
10 - 19	(+/-) +	Record # trees with hollows, not number of hollows
5 - 9	(+/-) +	Count as one stem where tree is multistemmed
< 5	(+/-)	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows	<20cm IIII 1	Total # 6
	>20cm**	
Length of logs		Total (m) 64m

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots) Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	**Litter**	10	70	100	95	95	74
	Bare ground	90	20	0	5	5	24
	Cryptogam	0	0	0	0	0	0
	Rock	0	0	0	0	0	0

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)			Microrelief
Cultivation			Slope
Grazing (native / stock)			Aspect
Soil erosion			Soil surface texture
Firewood removal			Soil colour
Fire (ground stratum, mid, canopy burnt?)			Site drainage
Storm damage			Distance to nearest water
Weediness			Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes

BAM Plot - Field Survey Sheet

Date	Survey Name				
Recorders		Plot ID # MAC71		Zone ID	
GF code	*Genus species* (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
FG	~~Sheep sorrel~~ Einadaia nutans	0.1	50		
	Smooth Catsear	0.1	100		
	Blackberry	5		HTE	
GG	Poa ~~sieberi~~ ; meionectes	15			
	Phalaris sp	5			
SG	Acacia ~~dilbata~~ decurbata	1	5		
FG	Otadis Pterannas	0.1	100		
FG	~~Carex sp.~~ Acaena echinata sp.	0.1	100		
	grass 1	1	200		
TG	Applebox 60 ~~25~~ 50				
FG	Haloragus sp.	0.1	100		
FG	geranium ~~(Photo)~~ solanderi	0.5	200		
	Senecio sp. (18/10/18)	0.1	20		
Acetosa ~~echinata~~	Sheep Sorrel Acetosella vulgare	0.1	50	HTE	
	Rumex sp.	0.1	10		
FG	Viola sp. (Photo) hunt.	0.1	50		
FG	forb 1 Stellaria media	1	200	E	
SG	Cassinia laevis ~~(Photo)~~	1	5		
FG	forb 2 Arotriche serrulata?	0.5	5		
	golden thistle	0.1	5		
	Plantago sp. (Photo)	0.1	50		
TG	Eucalyptus olives	5			
TG	Red stringy bark	5			
GG	Lomandra sp. filiformis	0.1	20		
	TG = 3				

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)
Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).
Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems
N=native, E=exotic, HTE=high threat exotic
All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc
Identify top 3 dominants in each stratum (use own stratum definitions) Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 19/10/2018	**Survey Name** McFillamy2		
Recorders JC and EG		**Plot ID #** MAC 72	**Zone ID**
Photo #		**Plot dimensions** 20 x 50	
Datum	**Zone**	**Plot bearing along midline** ~~255°~~ 255°	
Easting 719966	**Northing** 6293648	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type	**Condition state**

Floristics plot is centred on the midline, at 0 m point, 10 m either side

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size)
20 x 20 m 10 x 40 m

		Sum values*
Native Richness (count of native species)	**Trees**	1
	Shrubs	1
	Grasses etc	0
	Forbs	0
	Ferns	0
	Other	0
Cover (sum of cover of natives species)	**Trees**	0.1
	Shrubs	0.1
	Grasses etc	0
	Forbs	0
	Ferns	0
	Other	0
High threat weed cover		0.1

*These values summarise the floristic data for input into BAM calculator

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Function plot (1000m²)

Dimensions (circle applicable size)
20 x 50 m 10 x 100 m

Tree stem DBH (cm)

>80	(#)
50 - 79	(#)
30 - 49	(+/-)
20 - 29	(+/-)
10 - 19	(+/-)
5 - 9	(+/-)
< 5	(+/-) +

Notes on function attributes:
- Stem size class records # large trees (cf. benchmark)
- Record stems for living trees only, and for all species
- For multistemmed trees, record only the largest stem
- Presence of <5cm stems records regeneration
- Record # trees with hollows, not number of hollows
- Count as one stem where tree is multistemmed
- Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows	<20cm	Total # 0
	>20cm**	
Length of logs 29+21		Total (m) 50

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots) Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	**Litter**	100	90	95	100	90	95
	Bare ground	0	5	5	0	0	2
	Cryptogam	0	5	0	0	0	1
	Rock	0	0	0	0	0	0

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	3	NR	Microrelief
Cultivation	3	R	Slope Upper slope
Grazing (native / stock)	2	R	Aspect East
Soil erosion	0		Soil surface texture clay-loam
Firewood removal	0		Soil colour grey-Brown
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage run off
Storm damage	0		Distance to nearest water ?
Weediness	3	R	Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes

BAM Plot - Field Survey Sheet

Date	Survey Name				
Recorders		Plot ID # MAC72		Zone ID	
GF code	*Genus species* (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
TG	Eucalyptus, long-leaf box	0.1	~~4~~ 2		
	Pinus radiata	80			
	Pattersons curse	0.1	30		
	Sheep sorrell *Acetoselle vulgaire*	0.1	100	HTE	
	Smooth cats ear	0.1	50		
	grass 1	30			
	Phalaris sp.	5			
	trifolium (18/10/18)	0.1	50		
	Oxalis perennans	0.1	50		
SG	Cassinia sp.	0.1	1		
	Rumex sp.	0.1	1		

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)
Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).
Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems
N=native, E=exotic, HTE=high threat exotic
All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc
Identify top 3 dominants in each stratum (use own stratum definitions) Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 9/10/2018	Survey Name McFillamy 3		
Recorders JC and EG		Plot ID # MAC73	Zone ID Poor
Photo #		Plot dimensions 20x50	
Datum 94gda	Zone 55H	Plot bearing along midline 283°	
Easting 722097	Northing 6292986	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type 654	Condition state Poor

Floristics plot is centred on the midline, at 0 m point, 10 m either side

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x 20 m; 10 x 40 m

		Sum values*
Native Richness (count of native species)	Trees	1
	Shrubs	0
	Grasses etc	4
	Forbs	2
	Ferns	0
	Other	0
Cover (sum of cover of natives species)	Trees	5
	Shrubs	0
	Grasses etc	5.7
	Forbs	0.6
	Ferns	0
	Other	0
High threat weed cover		0.1

*These values summarise the floristic data for input into BAM calculator

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20 x 50 m; 10 x 100 m

Tree stem DBH (cm)		Notes on function attributes:
>80	(#)	Stem size class records # large trees (cf. benchmark)
50 - 79	(#)	Record stems for living trees only, and for all species
30 - 49	(+/-)	For multistemmed trees, record only the largest stem
20 - 29	(+/-)	Presence of <5cm stems records regeneration
10 - 19	(+/-) +	Record # trees with hollows, not number of hollows
5 - 9	(+/-) +	Count as one stem where tree is multistemmed
< 5	(+/-) +	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows		Total #
1	<20cm III	6
	>20cm** III	
Length of logs		Total (m) 8m

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots)

Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	80	80	90	90	95	87
	Bare ground	10	10	10	10	5	9
	Cryptogam	0	0	0	0	0	0
	Rock	0	0	0	0	0	0

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	3	NR	Microrelief
Cultivation	0		Slope ~~10m2 10m2~~ Slope
Grazing (native / stock)	3	R	Aspect
Soil erosion	0		Soil surface texture clay-loam
Firewood removal	0		Soil colour grey-brown
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage run off
Storm damage	0		Distance to nearest water
Weediness	2	R	Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes Grazed pasture - Regenerating Eucalyptus melanoxylon.

1.06 0.33 .27

BAM Plot - Field Survey Sheet

Date 19/10/2018	Survey Name				
Recorders		Plot ID # MAC73		Zone ID	
GF code	*Genus species* (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
	grass 1 *Vulpia myuros*	5		E	
GG	grass 2 *Microlaena stipoides*	5		N	
	grass 3 *Phalaris minor*	30		E	
	grass 4 *Pentameris airoides*	20		E	
	Trifolium (Photo) *Repens*	1	300	E	
GG	Juncus sp. *homalocaulis*	0.1	20	N	
	Smooth cats ear	1	200	E	
	forb 1 *Gamochaeta calviceps*	0.1	20	E	
FG	Oxalis Perennans	0.5	200	N	
	Thistle (Photo)	0.1	1	E	
	forb 2	0.1	50	E	
N	*Isolepis hookeriana* Sedge 1 ~~*Cyperus*~~	0.1	100	N	
	forb 3	0.1	20	N	
GG	grass 5	0.5	50	N	
	Pattersons curse	0.1	5	E	
FG	geranium sp. (Photo) *Splendens*	0.1	20	N	
TG	Yellow box	5		N	
	Blackberry	0.1	2	HT E	
	Plantago sp.	0.1	40	E	
	forb 4	0.1	20	E	
	Sedge 2 *Cyperus brevifolius*	0.1	40	E	
GG	*Enneapogon nigricans*	0.1	50	N	
	TG 1 5				
	SG 0				
	GG 4 5.7				
	FG 2 0.6				
	ATFW 0.1				

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)

Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).

Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems

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

All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc

Identify top 3 dominants in each stratum (use own stratum definitions) Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 19/10/2018	**Survey Name** McFillamys		
Recorders JC and EG		**Plot ID #** MAC74	**Zone ID** 287 Good
Photo #		**Plot dimensions** 20x50	
Datum 94GDA	**Zone** 55H	**Plot bearing along midline** 178°	
Easting 722286	**Northing** 6292860	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type 287	**Condition state** Good

Floristics plot is centred on the midline, at 0 m point, 10 m either side

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x 20 m | 10 x 40 m

		Sum values*
Native Richness (count of native species)	**Trees**	2
	Shrubs	3
	Grasses etc	6
	Forbs	10
	Ferns	0
	Other	0
Cover (sum of cover of natives species)	**Trees**	80
	Shrubs	0.3
	Grasses etc	13.1
	Forbs	1.2
	Ferns	0
	Other	0
High threat weed cover		1

*These values summarise the floristic data for input into BAM calculator

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20 x 50 m | 10 x 100 m

Tree stem DBH (cm)

		Notes on function attributes:
>80	(#)	Stem size class records # large trees (cf. benchmark)
50 - 79	(#) 1	Record stems for living trees only, and for all species
30 - 49	(+/-) +	For multistemmed trees, record only the largest stem
20 - 29	(+/-) +	Presence of <5cm stems records regeneration
10 - 19	(+/-) +	Record # trees with hollows, not number of hollows
5 - 9	(+/-) +	Count as one stem where tree is multistemmed
< 5	(+/-) +	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows 1	<20cm III	Total # 4
	>20cm** 1	
Length of logs		Total (m) 29m

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots) Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	**Litter**	90	80	75	60	80	77
	Bare ground	10	10	20	20	10	14
	Cryptogam	0	0	5	0	5	2
	Rock	0	0	0	20	5	5

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	2	NR	Microrelief
Cultivation	0		Slope Upper slope
Grazing (native / stock)	3	R	Aspect
Soil erosion	0		Soil surface texture
Firewood removal	0		Soil colour
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage run off
Storm damage	0		Distance to nearest water
Weediness			Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes Grazed pasture under remnant Eucalyptus. Some regeneration

BAM Plot - Field Survey Sheet

Date	Survey Name				
Recorders		Plot ID #		Zone ID	

GF code	*Genus species* (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
TG	Stringy bark Red Stringybark	30		N	
TG	long-leafed box	50		N	
GG	Poa sieberi	10		N	
	Sedges (MAC 73)	0.5	50	N	
FG	Acaena ~~ovina~~ echinata ~~sp.~~	0.1	50		
SG	Hibbertia obtusefolia	0.1	20	N	
FG	Gonocarpus sp. ~~tetragynus~~ tetragynus	0.1	20	N	
SG	Pultenea microphylla	0.1	100	N	
	Aristida m.grass 3 (MAC 73)	5			
GG	Microlaena stipoides grass 2 (MAC 73)	1	50		
SG	Cassinia aculeata	0.1	1		
~~FG~~	Wurmbea dioica early nancy (photo)	0.1	3		
FG	forb 1 Moenchia erecta	0.5	100		
FG	viola sp. (MAC 71) hunt.	0.1	10		
	Sedge 1	0.1	40		
FG	Drosera sp. Sundew (photo)	0.1	10		
FG	Chrysocephalum apic. Daisy 1 ~~Gnaph~~	0.1	40		
FG	Gnaphalodes prossinus Daisy 2 (photo)	0.1	20		
FG	Oxalis Perennans	0.5	200		
GG	Juncus homalocaulis ~~FG~~ Juncus sp. (MAC 73)	0.1	10		
	Blackberry	~~0.1~~ 1	~~5~~ 1	HTE	
GG	Bothriochloa macra	1	100		
	forb 2	0.1	20		
FG	geranium sp. (MAC 73)	0.1	10		
	Hawthorn Shrub 1 Crataegus monogyna	1	2	E	
GG	Lomandra sp. filiformis	0.1	5		
	olearia sp.	0.1	1		
	Shrub 2 Meliciytos dentatus	0.1	1		
GG	Isolepsis hookeriana	0.5			
GG	Cyperus brevifolius	0.5			

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)
Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).
Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems
N=native, E=exotic, HTE=high threat exotic
All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc
Identify top 3 dominants in each stratum (use own stratum definitions) Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 19/10/2018	**Survey Name** McFillamys		
Recorders JC and GC		**Plot ID #** MQC 75	**Zone ID**
Photo #		**Plot dimensions** 20 x 50	
Datum 94gdA	**Zone** 55H	**Plot bearing along midline** 301°	
Easting 722373	**Northing** 6292184	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type Non-native	**Condition state** Pasture

Floristics plot is centred on the midline, at 0 m point, 10 m either side

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x (20) m; 10 x 40 m

		Sum values*
Native Richness (count of native species)	**Trees**	0
	Shrubs	0
	Grasses etc	2
	Forbs	1
	Ferns	0
	Other	0
Cover (sum of cover of natives species)	**Trees**	0
	Shrubs	0
	Grasses etc	0.1
	Forbs	0.1
	Ferns	0
	Other	0
High threat weed cover		0.1

*These values summarise the floristic data for input into BAM calculator

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20 x (50) m; 10 x 100 m

Tree stem DBH (cm)		Notes on function attributes:
>80	(#) —	Stem size class records # large trees (cf. benchmark)
50 - 79	(#) —	Record stems for living trees only, and for all species
30 - 49	(+/-) —	For multistemmed trees, record only the largest stem
20 - 29	(+/-) —	Presence of <5cm stems records regeneration
10 - 19	(+/-) —	Record # trees with hollows, not number of hollows
5 - 9	(+/-) —	Count as one stem where tree is multistemmed
< 5	(+/-) —	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows	<20cm	Total # 0
	>20cm**	
Length of logs		Total (m) 0

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots)

Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	**Litter**	90	90	95	95	95	93
	Bare ground	10	10	5	5	5	7
	Cryptogam	0	0	0	0	0	0
	Rock	0	0	0	0	0	0

Litter / groundcover plots are located at S, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)			Microrelief
Cultivation			Slope
Grazing (native / stock)			Aspect
Soil erosion			Soil surface texture
Firewood removal			Soil colour
Fire (ground stratum, mid, canopy burnt?)			Site drainage
Storm damage			Distance to nearest water
Weediness			Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes Grazed, grassed paddock. Alignment through cleared pasture, fencing south and back into remnant veg.

BAM Plot - Field Survey Sheet

Date	Survey Name				
Recorders		Plot ID #		Zone ID	
GF code	*Genus species* (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
	Patersons curse	0.5	200	E	
	Smooth cats ear	0.1	50	E	
	trifolium sp. (Mac 73)	25		E	
	medicago sp.	10		E	
	Sheep sorrell Acetosa vulgaris	0.1	50	HT E	
	grass 1 Elensine tristachya	10		E	
	forb 1	5		E	
	golden thistle	0.1	1	E	
	erodium sp.	0.1	10	E	
FG	oxalis perennans	0.1	50	N	
	~~Sedges (Mac 7)~~	0.1	50	E	
	~~grass 2~~ Vulpia myuros	20		E	
GG	Cyperus brevifolius	0.1		N	
GG	Isolepis hookeriana	0.1	100	N	

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)
Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).
Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems
N=native, E=exotic, HTE=high threat exotic
All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc
Identify top 3 dominants in each stratum (use own stratum definitions) Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 19/10/2018	**Survey Name** mcfillamys		
Recorders JE and EC		**Plot ID #** MAC76	**Zone ID** 287 ~~Tingaringy~~
Photo #		**Plot dimensions** 20x50	
Datum	**Zone**	**Plot bearing along midline** 190°	
Easting 722263	**Northing** 6291861	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type 287.	**Condition state** Good ~~Moderate~~ Some shrubs but grazed.

Floristics plot is centred on the midline, at 0 m point, 10 m either side

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size)

20 x 20 m 10 x 40 m

		Sum values*
Native Richness (count of native species)	**Trees**	1
	Shrubs	1
	Grasses etc	3
	Forbs	7
	Ferns	0
	Other	1
Cover (sum of cover of natives species)	**Trees**	40
	Shrubs	5
	Grasses etc	6.1
	Forbs	1.1
	Ferns	0
	Other	0.1
High threat weed cover		0.1

*These values summarise the floristic data for input into BAM calculator

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Function plot (1000m²)

Dimensions (circle applicable size)

20 x 50 m 10 x 100 m

Tree stem DBH (cm)		Notes on function attributes:
>80	(#)	Stem size class records # large trees (cf. benchmark)
50 - 79	(#)	Record stems for living trees only, and for all species
30 - 49	(+/-) +	For multistemmed trees, record only the largest stem
20 - 29	(+/-) +	Presence of <5cm stems records regeneration
10 - 19	(+/-) +	Record # trees with hollows, not number of hollows
5 - 9	(+/-) +	Count as one stem where tree is multistemmed
< 5	(+/-) +	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows	<20cm	Total # 0
	>20cm**	
Length of logs		Total (m) 5m

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots) Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	**Litter**	60	10	50	90	80	58
	Bare ground	20	60	50	0	5	27
	Cryptogam	0	0	0	5	0	1
	Rock	0	5	0	0	5	2

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)			Microrelief
Cultivation			Slope
Grazing (native / stock)			Aspect
Soil erosion			Soil surface texture
Firewood removal			Soil colour
Fire (ground stratum, mid, canopy burnt?)			Site drainage
Storm damage			Distance to nearest water
Weediness			Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes

BAM Plot - Field Survey Sheet

Date	Survey Name				
Recorders		Plot ID #		Zone ID	
GF code	*Genus species* (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
TG	long leaf box × E. goniocalyx.	40			
FG	~~acaena~~ sp. Acaena echinata	0.1	100		
FG Aperula	conferta Pomelia sp.	0.1	20		
	Smooth cats ear	0.1	50		
FG	dichondra repens	0.5	200		
GG	Bothrea clog macra	5			
	Blackberry	0.1	5	HTE	
	Plantago sp.	0.1			
	Rumex sp.	0.1	1		
GG	Lamandra sp. filiformis	0.1	5		
OG Convolvulus	angustissimus Australian Bindweed	0.1	1		
FG Goodenia	heterophylla goodenia (photo)	0.1	20		
SG Melicytus	dentatus Shrub1 (Mac 74)	5			
FG	Senecio ~~sp.~~ pinnatifolioides	0.1	5		
	forb (photo)	0.1	20		
GG	Poa sieberi	1	50		
	hypochaeris sp. (photo)	0.1	1		
	Elymus scabrus grass1 (Mac 75)	1	50	E	
FG Cymbonotus	preissianus Daisy (photo)	0.1	50		
	forb1	0.1	5		
FG	Oxalis perennans	0.1	50		
	Medicago sp. (Mac 75)	1	100		

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)
Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).
Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems
N=native, E=exotic, HTE=high threat exotic
All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc
Identify top 3 dominants in each stratum (use own stratum definitions) Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 19/10/2019	**Survey Name** McFillamyD		
Recorders EG and JC		**Plot ID #** MAC77	**Zone ID** 1330 Poor
Photo #		**Plot dimensions** 20x50	
Datum 94gdA	**Zone** 55h	**Plot bearing along midline** 150°	
Easting 722520	**Northing** 6291556	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type 1330	**Condition state** Paddock trees. Poor

Floristics plot is centred on the midline, at 0 m point, 10 m either side

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size)

20 x 20 m 10 x 40 m

		Sum values*
Native Richness (count of native species)	**Trees**	1
	Shrubs	0
	Grasses etc	2
	Forbs	1
	Ferns	0
	Other	1
Cover (sum of cover of natives species)	**Trees**	25
	Shrubs	0
	Grasses etc	0.2
	Forbs	0.1
	Ferns	0
	Other	1
High threat weed cover		0.2

*These values summarise the floristic data for input into BAM calculator

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Function plot (1000m²)

Dimensions (circle applicable size)

20 x 50 m 10 x 100 m

Tree stem DBH (cm)		Notes on function attributes:
>80	(#) 1	Stem size class records # large trees (cf. benchmark)
50 - 79	(#) 1	Record stems for living trees only, and for all species
30 - 49	(+/-)	For multistemmed trees, record only the largest stem
20 - 29	(+/-)	Presence of <5cm stems records regeneration
10 - 19	(+/-)	Record # trees with hollows, not number of hollows
5 - 9	(+/-)	Count as one stem where tree is multistemmed
< 5	(+/-) +	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows	<20cm	Total #
	>20cm**	
Length of logs		Total (m)

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots) Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	**Litter**	60	70	50	50	70	60
	Bare ground	5	10	10	20	20	13
	Cryptogam	0	0	0	0	0	0
	Rock	0	0	0	0	0	0

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)			**Microrelief**
Cultivation			**Slope**
Grazing (native / stock)			**Aspect**
Soil erosion			**Soil surface texture**
Firewood removal			**Soil colour**
Fire (ground stratum, mid, canopy burnt?)			**Site drainage**
Storm damage			**Distance to nearest water**
Weediness			**Distance to nearest rock outcrop /cave**

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes

BAM Plot - Field Survey Sheet

Date	Survey Name				
Recorders		Plot ID #		Zone ID	
GF code	*Genus species* (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
TG	yellow box	25			
	Smooth cats ear	0.1	50		
OG	mistletoe sp.	1	2		
	Pattersons curse	0.1	50		
	medicago sp. 1	5			
Eragrostis tristachya	grass 1 (Mac 75)	40			
	trifolium	0.1	100		
Vulpia myuros	grass 2	10			
	Brassica sp. (photo) ?.	0.1	10	HTE	
	Hore hound	0.1	10		
	erodium sp. (Mac 76)	0.1	20		
	Blackberry	0.1	1	HTE	
	grass 3	10			
	Rumex sp.	0.1	10		
FG	erodium sp. 2	0.1	20		
GG	Poa labillardieresi	0.1	1		
GG	Panicum effusn	0.1	1		
	TG 1 25				
	SG 0				
	GG 2 0.2				
	FG 1 0.1				
	OG 1 1				

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)

Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).

Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems

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

All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc

Identify top 3 dominants in each stratum (use own stratum definitions)

Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

4/12-7/12 FIELDWORK

BAM Plot - Field Survey Sheet

Date 4/12/18	Survey Name McPhillamys		
Recorders		Plot ID # MAC4120 1	Zone ID
Photo #		Plot dimensions 20 x 50	
Datum 55	Zone	Plot bearing along midline	
Easting 725707	Northing 6290584	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type No PCT	Condition state

Floristics plot is centred on the midline, at 0 m point, 10 m either side

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x 20 m (circled) | 10 x 40 m

		Sum values*
Native Richness (count of native species)	Trees	0
	Shrubs	0
	Grasses etc	3
	Forbs	0
	Ferns	0
	Other	0
Cover (sum of cover of natives species)	Trees	0
	Shrubs	0
	Grasses etc	1.1
	Forbs	0
	Ferns	0
	Other	0
High threat weed cover		//

*These values summarise the floristic data for input into BAM calculator

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20 x 50 m (circled) | 10 x 100 m

Tree stem DBH (cm)		Notes on function attributes:
>80	(#) —	Stem size class records # large trees (cf. benchmark)
50 - 79	(#) —	Record stems for living trees only, and for all species
30 - 49	(+/-) —	For multistemmed trees, record only the largest stem
20 - 29	(+/-) —	Presence of <5cm stems records regeneration
10 - 19	(+/-) —	Record # trees with hollows, not number of hollows
5 - 9	(+/-) —	Count as one stem where tree is multistemmed
< 5	(+/-) —	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows		Total #
0	<20cm	0
	>20cm**	

Length of logs	Total (m)
	0

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots) Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	30	40	20	30	50	34
	Bare ground	60	40	60	60	30	50
	Cryptogam	0	0	0	0	0	0
	Rock	0	0	0	0	0	0

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform	
Clearing (incl. logging)	3	O	Microrelief	
Cultivation	3	R	Slope	Upper Slope
Grazing (native / stock)	3	R	Aspect	North
Soil erosion	0		Soil surface texture	Sandy loam
Firewood removal	0		Soil colour	Brown
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage	run off
Storm damage	0		Distance to nearest water	100 m
Weediness	3	R	Distance to nearest rock outcrop /cave	?

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes Cleared, improved pasture. Brown Songlark, Cattle, Skylark, Sheep, A. Magpie

61202

BAM Plot - Field Survey Sheet

Date	Survey Name				
Recorders		Plot ID #		Zone ID	
GF code	*Genus species* (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
	Patersons Curse Echium plantagineum	10		E	
	Brassica tournefortii	1	100	E	
	Canola Brassica oleracea	1	50	E	
	Sheep sorrel Acetosella vulgaris	10		E	
	Bromus (photo) hordeaceus	5		E	
	Phalaris sp. aquatica	1	100	E	
	Fine seeded grass (photo) Pentameris airoides	10		E	
	Hypochaeris glabra	0.5	200	E	
	Wallaby grass Rytidosperma monticola	0.5	100	N	
Hordeum leporinum	wheat grass (photo)	5		E	
	Cat's tails Trifolium arvense	1	300	E	
	Daisy (photo) Monocculus monstrosus	0.1	20	E	
	Paddock Lovegrass Eragrostis leptostachya	0.1	20	N	
Vulpia myuros	Rumo-lilic grass (photo)	25		E	
Ehra cupaniana	~~Stinkgrass (Eragrostis)~~	1	100	E	
	Forb 1 (photo)	0.1	5		
	Buffalo-lily grass Eleusine tristachya	0.5	50	N	
	Grass				
	B	1.1			

Growth Form (see BAM Appendix 4) - **Tree** (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)
Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).
Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems
N=native, E=exotic, HTE=high threat exotic
All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc
Identify top 3 dominants in each stratum (use own stratum definitions) Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 4/12/18	**Survey Name** McPhillamys		
Recorders		**Plot ID #** MAC41202	**Zone ID**
Photo #		**Plot dimensions** 20 x 50	
Datum	**Zone**	**Plot bearing along midline** 22°	
Easting 724660	**Northing** 6290788	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type	No PCT **Condition state**

Floristics plot is centred on the midline, at 0 m point, 10 m either side

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x 20 m | 10 x 40 m

		Sum values*
Native Richness (count of native species)	**Trees**	0
	Shrubs	0
	Grasses etc	1
	Forbs	1
	Ferns	0
	Other	0
Cover (sum of cover of natives species)	**Trees**	0
	Shrubs	0
	Grasses etc	5
	Forbs	0.1
	Ferns	0
	Other	0
High threat weed cover		1.5

*These values summarise the floristic data for input into BAM calculator

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20 x 50 m | 10 x 100 m

Tree stem DBH (cm)

>80	(#) —	Stem size class records # large trees (cf. benchmark)
50 - 79	(#) —	Record stems for living trees only, and for all species
30 - 49	(+/-) —	For multistemmed trees, record only the largest stem
20 - 29	(+/-) —	Presence of <5cm stems records regeneration
10 - 19	(+/-) —	Record # trees with hollows, not number of hollows
5 - 9	(+/-) —	Count as one stem where tree is multistemmed
< 5	(+/-) —	Hollow bearing stem may be a dead stem (incl. stag)

Notes on function attributes:

# Trees with hollows	<20cm	Total # 0
	>20cm**	
Length of logs		Total (m) 0

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots) Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	**Litter**	50	70	40	50	30	48
	Bare ground	50	30	10	20	60	40
	Cryptogam	0	0	0	0	0	0
	Rock	0	0	0	0	0	0

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	3	O	**Microrelief**
Cultivation	3	R	**Slope** Mid Slope
Grazing (native / stock)	3	R	**Aspect** North
Soil erosion	0		**Soil surface texture** Sandy loam
Firewood removal	0		**Soil colour** Brown
Fire (ground stratum, mid, canopy burnt?)	0		**Site drainage** run off
Storm damage	0		**Distance to nearest water** 500m
Weediness	3	R	**Distance to nearest rock outcrop /cave**

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes As MAC41201

Alignment follows stock route (20m wide fenced lane).

Stephanie
Y.R. Thornbill
Crested Pigeon.

BAM Plot - Field Survey Sheet

Date 4/12/18	Survey Name				
Recorders		Plot ID # MAC49202		Zone ID	
GF code	*Genus species* (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
	Bromus (41201) hordeaceus	5		E	
	Phalaris sp. aquatica	40 ~~30~~		E	
	Rumex sp	0.1	20	E	
	Fairy Lovegrass Sporobolus caroli	5		N	
	Hypochaeris glabra	0.1	50	E	
	Patersons Curse Echium plantagineum	0.5	50	E	
	Avena barbata	0.5	100	E	
	Wheat grass (41201) Hordeum leporinum	1	500	E	
	Sheep Sorrel Acetosella vulgaris	1	500	E	
	Rye Grass Lolium perenne	1	500	E	
	Brassica sp. tournefortii	0.5		E	
FG	Forb 1 Persicaria prostrata	0.1	5	N	

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)
Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).
Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems
N=native, E=exotic, HTE=high threat exotic
All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc
Identify top 3 dominants in each stratum (use own stratum definitions) Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5rn, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 4/12/18	Survey Name McPhillamys		
Recorders		Plot ID # MAC41203	Zone ID
Photo #		Plot dimensions 20x50	
Datum	Zone	Plot bearing along midline 24°	
Easting 726299	Northing 6290299	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type n/a PCT	Condition state

Floristics plot is centred on the midline, at 0 m point, 10 m either side

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x 20 m (circled) | 10 x 40 m

		Sum values*
Native Richness (count of native species)	Trees	0
	Shrubs	0
	Grasses etc	2
	Forbs	3
	Ferns	0
	Other	0
Cover (sum of cover of natives species)	Trees	0
	Shrubs	0
	Grasses etc	1.5
	Forbs	0.3
	Ferns	0
	Other	0
High threat weed cover		

*These values summarise the floristic data for input into BAM calculator

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20 x 50 m (circled) | 10 x 100 m

Tree stem DBH (cm)		Notes on function attributes:
>80	(#)	Stem size class records # large trees (cf. benchmark)
50 - 79	(#)	Record stems for living trees only, and for all species
30 - 49	(+/-)	For multistemmed trees, record only the largest stem
20 - 29	(+/-)	Presence of <5cm stems records regeneration
10 - 19	(+/-)	Record # trees with hollows, not number of hollows
5 - 9	(+/-)	Count as one stem where tree is multistemmed
< 5	(+/-)	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows	<20cm	Total # 0
	>20cm**	
Length of logs		Total (m) 0

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots) Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	90	90	95	60	80	83
	Bare ground	5	5	0	30	15	11
	Cryptogam	0	0	0	0	0	0
	Rock	0	0	0	0	0	0

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	3	O	Microrelief
Cultivation	0	O	Slope Drainage floor
Grazing (native / stock)	3	R	Aspect East
Soil erosion	0		Soil surface texture Clay loam
Firewood removal	0		Soil colour brown / grey
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage run on
Storm damage	0		Distance to nearest water 70m
Weediness	3	R	Distance to nearest rock outcrop /cave 0

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes Wedge tail Eagle
St. Peralatta
N. Miner
Sheep
E. Rosella

BAM Plot - Field Survey Sheet

Date	Survey Name				
Recorders		Plot ID #		Zone ID	
GF code	*Genus species* (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
GG	Phalaris sp. aquatica	80		E	
GG	Bromus from 4120, 02 hordeaceus	10		E	
FG	Hypochaeris glabra	0.5	200	E	
FG	Rumex sp.	0.1	20	E	
FG	Paterson Curse Echium plantagineum	0.1	10	E	
GG	Carex sp. (with Phalaris type head) aggressa	0.5	10	N	
GG	Reddish lax grass Eragrostis leptostachya	1	100	N	
FG	Forb1 (4120) Persicaria prostrata	0.1	5	N	
FG	Creeping oxalis perenneus	0.1	10	N	
GG	Yorkshire Fog Holcus lanatus	0.1	10	E	
FG	Geranium molle.	0.1	50	N	
GG	Vulpia myuros	5		E	
TG	Salix fragilis	1	6	E	
	Grass				
	2 1.5				
	Forb				
	3 0.3				

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)
Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).
Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems
N=native, E=exotic, HTE=high threat exotic
All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc
Identify top 3 dominants in each stratum (use own stratum definitions) Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 4/12/18	Survey Name M Phillamys		
Recorders		Plot ID # MMC41204	Zone ID
Photo #		Plot dimensions 20x50	
Datum	Zone	Plot bearing along midline 325	
Easting 726341	Northing 6290330	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type	Condition state

Floristics plot is centred on the midline, at 0 m point, 10 m either side

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x 20 m (circled) | 10 x 40 m

		Sum values*
Native Richness (count of native species)	Trees	1
	Shrubs	0
	Grasses etc	4
	Forbs	3
	Ferns	0
	Other	0
Cover (sum of cover of natives species)	Trees	25
	Shrubs	0
	Grasses etc	12
	Forbs	0.3
	Ferns	0
	Other	0
High threat weed cover		~~6~~ 1.3

*These values summarise the floristic data for input into BAM calculator

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20 x 50 m (circled) | 10 x 100 m

Tree stem DBH (cm)		Notes on function attributes:
>80	(#) 1	Stem size class records # large trees (cf. benchmark)
50 - 79	(#) ✓	Record stems for living trees only, and for all species
30 - 49	(+/-) ✓	For multistemmed trees, record only the largest stem
20 - 29	(+/-)	Presence of <5cm stems records regeneration
10 - 19	(+/-)	Record # trees with hollows, not number of hollows
5 - 9	(+/-)	Count as one stem where tree is multistemmed
< 5	(+/-)	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows 1	<20cm 1	Total # 1
	>20cm**	
Length of logs		Total (m) 2

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots) Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	40	80	80	40	60	
	Bare ground	50	5	0	50	40	
	Cryptogam	0	0	0	0	0	
	Rock	0	0	0	0	0	

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	3	O	Microrelief
Cultivation	0		Slope Drainage Floor
Grazing (native / stock)	2	R	Aspect –
Soil erosion	1 ~~0~~	R	Soil surface texture Clay loam
Firewood removal	0		Soil colour Brown/grey
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage run on
Storm damage	0		Distance to nearest water 10
Weediness	3	R	Distance to nearest rock outcrop /cave 0

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes Red-Rump E. Rosella W.T. Eagle Nest W.P. Hé. Rabbit G. Butcherbird St. Parakeet

Red Forb ~~Abutilon~~ Modiola caroliniana

BAM Plot - Field Survey Sheet

Date 4/12/18	Survey Name				
Recorders		Plot ID # MAC4/204		Zone ID	
GF code	Genus species (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
	Avalanis aquatica ~~s~~	25		E	
GG	Lonandra longifolia	1	10	N	
	Bromus (other sites) hordeaceus	5		E	
	Brassica sp	0.1	20	E	
GG	Grass 1 Austrostipa nodosa	15		N	
	Great Brome Bromus diandrus	0.1	20	E	
	Hypochaeris glabra	0.1	50	E	
	Blue Heliotrope Heliotropium amplexicaule	0.1	5	E	
	Rosa sp rubignosa	0.5	~~5~~	E	
	Grass 2	0.5	100		
	Blackberry Rubus	0.1	1	E	
TG	E. blakely	~~25~~	1 ~~3~~	N	
GG	Paddock lovegrass Eragrostis leptostachya	0.5	50	N	
	Patersons Curse Echium plantagineum	0.5	10	E	
	Forb/ plants Trifolium angustifolium	0.1	20	E	
	Pimpernel Lysimachia arvensis	0.1	5	E	
	~~Acacia sp~~ Acaena ovina	0.1	10	E	
FG	Forb 1 (4/12/2) Persicaria prostrata	0.1	5	N	
FG	Creeping Oxalis perennans	0.1	20	N	
	Scotch Thistle	0.1	10	E	
FG	Forbs 2 plants Alternanthera angustifolia	0.1	10	N	
GG	Grass 3 Anthosachne scabra	0.5	50	N	
	St Johns Wort Hypericum perforatum	0.5	~~30~~	E	
	Vulpia myuros	1 ~~0~~	100	E	
	Possible Black Gum out of plot, near to GPS point?				
	Nuts sampled. Photo of tree.				
	Smooth white branches				
	Grass				
	4	12			
	Forbs				
	3	0.3			
	Tree	25			
	1				

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)
Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).
Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems
N=native, E=exotic, HTE=high threat exotic
All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc
Identify top 3 dominants in each stratum (use own stratum definitions) Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 4/12/18	Survey Name McPhillamys		
Recorders		Plot ID # MAC41205	Zone ID
Photo #		Plot dimensions 20x50	
Datum	Zone	Plot bearing along midline 301°	
Easting 726508	Northing 6290615	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type No PCT.	Condition state

Floristics plot is centred on the midline, at 0 m point, 10 m either side

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x 20 m (circled) | 10 x 40 m

		Sum values*
Native Richness (count of native species)	Trees	0
	Shrubs	0
	Grasses etc	3 ~~0~~ 7
	Forbs	2 ~~0~~ 8
	Ferns	0
	Other	0
Cover (sum of cover of natives species)	Trees	0
	Shrubs	0
	Grasses etc	0.7
	Forbs	0.2
	Ferns	0
	Other	0
High threat weed cover		

*These values summarise the floristic data for input into BAM calculator

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20 x 50 m (circled) | 10 x 100 m

Tree stem DBH (cm)

>80	(#)	–
50 - 79	(#)	–
30 - 49	(+/-)	–
20 - 29	(+/-)	–
10 - 19	(+/-)	–
5 - 9	(+/-)	–
< 5	(+/-)	–

Notes on function attributes:

- Stem size class records # large trees (cf. benchmark)
- Record stems for living trees only, and for all species
- For multistemmed trees, record only the largest stem
- Presence of <5cm stems records regeneration
- Record # trees with hollows, not number of hollows
- Count as one stem where tree is multistemmed
- Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows	<20cm	Total # 0
	>20cm**	
Length of logs		Total (m) 0

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots) Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	10	5	10	10	50	17
	Bare ground	80	90	80	80	30	72
	Cryptogam	0	0	0	0	0	0
	Rock	0	0	0	0	0	0

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	3	O	Microrelief
Cultivation	3	O	Slope
Grazing (native / stock)	3	R	Aspect
Soil erosion	0		Soil surface texture
Firewood removal	0		Soil colour
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage
Storm damage	0		Distance to nearest water
Weediness	3	R	Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes Constructed contour banks. To north of plot, native veg (photo). Not impacted by pipeline. Alignment follows cleared side of fenceline to MAC41203.

Brown Songlark
L Icon Cockatoo
C. Rosella
N. Miner
Kestrel.
WB Woodswallow

BAM Plot - Field Survey Sheet

Date	Survey Name				
Recorders		Plot ID # MG4205		Zone ID	
GF code	*Genus species* (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
GG	Bromus (41201) hordeaceus	5		E	
GG	Grass 1 (41204) Austrostipa nodosa	0.5	50	N	
FG	Hypochaeris glabra	5		E	
GG	Grass 3 (41204) Anthosachne scabra	0.1	30	N	
FG	Scolymus hispanicus	0.1	30	E	
FG	Chickweed Polycarpon tetraphyllum	0.5	100	E	
FG	Brassica sp.	0.1	20	E	
Pentameris airoides	Fine seeded grass (41201)	0.1	50	E	
GG	Phalaris sp aquatica	~~0~~ 1	200	E	
FG	Euphorbia (phot) dallachyana	0.1	100	N	
FG	Trifolium (41201) Trifolium arvense	0.1	50	E	
FG	Forb 2 (41204) Alternanthera angustifolia	0.1	50	N	
FG	Red. Forb (phot) Modiola cordinjana	0.1	100	E	
GG	~~Digitaria (annual)~~ Chloris truncata	0.1	5	N	
	Eucalyptus bridgesiana in veg near plot				
GG		0.7			
FG		0.2			

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)

Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).

Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems

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

All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc

Identify top 3 dominants in each stratum (use own stratum definitions)

Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 4/12/18	Survey Name McPhillamup		
Recorders		Plot ID # MMK47206	Zone ID
Photo #		Plot dimensions 20x50	
Datum	Zone	Plot bearing along midline 63	
Easting 727403	Northing 6289658	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type 1340	Condition state Poor

Floristics plot is centred on the midline, at 0 m point, 10 m either side

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x 20 m (circled) | 10 x 40 m

		Sum values*
Native Richness (count of native species)	Trees	1
	Shrubs	0
	Grasses etc	2
	Forbs	2
	Ferns	0
	Other	0
Cover (sum of cover of natives species)	Trees	50
	Shrubs	0
	Grasses etc	10.1
	Forbs	0.2
	Ferns	0
	Other	0
High threat weed cover		

*These values summarise the floristic data for input into BAM calculator

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20 x 50 m (circled) | 10 x 100 m

Tree stem DBH (cm)		Notes on function attributes:
>80	(#) –	Stem size class records # large trees (cf. benchmark)
50 - 79	(#) /// 3	Record stems for living trees only, and for all species
30 - 49	(+/-) ✓	For multistemmed trees, record only the largest stem
20 - 29	(+/-) –	Presence of <5cm stems records regeneration
10 - 19	(+/-) –	Record # trees with hollows, not number of hollows
5 - 9	(+/-) –	Count as one stem where tree is multistemmed
< 5	(+/-) –	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows 1	<20cm 2	Total # 2
	>20cm**	
Length of logs		Total (m) 8

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots) Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	80	50	50	60	5	49
	Bare ground	10	50	10	40	80	38
	Cryptogam	0	0	0	0	0	0
	Rock	0	0	0	0	0	0

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	2	O	Microrelief
Cultivation	2	O	Slope Mid Slope
Grazing (native / stock)	3	R	Aspect North
Soil erosion	0		Soil surface texture Sandy loam
Firewood removal	0		Soil colour Grey
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage run off
Storm damage	0		Distance to nearest water 10m
Weediness	2	R	Distance to nearest rock outcrop /cave 0

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes St. Pardalote
W. B Woodswallow
L.R. Parrot

BAM Plot - Field Survey Sheet

Date 4/12/18	Survey Name				
Recorders		Plot ID # MMC41206		Zone ID	
GF code	*Genus species* (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
TG	E. blakelyi	50		N	
GG	Grass 1 (41204) Austrostipa nodosa	10		N	
GG	Wheat Grass (41201) Hordeum leporinum	0.1	50	E	
FG	Einadia nutans	0.1	5	N	
GG	Bromus (41201) hordeaceus	0.1	20	E	
	Grass 1	0.1	10		
	Forb 1	0.1	20		
FG	Hypochaeris glabra	0.1	50	E	
FG	Patersons Curse Echium plantagineum	0.1	10	E	
FG	Forb 2 (photo) ~~Haloragis~~ Alternanthera angustifolia	0.1	50	N	
GG	Paddock Lovegrass Eragrostis leptostachya	0.1	10	N	
FG	Cape Weed Arctotheca calendula	>1	10	E	
FG	Pink forb photo Spergularia rubra	0.1	10	E	
FG	Red forb (41205) Modiola truncata	0.1	20	E	

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)
Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).
Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems
N=native, E=exotic, HTE=high threat exotic
All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc
Identify top 3 dominants in each stratum (use own stratum definitions) Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 4/12/18	Survey Name McPhillamys		
Recorders		Plot ID # MK41207	Zone ID
Photo #		Plot dimensions 20x50	
Datum	Zone	Plot bearing along midline 285	
Easting 728739	Northing 6289513	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type No PCT.	Condition state

Floristics plot is centred on the midline, at 0 m point, 10 m either side

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x 20 m (○) | 10 x 40 m

		Sum values*
Native Richness (count of native species)	Trees	0
	Shrubs	0
	Grasses etc	4
	Forbs	6
	Ferns	0
	Other	0
Cover (sum of cover of natives species)	Trees	0
	Shrubs	0
	Grasses etc	1.7
	Forbs	1.4
	Ferns	0
	Other	0
High threat weed cover		5.6

*These values summarise the floristic data for input into BAM calculator

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20 x 50 m (○) | 10 x 100 m

Tree stem DBH (cm)		
>80	(#)	—
50 - 79	(#)	—
30 - 49	(+/-)	—
20 - 29	(+/-)	—
10 - 19	(+/-)	—
5 - 9	(+/-)	—
< 5	(+/-)	—

Notes on function attributes:
- Stem size class records # large trees (cf. benchmark)
- Record stems for living trees only, and for all species
- For multistemmed trees, record only the largest stem
- Presence of <5cm stems records regeneration
- Record # trees with hollows, not number of hollows
- Count as one stem where tree is multistemmed
- Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows	<20cm	Total # 0
	>20cm**	
Length of logs		Total (m) 0

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots) Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	30	40	30	50	20	34
	Bare ground	60	40	70	50	80	60
	Cryptogam	0	0	0	0	0	0
	Rock	0	0	0	0	0	0

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	3	O	Microrelief
Cultivation	2	NR	Slope Drainage Floor
Grazing (native / stock)	2	R	Aspect East
Soil erosion	1	R	Soil surface texture Clay loam
Firewood removal	0		Soil colour grey
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage run on
Storm damage	0		Distance to nearest water 20 m
Weediness	2	R	Distance to nearest rock outcrop /cave 500m

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes

BAM Plot - Field Survey Sheet

Date	Survey Name				
Recorders		Plot ID #		Zone ID	

GF code	*Genus species* (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
GG	Rye Grass *Lolium perenne*	~~2~~ 5		E	
FG	*Wahlenbergia* sp	0.1	50	N	
GG	*Bromus* (41201) *hordeaceus*	30		E	
FG	*Hypochaeris glabra*	1 ~~0.5~~	500	E	
FG	Creeping *Oxalis perennans*	0.~~5~~	200	N	
FG	Cat tails (41201) *Trifolium arvense*	0.5	100	E	
FG	Forb 1 *Petrorhagia* ~~sp~~ sp.	0.1	20	E	
GG	*Phalaris aquatricus*	0.1	30	E	
GG	Wheat Grass (41201)	0.5	700	E	
FG	Sheep sorrel *Acetosella vulgaris*	0.5	50	E	
FG	Forb 2 ~~to~~ *Pseudognaphalium luteoalbum*	0.1	100	N	
GG	Stinking Grass (*Eragrostis*) *Poa annua*	0.1	50	E	
GG	Plume grass (41201) *Vulpia myuros*	1	Lots	E	
FG	Forb 3 *Euchiton sphaericus*	0.1	50	N	
GG	Paddock Lovegrass *Eragrostis leptostachya*	1		N	
	Thistle phots	0.1	10	E	
FG	Austral Bearcat *Cymbonotus lawsonianus*	0.1	5	N	
GG	Button-like Grass *Elaeusine tristachya*	0.1	10	N	
FG	Red Forb (41205) *Modiola truncata*	0.1		E	
FG	Forb 1 (41202) *Persicaria prostrata*	0.5	10	N	
FG	Blue *Heliotropium amplexicaule*	0.1	1	E	
GG	Small headed wallaby grass *Rytidosperma monticola*	0.5		N	
FG	*Brassica* sp.	0.1	5	E	
GG	Grass 1 (41204) *Austrostipa*	0.1	20	N	
TG	*Salix fragilis* nodosa	5	0	E	
	Grass				
	IIII	1.7			
	Forb				
	HH 1	1.4			
		~~1~~ 3.1			

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)
Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).
Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems
N=native, E=exotic, HTE=high threat exotic
All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc
Identify top 3 dominants in each stratum (use own stratum definitions) Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 5/12/18	**Survey Name** McMillans		
Recorders		**Plot ID #** MC5120	**Zone ID**
Photo #		**Plot dimensions** 20x50	
Datum	**Zone**	**Plot bearing along midline** 189	
Easting 732380	**Northing** 6291751	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type 1330	**Condition state** Moderate

Floristics plot is centred on the midline, at 0 m point, 10 m either side

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x (20) m 10 x 40 m

		Sum values*
Native Richness (count of native species)	**Trees**	3
	Shrubs	0
	Grasses etc	5
	Forbs	3
	Ferns	0
	Other	0
Cover (sum of cover of natives species)	**Trees**	46
	Shrubs	0
	Grasses etc	5.8
	Forbs	5.6
	Ferns	0
	Other	0
High threat weed cover		25.5

*These values summarise the floristic data for input into BAM calculator

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20 x (50) m 10 x 100 m

Tree stem DBH (cm)		Notes on function attributes:
>80	(#) –	Stem size class records # large trees (cf. benchmark)
50 - 79	(#) III 4	Record stems for living trees only, and for all species
30 - 49	(+/-) ✓	For multistemmed trees, record only the largest stem
20 - 29	(+/-) ✓	Presence of <5cm stems records regeneration
10 - 19	(+/-) ✓	Record # trees with hollows, not number of hollows
5 - 9	(+/-)	Count as one stem where tree is multistemmed
< 5	(+/-)	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows ~~HHT~~ ~~4~~ 2	<20cm ~~HH~~ ~~4~~ 1	Total # 5 ~~10~~
	>20cm** III	
Length of logs ~~HH~~ ~~HH~~ ~~HH~~ ~~HH~~ ~~HH~~ ~~HH~~ ~~HH~~ III ~~HH~~ ~~HH~~ ~~HH~~ ~~HH~~ ~~HH~~ ~~HH~~ ~~HH~~		Total (m) 73

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots) Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	**Litter**	90	100	90	80	90	90
	Bare ground	0	0	0	10	5	3
	Cryptogam	0	0	5	0	5	2
	Rock	0	0	0	0	0	0

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	2	O	Microrelief
Cultivation	0		Slope Mid Slope
Grazing (native / stock)	1	R	Aspect West
Soil erosion	1	O	Soil surface texture Sandy clay loam
Firewood removal	0		Soil colour grey
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage run off
Storm damage	0		Distance to nearest water
Weediness	3	R	Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes Pipeline crosses windbreak perpindicular to plot.

R Songlark, S Songlark, Is Rosella, Red Rump, A. Magpie, N. Miner

BAM Plot - Field Survey Sheet

Date 5/12/18	Survey Name McPhillemys				
Recorders		Plot ID # MMC51201		Zone ID	
GF code	Genus species (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
TG	Eucalyptus bridgesiana	1	1	N	
TG	Eucalyptus blakelyi	25	2	N	
TG	Eucalyptus melliodora	20	2	N	
	Bromus hordeaceous	5		E	
	Bromus sp. (atharticus ?)	5		E	
	Horehound Marrubium vulgare	5		E	
FG	Einadia nutans	5 F	~~20~~	N	
	Echium plantagineum	1	50	E	
FG	Wahlenbergia sp	0.1	50	N	
	Hypochaeris glabra	0.1	100	E	
FG	Oxalis perennans	0.5	100	N	
	Lolium ~~arar~~ perenne	10		E	
GG	Aristida sp ramosa	0.5	50	N	
GG	Austrostipa nodosa	5		N	
	Brassica sp.	1	100	E	
	Wheat grass Hordeum leporinum	1	200	E	
	Rumex sp.	0.1	20	E	
	Great Brome Bromus diandrus	25		E	
GG	Eragrostis leptostachya	0.1	10	N	
	Sheep sorrel Acetosella vulgaris	0.5	100		
GG	Rytidosperma monticola	0.1	20	N	
	~~Phalaris~~ sp Cocks ~~Foot~~ Dactylis glomerata	0.5	50	E	
	Grass 1 Poa sieberiana	0.1	5		
GG	Rytidosperma sp (long head) caespitosum	0.1	10	N	
	Tree				
	3	46			
	Grass				
	5	5.8			
	Forb				
	3	5.6			

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)

Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).

Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems

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

All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc

Identify top 3 dominants in each stratum (use own stratum definitions) Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 5/12/18	**Survey Name** McPhillamys		
Recorders		**Plot ID #** MMCS1202	**Zone ID**
Photo #		**Plot dimensions** 10 x 100	
Datum	**Zone**	**Plot bearing along midline** 87°	
Easting 733226	**Northing** 6291844	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type No PCT.	**Condition state**

Floristics plot is centred on the midline, at 0 m point, 10 m either side

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x 20 m; 10 x 40 m

		Sum values*
Native Richness (count of native species)	**Trees**	0
	Shrubs	0
	Grasses etc	0
	Forbs	2
	Ferns	0
	Other	0
Cover (sum of cover of natives species)	**Trees**	0
	Shrubs	0
	Grasses etc	0
	Forbs	0.2
	Ferns	0
	Other	0
High threat weed cover		35

*These values summarise the floristic data for input into BAM calculator

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20 x 50 m; 10 x 100 m

Tree stem DBH (cm)		Notes on function attributes:
>80	(#) –	Stem size class records # large trees (cf. benchmark)
50 - 79	(#) –	Record stems for living trees only, and for all species
30 - 49	(+/-) –	For multistemmed trees, record only the largest stem
20 - 29	(+/-) –	Presence of <5cm stems records regeneration
10 - 19	(+/-) –	Record # trees with hollows, not number of hollows
5 - 9	(+/-) –	Count as one stem where tree is multistemmed
< 5	(+/-) –	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows	<20cm	Total # 0
	>20cm**	
Length of logs		Total (m) 0

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots) Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	**Litter**	90	90	95	80	70	85
	Bare ground	0	5	0	10	20	7
	Cryptogam	0	0	0	0	0	0
	Rock	0	0	0	0	0	0

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	3	O	Microrelief
Cultivation	0		Slope Upper slope
Grazing (native / stock)	1	NR	Aspect East
Soil erosion	0		Soil surface texture Sandy Clay Loam
Firewood removal	0		Soil colour Grey
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage run off
Storm damage	0		Distance to nearest water 300m
Weediness	3	R	Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes

BAM Plot - Field Survey Sheet

Date 5/12/18	Survey Name M. Phillamps				
Recorders		Plot ID # MAC51202		Zone ID	
GF code	Genus species (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
	Brassica tournefortii	30		E HTE	
	Echium plantagineum	5		E	
	Lepidium (phist) africanum	10		E	
	Lolium perenne	25		E	
	Sheep sorrel Acetosella vulgaris	5		E HTE	
	Hordeum leporinum (barley-grass)	0.5	100	E	
Loose Grass	~~Button like grass~~	0.1	50	E	
	Scotch thistle Onopordum acanthium	5		E	
	Tribulus terrestris	0.5	50	E	
FG	Portulaca oleracea	0.1	20	N	
FG	Dysphania ~~sp~~ pumilio	0.1	100	N	
	~~Mallow~~ Malva neglecta	0.1	20	E	
	Cynodon dactylon	~~1~~		E	
	Bromus hordeaceus	0.1	50	E	
	Lolium perenne	0.1	50	E	
	Cape Weed Arctotheca calendula	0.1	10	E	
		0.2%	native		

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)
Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).
Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems
N=native, E=exotic, HTE=high threat exotic
All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc
Identify top 3 dominants in each stratum (use own stratum definitions) Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 5/12/18	**Survey Name** McMillans		
Recorders		**Plot ID #** MACS1203	**Zone ID** Moderate
Photo #		**Plot dimensions** 20x50	
Datum	**Zone**	**Plot bearing along midline** 97°	
Easting 736215	**Northing** 6293182	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type 654	**Condition state** Mature trees over Moderate exotic.

Floristics plot is centred on the midline, at 0 m point, 10 m either side

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x 20 m | 10 x 40 m

		Sum values*
Native Richness (count of native species)	**Trees**	1
	Shrubs	0
	Grasses etc	4
	Forbs	8
	Ferns	0
	Other	1
Cover (sum of cover of natives species)	**Trees**	25
	Shrubs	0
	Grasses etc	21.2
	Forbs	1.2
	Ferns	0
	Other	1
High threat weed cover		10.1

*These values summarise the floristic data for input into BAM calculator

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20 x 50 m | 10 x 100 m

Tree stem DBH (cm)

		Notes on function attributes:
>80	(#)	Stem size class records # large trees (cf. benchmark)
50 - 79	(#) 2	Record stems for living trees only, and for all species
30 - 49	(+/-) ✓	For multistemmed trees, record only the largest stem
20 - 29	(+/-) ✓	Presence of <5cm stems records regeneration
10 - 19	(+/-) ✓	Record # trees with hollows, not number of hollows
5 - 9	(+/-)	Count as one stem where tree is multistemmed
< 5	(+/-) ✓	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows 0	<20cm	Total # 0
	>20cm**	
Length of logs III		Total (m) 3

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots)

Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	**Litter**	50	60	50	80	100	68
	Bare ground	50	40	40	10	0	28
	Cryptogam	0	0	0	0	0	0
	Rock	0	0	0	0	0	0

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	2	0	Microrelief
Cultivation	1	NR	Slope Hill crest
Grazing (native / stock)	2	R	Aspect East
Soil erosion	0		Soil surface texture Sandy loam
Firewood removal	0		Soil colour grey
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage run off
Storm damage	0		Distance to nearest water
Weediness	2	R	Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes

BAM Plot - Field Survey Sheet

Date 5/12/18	Survey Name				
Recorders		Plot ID # MAC5/203		Zone ID	
GF code	Genus species (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
TG	Eucalyptus melliodora	25		N	
	Lolium perenne	0·5	200	E	
GG	Austrostipa nodosa	20		N	
	Bromus ~~hordeaceus~~ sp. arthariticus	0·5	300	E	
	Brassica tournifortii	10		E HTE	
FG	Erhadia nutans	0·5	50	N	
	Great Brome Bromus diandrus	0·1	20	E HTE	
FG	Rumex brownii	0·1	5	N	
	Horehound Marrubium vulgare	0·5	10	E	
	Cocks Foot Dactylis glomerata	0·1	20	E	
FG	Erodium (grey toothed leaf) cicutarium	0·1	50	N	
FG	Wahlenbergia communis	0·1	20	N	
	Vulpia myuros	0·1	50		
GG	Rhytidosperma ~~monticola~~ caespitosum	1	200	N	
	Trifolium ~~hetiperne~~ arvense	0·1	50	E	
	Echium plantagineum	0·1	20	E	
	Hypochoeris glabra	0·1	50	E	
	Tribulus terrestris	0·1	20	E	
	Avena barbata	0·1	20	E	
	Cynodon dactylon	0·5		E	
	Trifolium repens	0·1	50	E	
FG	Vittadinia sp (photo) dissecta	0·1	5	N	
	Pink forb (photo) Spergularia rubra	0·1	1	E	
FG	Daisy (photo) Euchiton sphaericus	0·1	5	~~N~~	
GG	Eragrostis ~~leptostachya~~	0·1	5	N	
OG	Amyema sp. pendula	1	2	N	
GG	Bothriochloa macra (sample)	0·1	5	N	
FG	Oxalis perennans	0·1	5	N	
FG	Wahlenbergia sp (sample) gracilis	0·1	5	N	
	Euphorbia (4/12/18) maculata	0·1	25	~~E~~	
	Forbs				
	8	1·2			
	Grass	21·2			
	4				
	Other				
	1	1			

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)
Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).
Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems
N=native, E=exotic, HTE=high threat exotic
All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc
Identify top 3 dominants in each stratum (use own stratum definitions) Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% = 2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 6/12/18	**Survey Name** McPhillamys		
Recorders		**Plot ID #** MAC61201	**Zone ID**
Photo #		**Plot dimensions** 20x50	
Datum	**Zone**	**Plot bearing along midline** 236	
Easting 738954	**Northing** 6293612	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type	No PCT. **Condition state**

Floristics plot is centred on the midline, at 0 m point, 10 m either side

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x 20 m (10 x 40 m)

		Sum values*
Native Richness (count of native species)	**Trees**	0
	Shrubs	0
	Grasses etc	1
	Forbs	1
	Ferns	0
	Other	0
Cover (sum of cover of natives species)	**Trees**	0
	Shrubs	0
	Grasses etc	0.5
	Forbs	0.1
	Ferns	0
	Other	0
High threat weed cover		0.5

*These values summarise the floristic data for input into BAM calculator

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Function plot (1000m²)

Dimensions (circle applicable size): (20 x 50 m) 10 x 100 m

Tree stem DBH (cm)		Notes on function attributes:
>80	(#) —	Stem size class records # large trees (cf. benchmark)
50 - 79	(#) —	Record stems for living trees only, and for all species
30 - 49	(+/-) —	For multistemmed trees, record only the largest stem
20 - 29	(+/-) —	Presence of <5cm stems records regeneration
10 - 19	(+/-) —	Record # trees with hollows, not number of hollows
5 - 9	(+/-) —	Count as one stem where tree is multistemmed
< 5	(+/-) —	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows	<20cm	Total # 0
	>20cm**	
Length of logs		Total (m) 0

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots) Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	**Litter**	50	30	50	40	30	40
	Bare ground	40	50	30	40	50	42
	Cryptogam	0	0	0	0	0	0
	Rock	0	0	0	0	0	0

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	3	O	**Microrelief**
Cultivation	3	R	**Slope** Plain
Grazing (native / stock)	0		**Aspect** -
Soil erosion	0		**Soil surface texture** Clay loam
Firewood removal	0		**Soil colour** Grey
Fire (ground stratum, mid, canopy burnt?)	0		**Site drainage** run on
Storm damage	0		**Distance to nearest water**
Weediness	3	R	**Distance to nearest rock outcrop /cave**

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes Cultivated oats crop | Sleylark M. Lapwing

BAM Plot - Field Survey Sheet

Date 7/12/18	Survey Name McPhillamys				
Recorders		Plot ID # MACG120/		Zone ID	
GF code	*Genus species* (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
	Cynodon dactylon	25		E	
	Phalaris aquaticus	5		E	
	Brassica tournefortii	0.5	100	E HTW	
FG	Geranium sp molle	0.1	10		
	Bromus hordeaceus	0.1	50	E	
	Phragmites australis	1	200	N	
GG	River Tussock	0.5	5	N	
	Echium plantagineum	0.1	5	E	
	Scotch Thistle	25		E	
	Rumex sp.	0.1	100	E	
	Avena sp. (oat crop) sativa	50		E	
	Creeping forb from MACT120Z Pesacaria prostrata	0.1	5	E	
	Phennel Weed Foeniculum vulgare	1	10	E	

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)
Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).
Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems
N=native, E=exotic, HTE=high threat exotic
All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc
Identify top 3 dominants in each stratum (use own stratum definitions) Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 6/12/18	**Survey Name**		
Recorders		**Plot ID #** MAC61202	**Zone ID**
Photo #		**Plot dimensions** 20x50	
Datum	**Zone**	**Plot bearing along midline** 230°	
Easting 756516	**Northing** 6274485	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type 1330	**Condition state** Paddock Dotf trees

Floristics plot is centred on the midline, at 0 m point, 10 m either side

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size)

20 x 20 m | 10 x 40 m

		Sum values*
Native Richness (count of native species)	**Trees**	1
	Shrubs	0
	Grasses etc	0
	Forbs	3
	Ferns	0
	Other	0
Cover (sum of cover of natives species)	**Trees**	25
	Shrubs	0
	Grasses etc	0
	Forbs	0.7
	Ferns	0
	Other	0
High threat weed cover 25.3 ~~7~~		

*These values summarise the floristic data for input into BAM calculator

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Function plot (1000m²)

Dimensions (circle applicable size)

20 x 50 m | 10 x 100 m

Tree stem DBH (cm)		Notes on function attributes:
>80	(#) –	Stem size class records # large trees (cf. benchmark)
50 - 79	(#) 1	Record stems for living trees only, and for all species
30 - 49	(+/-) –	For multistemmed trees, record only the largest stem
20 - 29	(+/-) –	Presence of <5cm stems records regeneration
10 - 19	(+/-) –	Record # trees with hollows, not number of hollows
5 - 9	(+/-) –	Count as one stem where tree is multistemmed
< 5	(+/-) –	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows 1	<20cm 2	Total # 3
	>20cm** 1	
Length of logs		Total (m) 10

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots)

Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	**Litter**	60	80	90	70	90	78
	Bare ground	30	10	0	10	5	11
	Cryptogam	0	0	0	0	0	0
	Rock	0	0	0	0	0	0

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	2	O	Microrelief .
Cultivation	0		Slope Upper slope
Grazing (native / stock)	1	R	Aspect SW
Soil erosion	0		Soil surface texture Sand
Firewood removal	2 ~~3~~	R	Soil colour brown
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage run off
Storm damage	0		Distance to nearest water 400m
Weediness	3	R	Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes Cleared grazing land with paddock trees. Exotic pasture grasses dominate

Aust. Raven, Cattle
Bc. Songlark
R.R. Parrot
A. Magpie
E. Hare W.B. Woodswallow
Galah
M. Miner

BAM Plot - Field Survey Sheet

Date 6/12/18	Survey Name McWilliams				
Recorders		Plot ID # MAL61202		Zone ID	
GF code	*Genus species* (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
TG	E. multisetosa	25		N	
	Malva neglecta	1	100	E	
	Lolium perenne	1	200	E	
	Hordeum leporinum	25		E	
	Bromus diandrus	25		E HTE	
	Edrium plantagineum	1	50	E	
FG	stinging nettle Urtica incisa	0.5	50	N	
	Cocks Foot Dactylis glomerata	0.1	20	E	
	Blackberry	0.1	1	E HTE	
	Geranium sp (6120) molle	0.1	5		
	Atriplex (ghots) Chenopodium album	0.1	5	E	
	Cynodon dactylon	5		E	
	Brassica tournefortii	0.1	20	E HTE	
	Hypochaeris glabra	0.1	50	E	
	Trifolium arvense	0.1	20	E	
FG	Dysphania pumilio	0.1	10	N	
	Marrubium vulgare	0.1	5	E	
	Acetosella vulgaris	0.1	20	E HTE	
FG	Thadia nutans	0.1	5	N	

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)
Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).
Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems
N=native, E=exotic, HTE=high threat exotic
All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc
Identify top 3 dominants in each stratum (use own stratum definitions) Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 6/12/18	Survey Name McPhillamys		
Recorders		Plot ID # MACG1203	Zone ID
Photo #		Plot dimensions 20x50	
Datum	Zone	Plot bearing along midline 56°	
Easting 752673	Northing 6293748	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type ~~278~~ 1330 - ~~Mod~~ Medium	Condition state Re-vegetation

Floristics plot is centred on the midline, at 0 m point, 10 m either side

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x 20 m (circled) | 10 x 40 m

		Sum values*
Native Richness (count of native species)	Trees	2
	Shrubs	3
	Grasses etc	2
	Forbs	4
	Ferns	0
	Other	0
Cover (sum of cover of natives species)	Trees	2
	Shrubs	11
	Grasses etc	0·6
	Forbs	1·3
	Ferns	0
	Other	0
High threat weed cover		1·5

*These values summarise the floristic data for input into BAM calculator

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20x 50 m (circled) | 10 x 100 m

Tree stem DBH (cm)		Notes on function attributes:
>80	(#)	Stem size class records # large trees (cf. benchmark)
50 - 79	(#)	Record stems for living trees only, and for all species
30 - 49	(+/-)	For multistemmed trees, record only the largest stem
20 - 29	(+/-)	Presence of <5cm stems records regeneration
10 - 19	(+/-) ✓	Record # trees with hollows, not number of hollows
5 - 9	(+/-) ✓	Count as one stem where tree is multistemmed
< 5	(+/-)	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows		Total #
0	<20cm	0
	>20cm**	
Length of logs		Total (m) 0

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots) Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	90	80	95	90	80	87
	Bare ground	0	0	0	0	0	0
	Cryptogam	0	0	0	0	0	0
	Rock	0	0	0	0	0	0

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	3	O	Microrelief
Cultivation	0		Slope Plain
Grazing (native / stock)	0		Aspect -
Soil erosion	0		Soil surface texture Clay loam
Firewood removal	0		Soil colour Grey
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage run on
Storm damage	0		Distance to nearest water
Weediness	3	R	Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes Revegetated creek bank with mixture of local and non-local natives.

R. Songlark
R. whistler
W.B. Woodswallow
weebill
Gold finch
Silvereye.
B. Fawn, CS
Y. Faced HE
W.S. HE.

BAM Plot - Field Survey Sheet

Date 6/12/18	Survey Name				
Recorders		Plot ID # MAC61203		Zone ID	
GF code	*Genus species* (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
	Dactylis glomerata	80		E	
	Prickly lettuce	0·1	50	E	
	Bromus hordeaceus	5		E	
	Trifolium arvense	0·1	100	E	
	~~Datura~~ Salix fragilis	1	0	E HTE	
	Brassica tournefortii	0·5	100	E HTE	
FG	Chrysocephalum apiculatum	1	50	N	
	Plantago sp.	0·1	20	E	
FG	Oxalis perennens	0·1	100	N	
TG	Eucalyptus blakelyi	1	0	N	
	Lolium perenne	0·1	100	E	
FG	Wahlenbergia communis	0·1	20	N	
EG	Cyperus (photo) ~~Thotskyanus~~	0·5 ~~EST~~	50	N	
SG	Acacia (~~photo~~) ~~decurrens~~ acuminata	5		N	
	Scolymus hispanicus	0·1	10	E	
	Hordeum leporinum	0·1	20	E	
FG	Rumex brownii	0·1	10	N	
	Hypochaeris glabra	0·1	30	E	
	Large Hypochaeris type seed head	0·1	100	E	
GG	Rytidosperma racemosum	0·1	20	N	
TG	River Oak Casuarina cunninghamiana	1	1	N	
SG	Acacia (photo)	5		N	
SG	River Callistemon citrinus	1	1	N	
	Tree				
	2	2			
	Shrub				
	3	11			
	Forb				
	4	1·3			
	Grass				
	2	0·6			

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)

Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).

Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems

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

All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc

Identify top 3 dominants in each stratum (use own stratum definitions)

Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% = 2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 7/12/18	Survey Name McPhillamys		
Recorders		Plot ID # MMCT1201	Zone ID
Photo #		Plot dimensions 20x50	
Datum	Zone	Plot bearing along midline 266°	
Easting 776650	Northing 6303448	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type 1093	Condition state Intact

Floristics plot is centred on the midline, at 0 m point, 10 m either side

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x 20 m (circled) | 10 x 40 m

		Sum values*
Native Richness (count of native species)	Trees	2
	Shrubs	7
	Grasses etc	7
	Forbs	8
	Ferns	0
	Other	0
Cover (sum of cover of natives species)	Trees	70
	Shrubs	87
	Grasses etc	86
	Forbs	12
	Ferns	0
	Other	0
High threat weed cover		0.6

*These values summarise the floristic data for input into BAM calculator

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20 x 50 m (circled) | 10 x 100 m

Tree stem DBH (cm)		Notes on function attributes:
>80	(#) –	5tem size class records # large trees (cf. benchmark)
50 - 79	(#) –	Record stems for living trees only, and for all species
30 - 49	(+/-) ✓	For multistemmed trees, record only the largest stem
20 - 29	(+/-) ✓	Presence of <5cm stems records regeneration
10 - 19	(+/-) ✓	Record # trees with hollows, not number of hollows
5 - 9	(+/-) ✓	Count as one stem where tree is multistemmed
< 5	(+/-) ✓	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows	<20cm	Total # 0
	>20cm**	
Length of logs		Total (m) 12

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots) Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	90	80	95	95	90	90
	Bare ground	5	0	0	0	5	
	Cryptogam	0	0	0	0	0	
	Rock	0	0	5	0	0	

90 80 95 95 90 / 450/5 =

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	1	NR	Microrelief
Cultivation	0		Slope mid-slope
Grazing (native / stock)	0		Aspect South
Soil erosion	0		Soil surface texture Clay loam
Firewood removal	1	R	Soil colour Grey
Fire (ground stratum, mid, canopy burnt?)	1	NR	Site drainage run off
Storm damage	0		Distance to nearest water 200m
Weediness	1	R	Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes

BAM Plot - Field Survey Sheet

Date 7/12/18	Survey Name McMillanups				
Recorders		Plot ID # MAC71201		Zone ID	
GF code	Genus species (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
E. mucronata TG	Euc 1 (smooth bark) Photo 837 ~~rossii~~ ~~marmifera~~	30			
TG	Euc 2 (box/stringy bark) E. dives	~~4~~ 40			
FG	Forb 1 Leucopogon appressus	0.5	20		
SG	Pea 1 (photo) Dillwynia phylicoides	1	20		
SG	Pea 2 (photo) Daviesia leptophylla	1	20		
GG	Hardenbergia violacea	0.5	10		
GG	Lomandra filiformis	5			
GG	Poa sieberiana	60			
GG	Themeda triandra	15			
GG	Dianella	1 ~~5~~	50		
	Plantago sp	0.1	50		
HTW	St Johns Wort Hypericum perforatum	0.1	50	HTW	
SG	Cassinia sp (photo 842) quinquefaria	1	10		
	~~Pimelea sp (photo 843)~~				
GG	Grass 1 Poa induta	5			
GG	Lomandra longifolia	0.~~5~~	10		
SG	Hibertia obtusifolia	0.1	5		
SG	Acacia decalbata (silver wattle?)	5			
OG	Amyema (photo)	5			
SG	Acacia 1	0.5	0		
HTW	Blackberry	0.5	7	HTW	
FG	Oxalis perennans	0.1	10		
FG	Pea 3 Bossiaea buxifolia	0.1	1	~~HTE~~ N	
FG	Wahlenbergia sp gracilenta	0.1	50		
FG	Chrysocephalum apiculatum	0.1	5		
	Hypochaeris glabra	0.1	20		
FG	Haloragis sp	0.1	20		
TG	Euc 3? (photo 851) ~~no seedlings~~ E. mannifera	5			
FG	Trigger Plant Stylidium graminifolium	0.1	5		
FG	Daisy (photos 852-853)	0.1	100		
SG	Hovea sp? heterophylla	0.1	1	N	
	TG 2 70				
	SG 7 8.7				
	GG 7 ~~26~~ 6				
	FG 8 1.2				

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)
Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).
Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems
N=native, E=exotic, HTE=high threat exotic
All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc
Identify top 3 dominants in each stratum (use own stratum definitions) Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

linum at all sites either pimelea or St Johns Wort?

19/9-20/9 FIELD WORK

BAM Plot - Field Survey Sheet

Date 24/9/18	Survey Name McMillans		
Recorders JC		Plot ID # MAC240901	Zone ID
Photo #		Plot dimensions 20x50	
Datum GDA94	Zone MGA55	Plot bearing along midline 31°	
Easting 770658	Northing 6300945	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	Sth East Highlands
Subregion	
Likely Vegetation Class	
Plant Community Type	1197 - Snow Gum - Mountain Gum	Condition state

Floristics plot is centred on the midline, at 0 m point, 10 m either side

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): (20 x 20 m) 10 x 40 m

		Sum values*
Native Richness (count of native species)	Trees	3
	Shrubs	4
	Grasses etc	3
	Forbs	8
	Ferns	1
	Other	0
Cover (sum of cover of natives species)	Trees	76
	Shrubs	0.8
	Grasses etc	45.2
	Forbs	0.8
	Ferns	20
	Other	0
High threat weed cover		0

*These values summarise the floristic data for input into BAM calculator

BAM Function plot (1000m²)

Dimensions (circle applicable size): (20 x 50 m) 10 x 100 m

Tree stem DBH (cm)		Notes on function attributes:
>80	(#) I	Stem size class records # large trees (cf. benchmark)
50 - 79	(#) ~~IIII~~ IIII	Record stems for living trees only, and for all species
30 - 49	(+/-) ✓	For multistemmed trees, record only the largest stem
20 - 29	(+/-) ✓	Presence of <5cm stems records regeneration
10 - 19	(+/-) ✓	Record # trees with hollows, not number of hollows
5 - 9	(+/-) ✓	Count as one stem where tree is multistemmed
< 5	(+/-) ✓	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows ✓	<20cm II	Total # 3
	>20cm** I	
Length of logs: Logs ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ III		Total (m) 48

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots)

Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	100	90	90	90	95	93
	Bare ground	0	0	0	0	0	0
	Cryptogam	0	0	0	0	0	0
	Rock	0	0	0	0	0	0

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	1	O	Microrelief
Cultivation	0		Slope Upper slope.
Grazing (native / stock)	0		Aspect NNE
Soil erosion	0		Soil surface texture Clay-loam
Firewood removal	0		Soil colour brown
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage run off
Storm damage	0		Distance to nearest water
Weediness	0		Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes Pipeline on NW side of road in table drain.
- Aust. Raven
- YF HE
- Crimson Rosella
- Red WB
- Grey Fantail
- S. B. W
- Scrubwren
- WT Treecreeper

BAM Plot - Field Survey Sheet

Date 24/9/18	Survey Name MacPhillamys				
Recorders JC		Plot ID # MAC240901		Zone ID	
GF code	***Genus species*** (tick if photographed or sample taken)	**Cover %**	**Abund** (count)	**N, E, HTE**	Stratum
TG	Scribbly Gum, E. rossii?	25			
TG	Eucalyptus sp1 pauciflora	50			
EG	Bracken Pteridium esculentum	20			
GG	Poa sieberiana	40			
GG	Lomandra longifolia	5			
SG	Epacrid SP1 Acrotriche divaricata	0.1	3		
GG	Lomandra filiformis	0.1	20		
TG	Black Wattle Acacia melanoxylon	1	4		
~~FG~~	~~Forb 1~~ (1/2 from epacrid)	0.1	200		
FG	Forb 2 Goodenia sp. (1/2 from RAP quad)	0.1	50		
TG	Hardenbergia violacea	0.1	10		
SG	Acacia SP1 implexa	0.1	3		
~~FG~~	Forb 3 Minuartia ~~md~~ mediterranea	0.1	10		
FG	Daisy SP1 (Purple in photo)	0.1	200	Brachyscome decipiens	
SG	Bursaria spinosa	0.5	2		
~~FG~~	Hypochaeris ~~rad~~	0.1	50		
FG	Ragwort Gonocarpus tetragynus	0.1	300		
~~FG~~	Forb 4	0.1	20		
FG	Kidney Weed Dichondra repens	0.1	200		
FG	Daisy 2 Senecio diaschides	0.1	1		
FG	Daisy 3 Chrysocephalum apiculatum	0.1	10		
FG	Forb 5 Viola betonicifolia	0.1	1		
~~FG~~	Forb 6	0.1	50		
GG	Grass 1 Microlaena stipoides	0.1	5		
SG	~~Pea~~ SP1 Hibbertia obtusifolia	0.1	3		
	Zieria cytisoides?				

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)
Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).
Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems
N=native, E=exotic, HTE=high threat exotic
All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc
Identify top 3 dominants in each stratum (use own stratum definitions) Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 24/9/18	Survey Name MacPhillamys		
Recorders JC		Plot ID # MAC240902	Zone ID
Photo #		Plot dimensions 20x50	
Datum GDA94	Zone MGA 55	Plot bearing along midline 359°	
Easting 771266	Northing 6301507	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type 1197	Condition state

Floristics plot is centred on the midline, at 0 m point, 10 m either side

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x 20 m | 10 x 40 m

		Sum values*
Native Richness (count of native species)	Trees	3
	Shrubs	4
	Grasses etc	5
	Forbs	10
	Ferns	0
	Other	1
Cover (sum of cover of natives species)	Trees	95
	Shrubs	0.8
	Grasses etc	65.2
	Forbs	1.9
	Ferns	0
	Other	0.1
High threat weed cover		0.2

*These values summarise the floristic data for input into BAM calculator

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20 x 50 m | 10 x 100 m

Tree stem DBH (cm)			Notes on function attributes:
>80	(#)	1	Stem size class records # large trees (cf. benchmark)
50 - 79	(#)	111	Record stems for living trees only, and for all species
30 - 49	(+/-)	✓	For multistemmed trees, record only the largest stem
20 - 29	(+/-)	✓	Presence of <5cm stems records regeneration
10 - 19	(+/-)	✓	Record # trees with hollows, not number of hollows
5 - 9	(+/-)	✓	Count as one stem where tree is multistemmed
< 5	(+/-)	✓	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows		Total #
0	<20cm	0
	>20cm**	

Length of logs	Total (m)
[tally marks]	73

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots) Litter cover is used for BAM, other attributes are useful for recording site condition in general

Sub-plot score (% cover)		1	2	3	4	5	Average
	Litter						90
	Bare ground						0
	Cryptogam						0
	Rock						0

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform	
Clearing (incl. logging)	1	O	Microrelief	
Cultivation	0		Slope	Upper slope
Grazing (native / stock)	0		Aspect	N
Soil erosion	0		Soil surface texture	Clay-loam
Firewood removal	0		Soil colour	brown
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage	run off
Storm damage	0		Distance to nearest water	
Weediness	0		Distance to nearest rock outcrop /cave	

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes Wombat
E.G. Kangaroo
C Rosella

BAM Plot - Field Survey Sheet

Date 24/9/18	Survey Name McPhillamys				
Recorders SC		Plot ID # MAC240902		Zone ID	
GF code	Genus species (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
* SG	Blueberry	0.1	2	HTE	M
FG	Kidney weed Dichondra repens	1	1000		L
GG	Lomandra longifolia	5			L
GG	" " filiformis	0.1	50		L
GG	Poa siebariana	~~3~~ 30			L
FG	Daisy 1 (MAC240901)	0.1	~~8~~ 800		L
GG	Grass 1 (" ") Microlaena stipoides	0.1	5		L
GG	Poa sp 2 Cabillardierei	30			L
* FG	Forb 1 Mhwartia mediterranea	0.1	10		L
~~TG~~	~~Euc 1~~	~~10~~			~~U~~
FG	Forb 2 Geranium solanderi	0.1	200		L
* SG	Scotch Broom Cytisus scoparius	0.1	3	HTE	M
SG	Hardenbergia violacea	0.5	30		M
FG	Raspwort Gonocarpus tetragynus	0.1	50		L
* FG	Hypocheaeris glabra	0.1	20		L
OG	Vine 1 Billardiera scandens	0.1	1		L
SG	Epacrid Monotoca scoparia	0.1	1		M
FG	Raspwort from MAC240901	0.1	50		L
FG	Triangle leaf forb from MAC240901 Viola hederacifolia	0.1	200		L
TG	Euc 2 Hovea heterophylla	0.1	3		M
SG	Pea 1 from MAC240901 Hibbertia obtusifolia	0.1	3		L
FG	Daisy from MAC240901 like CHAP	0.1	50		L
TG	Acacia 2 melanoxylon	10			M
TG	Euc 2 dalrympleana	60			U
~~TG~~	~~Euc 3 dalrympleana~~	~~10~~			~~U~~
TG	Euc 4 pauciflora	~~35~~			~~M~~ U
SG	Exocarpos strictus	0.1	1		M
FG	Acaena ovina	0.1	100		L
FG	~~Veronica befonicifolia~~				
FG	Veronica calycina	0.1			L
	TG 2 95				
	SG 1 0.8				
	FG 10 1.9				
	GG 5 65.2				
	OG 1 0.1				
	HTW 0.1				

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)

Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).

Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems

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

All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc

Identify top 3 dominants in each stratum (use own stratum definitions) Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

t - Field Survey Sheet

19/8	Survey Name	McPhillamys	
ecorders JC		Plot ID # MAC250901	Zone ID
noto #		Plot dimensions 10x100	
atum	Zone	Plot bearing along midline 29°	
asting 770902	Northing 6301001	Record magnetic bearing along midline from 0 m point	

cord easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

RA region	
ubregion	
kely Vegetation Class	
ant Community Type 1197	Condition state

ristics plot is centred on the midline, at 0 m point, 10 m either side

AM Composition / Structure plot (400m²)

mensions (circle applicable size)
x 20 m 10 x 40 m

		Sum values*
Native Richness (count of tive species)	Trees	2
	Shrubs	1
	Grasses etc	4
	Forbs	4
	Ferns	1
	Other	0
Cover um of cover of natives species)	Trees	10
	Shrubs	5
	Grasses etc	21.1
	Forbs	0.4
	Ferns	35
	Other	0

gh threat weed cover 50.1 ~~22~~

se values summarise the floristic data for input into BAM calculator

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Function plot (1000m²)

Dimensions (circle applicable size)
20 x 50 m 10 x 100 m

Tree stem DBH (cm)

>80	(#)	—
50 - 79	(#)	—
30 - 49	(+/-)	—
20 - 29	(+/-)	✓
10 - 19	(+/-)	✓
5 - 9	(+/-)	✓
< 5	(+/-)	✓

Notes on function attributes:
- Stem size class records # large trees (cf. benchmark)
- Record stems for living trees only, and for all species
- For multistemmed trees, record only the largest stem
- Presence of <5cm stems records regeneration
- Record # trees with hollows, not number of hollows
- Count as one stem where tree is multistemmed
- Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows	<20cm	Total # 0
	>20cm**	
Length of logs		Total (m) 0

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

M Litter/ Groundcover (1 x 1 m plots) Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
b-plot score (% cover)	Litter	90	80	75	90	95	86
	Bare ground	0	0	0	0	0	
	Cryptogam	0	0	0	0	0	
	Rock	0	0	0	0	0	

/ groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

ner plot information (not essential for BAM)

turbance	Severity	Timing	Landform
aring (incl. logging)	3	0	Microrelief
tivation	0		Slope Upper slope
zing (native / stock)	1	R	Aspect NNE
l erosion	0		Soil surface texture Clay loam
ewood removal	0		Soil colour Brown
(ground stratum, mid, canopy burnt?)	0		Site drainage Run off
rm damage	0		Distance to nearest water 500
ediness	3	R	Distance to nearest rock outcrop /cave

ity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

g code: R = recent (<3y), NR = not recent, O = old/historic

es Wiri Chough, Pied Currawong, G. Shrikethrush, Aust. Magpie, WT Treecreeper, Aust. Raven, S.C. Cockatoo, Grey Fantail, Crimson Rosella, King Parrot

Wombat

BAM Plot - Field Survey Sheet

Date 25/9/18	Survey Name McPhillamys.			
Recorders		Plot ID # MAC250901	Zone ID	

GF code	Genus species (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
TG	E. pauciflora	5			
SG	Acacia oleabata	5	6		
EG	bracken	35			
* SG	Scotch broom Cytisus scoparius	25		HTE	
* FG	Thistle phots	1	50	E	
* FG	Plantago sp	0.1	1000	E	
* FG	Hypochaeris glabra	0.1	1000	E	
* GG	Phalaris sp	30		E	
GG	Poa siebertiensis	20		N	
* SG	Blackberry	25		HTE	
FG	Epacrid ground cover (MAC240901)	0.1	5		
FG	Cotula Everlasting? (sample)	0.1	50		
FG	CHAP-like daisy	0.1	1000		
TG	Acacia melanoxylon	5			
FG	Geranium solanderi	0.1	20		
GG	Weeping Grass	0.5	100		
* FG	Big Dandelion, toothed leaves	0.1	20	E	
* FG	Sheep sorrell Acetosa vulgaris	0.1	10	HTE	
* FG	Medicago polymorpha	0.1	20	E	
GG	Themeda triandra	0.1	5		
GG	Poa labilladieria	0.5	50		
A	Xerochrysum viscosum.				
	TG 2 10				
	SG 1 5				
	GG 4 21.1				
	FG 4 0.4				
	EG 1 35				
	HTW 25				

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)

Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).

Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems

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

All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc

Identify top 3 dominants in each stratum (use own stratum definitions)

Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BATHURST COPPER WINGED BUTTERFLY SITE ASSESSMENT

Date 25/7/18	Survey Name McPhillamys		
Recorders		Site ID # MAC250901	Zone ID
Photo # N for BAM Plot		Site dimensions	
Datum	Zone	Site bearing along midline	
Easting	Northing	Record magnetic bearing along midline from 0 m point	

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type	

Weather: (sunny/overcast/wind/temperature etc)

overcast, cool morning

Butterfly Species Observed

Species	Number	Breeding (Y/N)	Larvae	Location	Behaviour

NONE

Blackthorn (*Bursaria*)

Present (Y/N)	Condition	Extent	Cover (%)	Grazed (Y/N)	Habit	Comments
N						

Ants Observed: YES SMALL BLACK ANTS.

Flowering Plants

Species	Butterflies present (Y/N)
Acacia dealbata Acacia melanoxylon.	N.

Weeds

Species	Cover
Scotch broom	25
Blackberry	25
Rhamnus alaternus	30

Other Insects Present

Species	Comments
Ants	
lerp on Euc's.	

BAM Plot - Field Survey Sheet

Date 25/09/18	**Survey Name** McPhillamys		
Recorders JC		**Plot ID #** MAC250902	**Zone ID**
Photo #		**Plot dimensions** 10x100	
Datum	**Zone**	**Plot bearing along midline** 77°	
Easting 771524	**Northing** 6301631	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type 1197	**Condition state** V. Poor (no canopy).

Floristics plot is centred on the midline, at 0 m point, 10 m either side

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x 20 m; 10 x ~~40~~ m

		Sum values*
Native Richness (count of native species)	**Trees**	1
	Shrubs	1
	Grasses etc	3
	Forbs	5
	Ferns	1
	Other	0
Cover (sum of cover of natives species)	**Trees**	5
	Shrubs	0.1
	Grasses etc	0.1
	Forbs	0.5
	Ferns	5
	Other	0
High threat weed cover		100%

*These values summarise the floristic data for input into BAM calculator

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20 x 50 m; 10 x 100 m

Tree stem DBH (cm)		Notes on function attributes:
>80	(#)	Stem size class records # large trees (cf. benchmark)
50 - 79	(#)	Record stems for living trees only, and for all species
30 - 49	(+/-)	For multistemmed trees, record only the largest stem
20 - 29	(+/-)	Presence of <5cm stems records regeneration
10 - 19	(+/-) ✓	Record # trees with hollows, not number of hollows
5 - 9	(+/-)	Count as one stem where tree is multistemmed
< 5	(+/-) ✓	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows	<20cm	Total # 0
	>20cm**	
Length of logs		Total (m) 87

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

AU Acacia mel.

BAM Litter/ Groundcover (1 x 1 m plots) Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	**Litter**	80	100	90	100	95	93
	Bare ground	0	0	0	0	0	0
	Cryptogam	0	0	0	0	0	0
	Rock	0	0	0	0	0	0

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	3	R	Microrelief
Cultivation	3	R	Slope Upper Slope
Grazing (native / stock)	1	R	Aspect ENE
Soil erosion	0		Soil surface texture Clay loam
Firewood removal	0		Soil colour light brown/grey
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage run off
Storm damage	0		Distance to nearest water
Weediness	3	R	Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes YT Black cockatoo
Aust. Raven

0.39
0.14
0.17

Rabbit
EG. Kangaroo
Wombat
Fox

BAM Plot - Field Survey Sheet

Date	Survey Name				
Recorders		Plot ID #		Zone ID	
GF code	*Genus species* (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
GG	Poa labilladieria	5			
TG	Pinus radiata	90		HT E	
GG	Phalaris sp.	0.5	100	E	
FG	Geranium solanderi	0.1	200		
TG	Acacia mearnsoxylon	~~5~~	2		
GG	Grass 1	0.1	20		
FG	Cut leaf dandelion Taraxacum sp. ~~Hetichrysum lite~~	0.1	10	E	
FG	CHAP-like daisy ~~Chrysanthemum spp.~~	0.1	100	E	
FG	Plantago sp	0.1	500	E	
FG	Hypochaeris glabra	0.1	500	E	
FG	~~Forb~~ Forb 1 Acaena echinata	0.1	200		
FG	Forb 2 Lunocarpus humilis	0.1	200		
FG	Dichondra repens	0.1	1000		
EG	Bracken Pteridium esculentum	5			
	Vine 1 (Glycine?) Desmodium gunnii	0.1	5		
SG	Blackberry	10		HT E	
FG	~~Hypericum monogynum~~ St. John's Wort.	0.1	10	HTE	
SG	Cassinia sp. Laevis	0.1	1		
GG	Poa siberiana	1	100		
FG	Thistle from MAC250901	0.1	20	E	
	Poa labillardierei	1	50		
	TG 1 5				
	SG 1 0.1				
	GG 3 0.1				
	FG 5 0.5				
	EG 1 5				
	HTW 10				

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)

Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).

Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems

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

All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc

Identify top 3 dominants in each stratum (use own stratum definitions)

Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BATHURST COPPER WINGED BUTTERFLY SITE ASSESSMENT

Date 23/9/18	Survey Name McWilliams		
Recorders JC		Site ID # MAC250902	Zone ID
Photo # As for MAC240902 BAM		Site dimensions 100x100	
Datum	Zone	Site bearing along midline 77	
Easting	Northing	Record magnetic bearing along midline from 0 m point	

IBRA region
Subregion
Likely Vegetation Class
Plant Community Type

Weather: (sunny/overcast/wind/temperature etc)

Sunny. Cold. Light breeze.

Butterfly Species Observed

Species	Number	Breeding (Y/N)	Larvae	Location	Behaviour
NONE					

Blackthorn (*Bursaria*)

Present (Y/N)	Condition	Extent	Cover (%)	Grazed (Y/N)	Habit	Comments
N						

Ants Observed:

Flowering Plants

Species	Butterflies present (Y/N)
Acacia melanoxylon.	

Weeds

Species	Cover
Pinus radiata	90
Blackberry	10
Phalaris	0.5

Other Insects Present

Species	Comments

BAM Plot - Field Survey Sheet

Date 25/9/18	Survey Name McPhillamys		
Recorders JC		Plot ID #MAC250903	Zone ID
Photo #		Plot dimensions 20x50	
Datum	Zone	Plot bearing along midline 135	
Easting 771905	Northing 6301567	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type 1197	Condition state V. Poor (no canopy)

Floristics plot is centred on the midline, at 0 m point, 10 m either side

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x 20 m (circled) | 10 x 40 m

		Sum values*
Native Richness (count of native species)	Trees	2
	Shrubs	0
	Grasses etc	6
	Forbs	4
	Ferns	0
	Other	0
Cover (sum of cover of natives species)	Trees	10
	Shrubs	0
	Grasses etc	11.2
	Forbs	0.8
	Ferns	0
	Other	0
High threat weed cover		120

*These values summarise the floristic data for input into BAM calculator

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20 x 50 m (circled) | 10 x 100 m

Tree stem DBH (cm)

>80	(#) —	Stem size class records # large trees (cf. benchmark)
50 - 79	(#) —	Record stems for living trees only, and for all species
30 - 49	(+/-)	For multistemmed trees, record only the largest stem
20 - 29	(+/-) ✓	Presence of <5cm stems records regeneration
10 - 19	(+/-)	Record # trees with hollows, not number of hollows
5 - 9	(+/-) ✓	Count as one stem where tree is multistemmed
< 5	(+/-) —	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows	<20cm	Total # 0
	>20cm**	
Length of logs		Total (m) 92

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots)

Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	80	90	100	85	95	90
	Bare ground	0	5	0	0	0	1
	Cryptogam	5	5	0	0	0	2
	Rock	0	0	0	0	0	0

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	3	R	Microrelief
Cultivation	3	R	Slope
Grazing (native / stock)	1	R	Aspect
Soil erosion	0		Soil surface texture
Firewood removal	0		Soil colour
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage
Storm damage	0		Distance to nearest water
Weediness	3	R	Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes Grey Fantail / E. Spinebill / W. Treecreeper / R. Whistler / G. S. Thrush / W. Naped HE

A. obliquinervia ~~x linearis~~

BAM Plot - Field Survey Sheet

Date 25/9/18	Survey Name McPhillamys				
Recorders JC		Plot ID #MPC250903		Zone ID	
GF code	**Genus species** (tick if photographed or sample taken)	**Cover %**	**Abund** (count)	**N, E, HTE**	**Stratum**
TG	Acacia ~~melanoxylon~~ (Check ID from pic + sample)	5			
TG	Eucalyptus fastigata	5			
TG	Pinus radiata	70		HTE	
FG	Dichondra repens	0.5	2000		
FG	Forb 1 (MPC250902)	0.1	100		
SG	Blackberry	50		HTE	
GG	Lomandra filiformis	0.1	5		
FG	CHAP-like daisy	0.1	500		
FG	Hypochaeris glabra	0.1	500	E	
GG	Poa labillardieri	5			
EG	Bracken	5			
GG	Lomandra longifolia	0.1	2		
GG	Weeping Grass	0.5	100		
FG	Cut-leaf dandelion Taraxacum sp.	0.1	20	E	
FG	Epacris grandiflora (MPC250901)	0.1	5		
GG	Poa siberiana	5			
GG	Poa sp. (small)	0.5			
FG	Plantago sp.				
	E. viminalis over road.				
	TG 2 10				
	SG				
	GG 6 11.2				
	FG 4 0.8				
	HTW 50				

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)
Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).
Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems
N=native, E=exotic, HTE=high threat exotic
All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc
Identify top 3 dominants in each stratum (use own stratum definitions) Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BATHURST COPPER WINGED BUTTERFLY SITE ASSESSMENT

Date 25/9/18	Survey Name Mac Phillamys		
Recorders SC		Site ID # MAC250903	Zone ID
Photo # 1 for BAM site		Site dimensions 20x50	
Datum	Zone	Site bearing along midline	
Easting	Northing	Record magnetic bearing along midline from 0 m point	

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type	E. viminalis

Weather: (sunny/overcast/wind/temperature etc)

Sunny - isol. breeze.
Prevailing dry conditions

Butterfly Species Observed

Species	Number	Breeding (Y/N)	Larvae	Location	Behaviour

Blackthorn (*Bursaria*)

Present (Y/N)	Condition	Extent	Cover (%)	Grazed (Y/N)	Habit	Comments
N						

Ants Observed: None.

Flowering Plants

Species	Butterflies present (Y/N)
None.	N

Weeds

Species	Cover
Pinus radiata	70
Blackberry	50.

Other Insects Present

Species	Comments

BAM Plot - Field Survey Sheet

Date 25/9/18	Survey Name McPhillamys		
Recorders		Plot ID # MAC250904	Zone ID
Photo #		Plot dimensions 20 x 50	
Datum	Zone	Plot bearing along midline 1	
Easting 772765	Northing 6301702	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type 1197	Condition state Intact.

Floristics plot is centred on the midline, at 0 m point, 10 m either side

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): (20 x 20 m) 10 x 40 m

		Sum values*
Native Richness (count of native species)	Trees	3
	Shrubs	1
	Grasses etc	5
	Forbs	10
	Ferns	2
	Other	3
Cover (sum of cover of natives species)	Trees	85
	Shrubs	5
	Grasses etc	20.6
	Forbs	2.7
	Ferns	25.1
	Other	1.6
High threat weed cover		20.1

These values summarise the floristic data for input into BAM calculator

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Function plot (1000m²)

Dimensions (circle applicable size): (20 x 50 m) 10 x 100 m

Tree stem DBH (cm)		Notes on function attributes:
>80	(#)	Stem size class records # large trees (cf. benchmark)
50 - 79	(#) II	Record stems for living trees only, and for all species
30 - 49	(+/-) ✓	For multistemmed trees, record only the largest stem
20 - 29	(+/-) ✓	Presence of <5cm stems records regeneration
10 - 19	(+/-) ✓	Record # trees with hollows, not number of hollows
5 - 9	(+/-) ✓	Count as one stem where tree is multistemmed
< 5	(+/-) ✓	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows	<20cm II	Total # 2
	>20cm**	
Length of logs		Total (m) 78

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots) Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	90	80	95	90	80	
	Bare ground	0	5	5	5	0	
	Cryptogam	0	0	0	50	0	
	Rock	0	0	0	0	0	

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	2	0	Microrelief
Cultivation	0		Slope mid slope
Grazing (native / stock)	1		Aspect West
Soil erosion	0		Soil surface texture Clay loam
Firewood removal	0		Soil colour Yellow - Brown
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage runoff
Storm damage	0		Distance to nearest water 50m
Weediness	2	R	Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes YFHE S.F. Wren Treecreeper sp. (Buloke).
YTBC Striated Thornbill Aust. Raven
Grey Fantail & Raven SL. Pardalote

1197 8 matches, 699 6 matches

BAM Plot - Field Survey Sheet

Date 25/9/18	Survey Name McPhillamys				
Recorders JC		Plot ID # MAC250904		Zone ID	
GF code	**Genus species** (tick if photographed or sample taken)	**Cover %**	**Abund** (count)	**N, E, HTE**	**Stratum**
TG	Acacia melanoxylon	25			
TG	E. pauciflora	~~50~~			
SG	Acacia dealbata	5			
EG	Bracken Pteridium esculentum	25			
TG	Euc sp2 (~~Apple box?~~) E. dives	10			
GG	Lomandra longifolia	5			
GG	Poa Labilladieri	10			
FG	Epacrid grandiflorum (MAC240901)	0.5	50		
FG	Dichondra repens	1	500		
SG	Blackberry	20		HTE	
GG	Weeping Grass Microlaena stipoides	5			
FG	Plantago sp.	0.1	100	E	
FG	Thistle fam MAC250901	0.1	2	E	
GG	Lomandra filiformis	0.1	50		
FG	CHAP-like density	0.1	50		
FG	Geranium solicliera	0.1	200		
FG	Raspwort (MAC250902)	0.1	~~50~~		
	Vine 1 (MAC250903)	0.1	10		
GG	Rhytidosperma sp	0.1	50		
GG	Austrostipa sp	0.5	50		
FG	Forb 1 (MAC250902)	0.1	300		
FG	Hypochaeris	0.1	50	E	
FG	Adelens Lepyrodes Ophioglossum lusitanicum	0.1	200	N	
EG	Senecio sp (MAC240901)	0.1	10		
FG	Daisy 1 Cymbonotus lawsonianus	0.1	100		
~~FG~~	~~Forb 2~~	~~0.1~~	~~100~~		
FG	Forb 3 Geranium solanderi	0.5	1000		
GG	Dianella sp? Longifolia	0.1	10		
FG	Viola (MAC240901)	0.1	10		
	Mistletoe sp (in Euc.) Amyema miquelii	~~0.5~~			
FG	Sweep sorrel Acetosella vulgaris	0.1	10	HTE	
	Mistletoe sp1 (Acacia)	1			
	TG 3 85				
	SG 1 5				
	GG 5 20.6				
	FG 10 27				
	EG 2 25.1				
	OG 3 1.6				

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)

Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).

Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems

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

All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc

Identify top 3 dominants in each stratum (use own stratum definitions)

Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 25/9/18	**Survey Name** McPhillamys		
Recorders JC		**Plot ID #** MAC250906	**Zone ID**
Photo #		**Plot dimensions** 10x100	
Datum	**Zone**	**Plot bearing along midline** 318	
Easting 773549	**Northing** 6301893	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type 649	**Condition state** V. Poor (no canopy).

Floristics plot is centred on the midline, at 0 m point, 10 m either side

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x 20 m; 10 x (40) m

		Sum values*
Native Richness (count of native species)	**Trees**	1
	Shrubs	6
	Grasses etc	5
	Forbs	3
	Ferns	0
	Other	1
Cover (sum of cover of natives species)	**Trees**	10
	Shrubs	11.9
	Grasses etc	50.7
	Forbs	0.3
	Ferns	0
	Other	0.1
High threat weed cover		5 ~~0.1~~

*These values summarise the floristic data for input into BAM calculator

Access Soil.

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20 x 50 m; 10 x (100) m

Tree stem DBH (cm)		Notes on function attributes:
>80	(#)	Stem size class records # large trees (cf. benchmark)
50 - 79	(#)	Record stems for living trees only, and for all species
30 - 49	(+/-)	For multistemmed trees, record only the largest stem
20 - 29	(+/-)	Presence of <5cm stems records regeneration
10 - 19	(+/-)	Record # trees with hollows, not number of hollows
5 - 9	(+/-) ✓	Count as one stem where tree is multistemmed
< 5	(+/-) ✓	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows	<20cm	Total # 0
	>20cm**	
Length of logs		Total (m) 120

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots)

Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	**Litter**	40	40	~~3~~ 70	50	~~9~~ 0	58
	Bare ground	10	10	0	20	0	8
	Cryptogam	0	0	0	0	0	0
	Rock	5	0	10	0	0	3

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	3	R	Microrelief
Cultivation	3	R	Slope Hill Crest
Grazing (native / stock)	0		Aspect
Soil erosion	0		Soil surface texture Clay loam
Firewood removal	0		Soil colour red
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage run off
Storm damage	0		Distance to nearest water 1km.
Weediness	3	R	Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes YTB. Wedgetail (3x imm+adults)

BAM Plot - Field Survey Sheet

Date	Survey Name				
Recorders		Plot ID #		Zone ID	
GF code	*Genus species* (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
TG	Pinus radiata	50		HTE	U
SG	Hardenbergia violacea	0.5	20	N	M
SG	Cassinia ~~sp laevis~~ longifolia	10		N	M
SG	Acacia dealbata	1	2	N	M
GG	Poa labillardieri	45		N	L
GG	Lomandra longifolia	0.1	5	N	L
FG	~~Hypericum perforatum~~ St Johns Wort	0.1	500	E	L
FG	Hypochaeris	0.1	500	E	L
GG	Lomandra filiformis	0.5	500	N	L
GG	Grass 1 (photo) (serrated tussock?)	5		E	L
FG	Eparrid groundcover	0.1	10	N	L
FG	CHAP-like daisy Helichrysum ~~compactum~~ luteoalbum	0.1	50	E	L
EG	Pteridium sp	0.5	20	E	L
GG	Poa sieberiana	5		N	L
FG	Forb 1 Pultenaea microphylla.	0.1	3	N	L
SG	Shrub 1 Dillwynia sericea?	0.2	5	N	L
SG	Shrub 2 Cassinia arcuata	0.1	1	N	L
FG	Oxalis sp	0.1	50	E	L
SG	Blackberry	1	15	HTE	L
TG	Acacia spl melanoxylon	10		N	M
FG	Senecio from MAC240901	0.1	5		
GG	Juncus sp gregiflorus?	0.1	10		
OG	Mistletoe sp (photo)	0.1	1		
	Forb in photo	0.1	50		
SG	Shrub 3 Amperea xiphoclada	0.1	1	N	L
TG	1	10			
SG	6	11.9			
GG	5	50.7			
FG	3	0.3			
OG	1	0.1			
HTE	0.1				

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)
Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).
Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems
N=native, E=exotic, HTE=high threat exotic
All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc
Identify top 3 dominants in each stratum (use own stratum definitions) Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 25/9/18	Survey Name McPhillamys		
Recorders JC		Plot ID # MAC250909	Zone ID 732 Good
Photo #		Plot dimensions 20x50	
Datum	Zone	Plot bearing along midline 13°	
Easting 775801	Northing 6303916	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type 732	Condition state Intact OS, Good grazed OS

Floristics plot is centred on the midline, at 0 m point, 10 m either side

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size): 20 x 20 m (circled) | 10 x 40 m

		Sum values*
Native Richness (count of native species)	Trees	2
	Shrubs	1
	Grasses etc	3
	Forbs	8
	Ferns	0
	Other	0
Cover (sum of cover of natives species)	Trees	65
	Shrubs	5
	Grasses etc	15.1
	Forbs	1.2
	Ferns	0
	Other	0
High threat weed cover		0.7

*These values summarise the floristic data for input into BAM calculator

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Function plot (1000m²)

Dimensions (circle applicable size): 20 x 50 m (circled) | 10 x 100 m

Tree stem DBH (cm)		Notes on function attributes:
>80	(#) —	Stem size class records # large trees (cf. benchmark)
50 - 79	(#) 2	Record stems for living trees only, and for all species
30 - 49	(+/-) ✓	For multistemmed trees, record only the largest stem
20 - 29	(+/-) ✓	Presence of <5cm stems records regeneration
10 - 19	(+/-) ✓	Record # trees with hollows, not number of hollows
5 - 9	(+/-) ✓	Count as one stem where tree is multistemmed
< 5	(+/-) ✓	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows IIII 4	<20cm IIII	Total # 7 6
	>20cm** II	
Length of logs		Total (m) 97

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots) Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	90	80	90	70	85	83
	Bare ground	0	5	0	10	5	4
	Cryptogam	0	0	0	0	0	0
	Rock	0	0	0	0	0	0

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)	2	O	Microrelief
Cultivation	0		Slope mid slope
Grazing (native / stock)	2	R	Aspect NW
Soil erosion	0		Soil surface texture Clay - loam
Firewood removal	0		Soil colour Grey
Fire (ground stratum, mid, canopy burnt?)	1	O	Site drainage run off
Storm damage	0		Distance to nearest water 1.5km.
Weediness	1	R	Distance to nearest rock outcrop / cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes WT Treecreeper, YF Honeyeater, Grey Fantail, Aust. Magpie, Red Currawong, Gerygone

Eucl = ~~E. botryoides~~ or E. mannifera

BAM Plot - Field Survey Sheet

Date 25/9/18	Survey Name McPhillamys				
Recorders JC		Plot ID # MAC250909		Zone ID	
GF code	Genus species (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
TG	BL Peppermint (photos) ~~Eucalyptus dives~~	15			
SG	Acacia dealbata	5			
SG	Sweet briar	0.1	5	HTE	
FG	Viola (from MAC240901) betonicifolia	0.1	50		
TG	Eucl (photo + sample) ~~Eucalyptus~~	50		E. rossii? E. mannifera?	
FG	Cut leaf daisybelium	0.1	50		
FG	Raspwort 1	0.1	500		
FG	Raspwort 2	0.1	500		
FG	Trifolium repens	0.1	10		
FG	Plantago sp	0.1	300		
GG	Lomandra filiformis	0.1	300		
FG	Dichondra repens	0.1	300		
FG	Geranium solanderi	0.1	300		
GG	(Grass?)	10			
GG	Poa sp. sieberi	5			
~~FG~~	Linum ~~marginale~~ St John's Wort	0.1	~~50~~	HTE	
FG	Forb 1 Acaena ~~sp.~~ ovina	0.1	1		
SG	Hyaldbrenys	0.5	10	HTE	
FG	forb 2 ? Hypericum gramineum	0.1	5		
FG	Epacrid 1 Acrotriche serrulata	0.5	10		
FG	Hypochoeris glabra	0.1	100		
	TG 2 .65				
	SG 1 5				
	GG 3 15.1				
	FG 8 1.2				
	HTE 0.7				

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)
Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).
Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems
N=native, E=exotic, HTE=high threat exotic
All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc
Identify top 3 dominants in each stratum (use own stratum definitions)
Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 25/9/18	Survey Name McPhillamys		
Recorders JC		Plot ID # MAC250907	Zone ID
Photo #		Plot dimensions 20 x 50	
Datum	Zone	Plot bearing along midline 53°	
Easting 775386	Northing 6303894	Record magnetic bearing along midline from 0 m point	

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	
Subregion	
Likely Vegetation Class	
Plant Community Type 1191	Condition state # Poor No shrub layer. (grazed)

Floristics plot is centred on the midline, at 0 m point, 10 m either side

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Composition / Structure plot (400m²)

Dimensions (circle applicable size)

20 x 20 m	10 x 40 m	Sum values*
Native Richness (count of native species)	Trees	1
	Shrubs	0
	Grasses etc	1
	Forbs	0
	Ferns	0
	Other	0
Cover (sum of cover of natives species)	Trees	80
	Shrubs	0
	Grasses etc	25
	Forbs	0
	Ferns	0
	Other	0
High threat weed cover		21

*These values summarise the floristic data for input into BAM calculator

BAM Function plot (1000m²)

Dimensions (circle applicable size)

20 x 50 m 10 x 100 m

Tree stem DBH (cm)			Notes on function attributes:
>80	(#)	2	Stem size class records # large trees (cf. benchmark)
50 - 79	(#)	—	Record stems for living trees only, and for all species
30 - 49	(+/-)	—	For multistemmed trees, record only the largest stem
20 - 29	(+/-)	✓	Presence of <5cm stems records regeneration
10 - 19	(+/-)	✓	Record # trees with hollows, not number of hollows
5 - 9	(+/-)	✓	Count as one stem where tree is multistemmed
< 5	(+/-)	✓	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows		Total #
1	<20cm 3	3
	>20cm**	
Length of logs		Total (m) 25

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots)

Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	80	90	70	50	30	
	Bare ground	0	0	10	40	50	
	Cryptogam	0	0	0	0	0	
	Rock	0	0	0	0	0	

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform	
Clearing (incl. logging)	2	O	Microrelief	
Cultivation	3	R	Slope	lower slope
Grazing (native / stock)	3	R	Aspect	
Soil erosion	0		Soil surface texture	
Firewood removal	0		Soil colour	
Fire (ground stratum, mid, canopy burnt?)	0		Site drainage	
Storm damage	0		Distance to nearest water	
Weediness	2	R	Distance to nearest rock outcrop /cave	

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes Pied Currawong, Pied Butcherbird, S. Fairy Wren, Red Wattlebird, Crimson Rosella, S. Pardalote

BAM Plot - Field Survey Sheet

Date 25/9/18	Survey Name McPhillamys				
Recorders JC		Plot ID # MAC250907		Zone ID	
GF code	***Genus species*** (tick if photographed or sample taken)	**Cover %**	**Abund** (count)	**N, E, HTE**	**Stratum**
SG	Blackberry	20		HTE	
TG	E. viminalis ?	80			
FG	Trifolium repens	0.5	200		
FG	Geranium solanderi	0.5	500		
FG	Plantago sp	0.1	200		
FG	Thistle from MAC250907	0.1	10		
FG	Forb 1 Vicia sativa	0.5	500		
FG	Rumex sp	0.1	50		
GG	Phalaris sp	25			
FG	Cut-leaf dandelion	0.1	200		
FG	Rosett leaf (photo)	0.1	50		
FG	~~Linaria~~ St. Johns wort	0.5	200		
SG	Rosa sp.	0.5	10	HTE	
FG	Medicago polymorpha	0.5	500		
GG	Poa sp (bill.	25			
FG	Hypocharaeris sp.				
	TG 1 80				
	GG 1 25				
	FG				

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)
Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).
Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems
N=native, E=exotic, HTE=high threat exotic
All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc
Identify top 3 dominants in each stratum (use own stratum definitions) Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10m

BAM Plot - Field Survey Sheet

Date 25/9/18	Survey Name McPhillamys				
Recorders JC		Plot ID # MAC250910		Zone ID	
GF code	Genus species (tick if photographed or sample taken)	Cover %	Abund (count)	N, E, HTE	Stratum
TG	Euc 1 (Broad-leaved Peppermint) E. dives	25			
TG	Euc 2 (scribbler) E. ~~mac~~ mannifera	5			
SG	Acacia dealbata	5			
FG	Dichondra repens	0.1	1000		
FG	Geranium s.	0.5	1000		
FG	Large ragwort (not Hakeragis)	0.1	300		
TG	Euc 3 (smooth, white, grey, Rough bark)	10		Eucalyptus ~~sp~~	
GG	Lomandra filiformis	25			
FG	Forb 1 Galium murale	0.1	300	E	
GG	Poa sp.	15			
FG	Forb 2 (photo)	0.1	50		
FG	~~Taraxacum officinale~~ St Johns wort	0.1	150	HTE	
GG	Eragrostis sp	0.5	30		
FG	Plantago sp.	0.1	100		
GG	Phalaris sp.	10	30		
FG	Hydrochaeris sp	0.1			
GG	~~Erodium~~ Themeda triandra	0.1	5		
SG	Scotch Broom Cytisus scoparius	0.1	1	HTE	
GG	Dianella spp revoluta (or longifolia)	0.1	10		
GG	Poa sieberiana	5			
FG	Scolymus hispanicus	0.1	2		
TG	Pinus radiata	0.1	1	HTE	
SG	Acacia deanei	0.5	3		
	TG 3 55				
	SG 2 5.5				
	GG 5 45.7				
	FG 3 0.7				

Growth Form (see BAM Appendix 4) - Tree (TG), Shrub (SG), Grass & grasslike (GG), Forb (FG), Fern (EG), Other (OG)

Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ...10, 15, 20, 25, ...100% (incl. leaf, branch, stem cover per species).

Abundance for each species with ≤5% cover: 1, 2, 3, 4, ... 10, 20, 30, ... 100, 500, 1000, 1500, 2000 stems

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

All species in a plot must be recorded. If you can only ID to genus, separate different species by unique identifiyer e.g. *Genus* sp1, *Genus* sp2 etc

Identify top 3 dominants in each stratum (use own stratum definitions)

Cover area examples: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% =2x2 m, 5%=4x5m, 25%=10x10

AM Plot - Field Survey Sheet

te 25/9/18	Survey Name McPhillamys		
corders JC		Plot ID # MAC250910	Zone ID
oto #		Plot dimensions 10x100	
tum	Zone	Plot bearing along midline 322	
sting 776240	Northing 6303718	Record magnetic bearing along midline from 0 m point	

ord easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

RA region	
bregion	
ely Vegetation Class	Intact (grazed)
nt Community Type 1093	Condition state ~~Robust Grazed~~

stics plot is centred on the midline, at 0 m point, 10 m either side

M Composition / Structure plot (400m²)

mensions (circle applicable size)

x 20 m | 10 x 40 m

		Sum values*
Native Richness (count of tive species)	Trees	3
	Shrubs	2
	Grasses etc	5
	Forbs	3
	Ferns	0
	Other	0
Cover um of cover of natives species)	Trees	55
	Shrubs	5.5
	Grasses etc	45.7
	Forbs	0.7
	Ferns	0
	Other	0
h threat weed cover		0.3

se values summarise the floristic data for input into BAM calculator

Function plot is an extention of floristics plot out to 50 m along midline (or equiv. area)

BAM Function plot (1000m²)

Dimensions (circle applicable size)

20 x 50 m | 10 x 100 m

Tree stem DBH (cm)		Notes on function attributes:
>80	(#) —	Stem size class records # large trees (cf. benchmark)
50 - 79	(#) 2	Record stems for living trees only, and for all species
30 - 49	(+/-) ✓	For multistemmed trees, record only the largest stem
20 - 29	(+/-) ✓	Presence of <5cm stems records regeneration
10 - 19	(+/-) ✓	Record # trees with hollows, not number of hollows
5 - 9	(+/-)	Count as one stem where tree is multistemmed
< 5	(+/-) ✓	Hollow bearing stem may be a dead stem (incl. stag)

# Trees with hollows	<20cm 1	Total #
1	>20cm**	1

Length of logs	Total (m)
	10

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

M Litter/ Groundcover (1 x 1 m plots)

Litter cover is used for BAM, other attributes are useful for recording site condition in general

		1	2	3	4	5	Average
p-plot score (% cover)	Litter	80	70	90	50	90	76
	Bare ground	0	5	0	0	0	
	Cryptogam	0	0	5	0	0	
	Rock	0	0	0	5	0	

~~380~~ 5

/ groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

er plot information (not essential for BAM)

turbance	Severity	Timing	Landform
aring (incl. logging)	3	0	Microrelief
tivation	0		Slope Crest
zing (native / stock)	2	R	Aspect
erosion	0		Soil surface texture Clay loam
wood removal	0		Soil colour Grey
(ground stratum, mid, canopy burnt?)	0		Site drainage run off
rm damage	0		Distance to nearest water 1Km
ediness	1	R	Distance to nearest rock outcrop /cave

ty code: 0=no evidence, 1=slight, 2=moderate, 3= severe

; code: R = recent (<3y), NR = not recent, O = old/historic

es Pipeline to follow East side of road or centreline.

azing + dry conditions meede ID grass difficult.

it of Possum

Appendix B

Vegetation integrity plot data

B.1 Mine development

Scientific name	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	1		2a		2b		3		4		5		6	
								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Acacia dealbata	Silver Wattle	Fabaceae (Mimosoideae)	N	-	-		Tree														
Acacia dealbata subsp. dealbata	Silver Wattle	Fabaceae (Mimosoideae)	N	-	-		Tree														
Acetosella vulgaris	Sheep Sorrel	Polygonaceae	E	-	-	HTW															
Agrostis stolonifera	Creeping Bent	Poaceae	E	-	-																
Amyema pendula subsp. pendula		Loranthaceae	N	-	-		Other														
Aristida ramosa	Purple Wiregrass	Poaceae	N	-	-		Grass & grasslike														
Asperula conferta	Common Woodruff	Rubiaceae	N	-	-		Forb														
Austrostipa scabra	Speargrass	Poaceae	N	-	-		Grass & grasslike														
Austrostipa scabra subsp. falcata	Rough Speargrass	Poaceae	N	-	-		Grass & grasslike														
Bothriochloa macra	Red Grass	Poaceae	N	-	-		Grass & grasslike			0.1	7	0.1	7								
Brassica spp.	Brassica	Brassicaceae	E	-	-																
Bromus catharticus	Praire Grass	Poaceae	E	-	-											0.3	50			0.1	400
Bromus hordeaceus	Soft Brome	Poaceae	E	-	-																
Bromus spp.	A Brome	Poaceae	N	-	-		Grass & grasslike			0.1	50	0.1	50								
Carex appressa	Tall Sedge	Cyperaceae	N	-	-		Grass & grasslike											70	2000		
Carex bichenoviana		Cyperaceae	N	-	-		Grass & grasslike														
Carex spp.		Cyperaceae	N	-	-		Grass & grasslike	0.1	10	0.5	100	0.5	100							0.1	30
Carthamus lanatus	Saffron Thistle	Asteraceae	E	-	-	HTW															
Cassinia arcuata	Sifton Bush	Asteraceae	N	-	-		Shrub														
Chenopodium album	Fat Hen	Chenopodiaceae	E	-	-																
Chloris gayana	Rhodes Grass	Poaceae	E	-	-	HTW															
Chloris truncata	Windmill Grass	Poaceae	N	-	-		Grass & grasslike														
Chondrilla juncea	Skeleton Weed	Asteraceae	E	-	-					0.1	7	0.1	7							0.1	4
Cirsium vulgare	Spear Thistle	Asteraceae	E	-	-					0.1	19	0.1	19			0.2	10	10	29		
Convolvulus angustissimus		Convolvulaceae	N	-	-		Other			0.1	2	0.1	2								
Convolvulus erubescens	Pink Bindweed	Convolvulaceae	N	-	-		Other														
Conyza bonariensis	Flaxleaf Fleabane	Asteraceae	E	-	-																
Cotula australis	Common Cotula	Asteraceae	N	-	-		Forb														
Cymbonotus lawsonianus	Bear's Ear	Asteraceae	N	-	-		Forb														
Cynodon dactylon	Common Couch	Poaceae	N	-	-		Grass & grasslike														
Cynosurus echinatus	Rough Dog's Tail	Poaceae	E	-	-					0.1	9	0.1	9								
Dactylis glomerata	Cocksfoot	Poaceae	E	-	-			0.1	80	0.1	2	0.1	2			0.2	20				
Desmodium varians	Slender Tick-trefoil	Fabaceae (Faboideae)	N	-	-		Other	0.1	1	0.3	800	0.3	800								
Dichondra repens	Kidney Weed	Convolvulaceae	N	-	-		Forb														
Dichondra spp.		Convolvulaceae	N	-	-		Forb			0.1	5	0.1	5								
Echium plantagineum	Patterson's Curse	Boraginaceae	E	-	-																
Einadia nutans	Climbing Saltbush	Chenopodiaceae	N	-	-		Forb	0.1	1	0.3	200	0.3	200			0.1	2				
Einadia nutans subsp. nutans	Climbing Saltbush	Chenopodiaceae	N	-	-		Forb														
Eleusine tristachya	Goose Grass	Poaceae	E	-	-											0.1	5				
Elymus scaber	Wheatgrass, Common Wheatgra	Poaceae	N	-	-		Grass & grasslike	2	5000	5	10000	5	10000							0.1	1000
Elymus scaber var. scaber	Wheatgrass, Common Wheatgra	Poaceae	N	-	-		Grass & grasslike														
Eragrostis brownii	Brown's Lovegrass	Poaceae	N	-	-		Grass & grasslike														

Scientific name	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	1		2a		2b		3		4		5		6	
								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Eragrostis leptostachya	Paddock Lovegrass	Poaceae	N	-	-		Grass & grasslike														
Eucalyptus bridgesiana	Apple Box	Myrtaceae	N	-	-		Tree									5	1			1	1
Eucalyptus dives	Broad-leaved Peppermint	Myrtaceae	N	-	-		Tree	35	10					30	20						
Eucalyptus goniocalyx	Bundy	Myrtaceae	N	-	-		Tree							25	10						
Eucalyptus mannifera	Brittle Gum	Myrtaceae	N	-	-		Tree							0.3	1						
Eucalyptus melliodora	Yellow Box	Myrtaceae	N	-	-		Tree			40	2	40	2			70	7			25	2
Eucalyptus viminalis	Ribbon Gum	Myrtaceae	N	-	-		Tree														
Euchiton sphaericus	Star Cudweed	Asteraceae	N	-	-		Forb														
Festuca arundinacea	Tall Fescue	Poaceae	E	-	-													70	2000		
Galium spp.		Rubiaceae	N	-	-		Forb														
Geranium solanderi	Native Geranium	Geraniaceae	N	-	-		Forb														
Glycine clandestina	Twining glycine	Fabaceae (Faboideae)	N	-	-		Other														
Gonocarpus tetragynus	Poverty Raspwort	Haloragaceae	N	-	-		Forb														
Goodenia hederacea	Ivy Goodenia	Goodeniaceae	N	-	-		Forb														
Hibbertia obtusifolia	Hoary Guinea Flower	Dilleniaceae	N	-	-		Shrub							0.2	5						
Holcus lanatus	Yorkshire Fog	Poaceae	E	-	-																
Hordeum hystrix	Mediterranean Barley Grass	Poaceae	E	-	-											0.3	50				
Hydrocotyle laxiflora	Stinking Pennywort	Apiaceae	N	-	-		Forb														
Hypochaeris radicata	Catsear	Asteraceae	E	-	-					0.1	9	0.1	9					0.2	12		
Isolepis spp.	Club-rush	Cyperaceae	N	-	-		Grass & grasslike														
Juncus spp.	A Rush	Juncaceae	N	-	-		Grass & grasslike													0.1	1
Juncus subsecundus	Finger Rush	Juncaceae	N	-	-		Grass & grasslike														
Juncus usitatus		Juncaceae	N	-	-		Grass & grasslike			0.1	1	0.1	1					0.1	2		
Lactuca serriola	Prickly Lettuce	Asteraceae	E	-	-					0.1	1	0.1	1					0.1	2		
Lepidium bonariense	Argentine Peppercress	Brassicaceae	E	-	-																
Lolium perenne	Perennial Ryegrass	Poaceae	E	-	-											0.1	10				
Lomandra filiformis	Wattle Matt-rush	Lomandraceae	N	-	-		Grass & grasslike	0.1	30											0.1	2
Lomandra multiflora subsp. multiflora	Many-flowered Mat-rush	Lomandraceae	N	-	-		Grass & grasslike														
Lomandra spp.	Mat-rush	Lomandraceae	N	-	-		Grass & grasslike														
Malva parviflora	Small-flowered Mallow	Malvaceae	E	-	-											0.1	2				
Medicago spp.	A Medic	Fabaceae (Faboideae)	E	-	-																
Mentha diemenica	Slender Mint	Lamiaceae	N	-	-		Forb														
Microlaena stipoides	Weeping Grass	Poaceae	N	-	-		Grass & grasslike	5	5000	0.1	40	0.1	40							0.8	1600
Modiola caroliniana	Red-flowered Mallow	Malvaceae	E	-	-					0.1	2	0.1	2								
Nassella trichotoma	Serrated Tussock	Poaceae	E	-	-																
Onopordum illyricum	Illyrian Thistle	Asteraceae	E	-	-																
Oxalis corniculata	Creeping Oxalis	Oxalidaceae	E	-	-																
Oxalis perennans		Oxalidaceae	N	-	-		Forb			0.1	3	0.1	3	0.1	1						
Ozothamnus diosmifolius	White Dogwood	Asteraceae	N	-	-		Shrub														
Panicum effusum	Hairy Panic	Poaceae	N	-	-		Grass & grasslike														
Paspalum dilatatum	Paspalum	Poaceae	E	-	-	HTW															
Phalaris aquatica	Phalaris	Poaceae	E	-	-					40	40000	40	40000					2	200	0.1	3

Scientific name	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	1		2a		2b		3		4		5		6	
								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Poa labillardierei var. labillardierei	Tussock	Poaceae	N	-	-		Grass & grasslike														
Poa sieberiana	Snowgrass	Poaceae	N	-	-		Grass & grasslike	5	5000					5	50						
Poa sieberiana var. sieberiana	Snowgrass	Poaceae	N	-	-		Grass & grasslike			5	5000	5	5000								
Poa spp.		Poaceae	N	-	-		Grass & grasslike														
Polygonum aviculare	Wireweed	Polygonaceae	E	-	-																
Polygonum plebeium	Small Knotweed	Polygonaceae	N	-	-		Forb									0.1	2			0.1	2
Poranthera microphylla	Small Poranthera	Phyllanthaceae	N	-	-		Forb														
Rosa rubiginosa	Sweet Briar	Rosaceae	E	-	-	HTW				0.1	1	0.1	1								
Rubus fruticosus sp. agg.	Blackberry complex	Rosaceae	E	-	-	HTW															
Rumex brownii	Swamp Dock	Polygonaceae	N	-	-		Forb											0.1	5		
Rumex spp.	Dock	Polygonaceae	N	-	-		Forb			0.1	1	0.1	1								
Rytidosperma carphoides	Short Wallaby Grass	Poaceae	N	-	-		Grass & grasslike														
Rytidosperma erianthum	Wallaby Grass	Poaceae	N	-	-		Grass & grasslike														
Rytidosperma pallidum	Redanther Wallaby Grass; Silver	Poaceae	N	-	-		Grass & grasslike							20	150						
Rytidosperma spp.		Poaceae	N	-	-		Grass & grasslike														
Rytidosperma tenuius	A Wallaby Grass	Poaceae	N	-	-		Grass & grasslike	15	10000	30	30000	30	30000	0.3	50	0.1	10			0.1	200
Senecio spp.	Groundsel, Fireweed	Asteraceae	N	-	-		Forb														
Solanum nigrum	Black-berry Nightshade	Solanaceae	E	-	-											0.1	1				
Solenogyne dominii		Asteraceae	N	-	-		Forb														
Stellaria media	Common Chickweed	Caryophyllaceae	E	-	-																
Taraxacum officinale	Dandelion	Asteraceae	E	-	-													0.1	2		
Themeda australis		Poaceae	N	-	-		Grass & grasslike														
Themeda triandra		Poaceae	N	-	-		Grass & grasslike	1	20	0.1	5	0.1	5								
Trifolium repens	White Clover	Fabaceae (Faboideae)	E	-	-													70	40000		
Vulpia bromoides	Squirrel Tail Fesque	Poaceae	E	-	-			2	10000					0.1	10						
Vulpia spp.	Rat's-tail Fescue	Poaceae	E	-	-															0.2	1600

Scientific name	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	7		8		9		10		11		12		1642	
								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Acacia dealbata	Silver Wattle	Fabaceae (Mimosoideae)	N	-	-		Tree														
Acacia dealbata subsp. dealbata	Silver Wattle	Fabaceae (Mimosoideae)	N	-	-		Tree			0.1	1										
Acetosella vulgaris	Sheep Sorrel	Polygonaceae	E	-	-	HTW														0.2	20
Agrostis stolonifera	Creeping Bent	Poaceae	E	-	-					10	10000										
Amyema pendula subsp. pendula		Loranthaceae	N	-	-		Other														
Aristida ramosa	Purple Wiregrass	Poaceae	N	-	-		Grass & grasslike														
Asperula conferta	Common Woodruff	Rubiaceae	N	-	-		Forb														
Austrostipa scabra	Speargrass	Poaceae	N	-	-		Grass & grasslike							0.1	3						
Austrostipa scabra subsp. falcata	Rough Speargrass	Poaceae	N	-	-		Grass & grasslike														
Bothriochloa macra	Red Grass	Poaceae	N	-	-		Grass & grasslike														
Brassica spp.	Brassica	Brassicaceae	E	-	-																
Bromus catharticus	Praire Grass	Poaceae	E	-	-																
Bromus hordeaceus	Soft Brome	Poaceae	E	-	-																
Bromus spp.	A Brome	Poaceae	N	-	-		Grass & grasslike														
Carex appressa	Tall Sedge	Cyperaceae	N	-	-		Grass & grasslike											70	2000		
Carex bichenoviana		Cyperaceae	N	-	-		Grass & grasslike			0.3	50										
Carex spp.		Cyperaceae	N	-	-		Grass & grasslike									0.1	5				
Carthamus lanatus	Saffron Thistle	Asteraceae	E	-	-	HTW															
Cassinia arcuata	Sifton Bush	Asteraceae	N	-	-		Shrub														
Chenopodium album	Fat Hen	Chenopodiaceae	E	-	-																
Chloris gayana	Rhodes Grass	Poaceae	E	-	-	HTW								15	6000						
Chloris truncata	Windmill Grass	Poaceae	N	-	-		Grass & grasslike														
Chondrilla juncea	Skeleton Weed	Asteraceae	E	-	-					0.1	1					0.1	1				
Cirsium vulgare	Spear Thistle	Asteraceae	E	-	-													10	29	0.1	10
Convolvulus angustissimus		Convolvulaceae	N	-	-		Other														
Convolvulus erubescens	Pink Bindweed	Convolvulaceae	N	-	-		Other														
Conyza bonariensis	Flaxleaf Fleabane	Asteraceae	E	-	-																
Cotula australis	Common Cotula	Asteraceae	N	-	-		Forb														
Cymbonotus lawsonianus	Bear's Ear	Asteraceae	N	-	-		Forb														
Cynodon dactylon	Common Couch	Poaceae	N	-	-		Grass & grasslike														
Cynosurus echinatus	Rough Dog's Tail	Poaceae	E	-	-							0.1	1								
Dactylis glomerata	Cocksfoot	Poaceae	E	-	-															20	2000
Desmodium varians	Slender Tick-trefoil	Fabaceae (Faboideae)	N	-	-		Other			0.1	9										
Dichondra repens	Kidney Weed	Convolvulaceae	N	-	-		Forb														
Dichondra spp.		Convolvulaceae	N	-	-		Forb														
Echium plantagineum	Patterson's Curse	Boraginaceae	E	-	-															0.2	50
Einadia nutans	Climbing Saltbush	Chenopodiaceae	N	-	-		Forb			0.6	19			0.1	1	0.1	3				
Einadia nutans subsp. nutans	Climbing Saltbush	Chenopodiaceae	N	-	-		Forb														
Eleusine tristachya	Goose Grass	Poaceae	E	-	-			0.1	1					0.1	20						
Elymus scaber	Wheatgrass, Common Wheatgra	Poaceae	N	-	-		Grass & grasslike			0.1	8	0.1	7	0.1	1	1	4000				
Elymus scaber var. scaber	Wheatgrass, Common Wheatgra	Poaceae	N	-	-		Grass & grasslike													5	400
Eragrostis brownii	Brown's Lovegrass	Poaceae	N	-	-		Grass & grasslike														

Scientific name	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	7		8		9		10		11		12		1642	
								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Eragrostis leptostachya	Paddock Lovegrass	Poaceae	N	-	-		Grass & grasslike														
Eucalyptus bridgesiana	Apple Box	Myrtaceae	N	-	-		Tree							10	2						
Eucalyptus dives	Broad-leaved Peppermint	Myrtaceae	N	-	-		Tree					18	6			12	3				
Eucalyptus goniocalyx	Bundy	Myrtaceae	N	-	-		Tree					39	13			10	1				
Eucalyptus mannifera	Brittle Gum	Myrtaceae	N	-	-		Tree														
Eucalyptus melliodora	Yellow Box	Myrtaceae	N	-	-		Tree	22	1	45	7										
Eucalyptus viminalis	Ribbon Gum	Myrtaceae	N	-	-		Tree														
Euchiton sphaericus	Star Cudweed	Asteraceae	N	-	-		Forb	0.1	10												
Festuca arundinacea	Tall Fescue	Poaceae	E	-	-													70	2000		
Galium spp.		Rubiaceae	N	-	-		Forb														
Geranium solanderi	Native Geranium	Geraniaceae	N	-	-		Forb														
Glycine clandestina	Twining glycine	Fabaceae (Faboideae)	N	-	-		Other														
Gonocarpus tetragynus	Poverty Raspwort	Haloragaceae	N	-	-		Forb														
Goodenia hederacea	Ivy Goodenia	Goodeniaceae	N	-	-		Forb														
Hibbertia obtusifolia	Hoary Guinea Flower	Dilleniaceae	N	-	-		Shrub														
Holcus lanatus	Yorkshire Fog	Poaceae	E	-	-																
Hordeum hystrix	Mediterranean Barley Grass	Poaceae	E	-	-																
Hydrocotyle laxiflora	Stinking Pennywort	Apiaceae	N	-	-		Forb														
Hypochaeris radicata	Catsear	Asteraceae	E	-	-			8	3000					0.1	2			0.2	12		
Isolepis spp.	Club-rush	Cyperaceae	N	-	-		Grass & grasslike														
Juncus spp.	A Rush	Juncaceae	N	-	-		Grass & grasslike									0.1	1				
Juncus subsecundus	Finger Rush	Juncaceae	N	-	-		Grass & grasslike														
Juncus usitatus		Juncaceae	N	-	-		Grass & grasslike							0.1	3			0.1	2		
Lactuca serriola	Prickly Lettuce	Asteraceae	E	-	-													0.1	2		
Lepidium bonariense	Argentine Peppercress	Brassicaceae	E	-	-																
Lolium perenne	Perennial Ryegrass	Poaceae	E	-	-							0.1	2	0.2	200					20	5000
Lomandra filiformis	Wattle Matt-rush	Lomandraceae	N	-	-		Grass & grasslike			0.1	13	0.4	127			0.1	4				
Lomandra multiflora subsp. multiflora	Many-flowered Mat-rush	Lomandraceae	N	-	-		Grass & grasslike														
Lomandra spp.	Mat-rush	Lomandraceae	N	-	-		Grass & grasslike														
Malva parviflora	Small-flowered Mallow	Malvaceae	E	-	-																
Medicago spp.	A Medic	Fabaceae (Faboideae)	E	-	-															5	2000
Mentha diemenica	Slender Mint	Lamiaceae	N	-	-		Forb														
Microlaena stipoides	Weeping Grass	Poaceae	N	-	-		Grass & grasslike	4	2000	0.1	15					1.5	800			5	2000
Modiola caroliniana	Red-flowered Mallow	Malvaceae	E	-	-																
Nassella trichotoma	Serrated Tussock	Poaceae	E	-	-																
Onopordum illyricum	Illyrian Thistle	Asteraceae	E	-	-															0.2	10
Oxalis corniculata	Creeping Oxalis	Oxalidaceae	E	-	-															0.1	10
Oxalis perennans		Oxalidaceae	N	-	-		Forb			0.1	1					0.1	1				
Ozothamnus diosmifolius	White Dogwood	Asteraceae	N	-	-		Shrub														
Panicum effusum	Hairy Panic	Poaceae	N	-	-		Grass & grasslike														
Paspalum dilatatum	Paspalum	Poaceae	E	-	-	HTW															
Phalaris aquatica	Phalaris	Poaceae	E	-	-			1	60	2.5	48			0.1	20			2	200	5	50

Scientific name	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	7		8		9		10		11		12		1642	
								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Poa labillardierei var. labillardierei	Tussock	Poaceae	N	-	-		Grass & grasslike														
Poa sieberiana	Snowgrass	Poaceae	N	-	-		Grass & grasslike														
Poa sieberiana var. sieberiana	Snowgrass	Poaceae	N	-	-		Grass & grasslike														
Poa spp.		Poaceae	N	-	-		Grass & grasslike			0.1	35	0.1	13								
Polygonum aviculare	Wireweed	Polygonaceae	E	-	-																
Polygonum plebeium	Small Knotweed	Polygonaceae	N	-	-		Forb							0.1	4	0.1	1				
Poranthera microphylla	Small Poranthera	Phyllanthaceae	N	-	-		Forb														
Rosa rubiginosa	Sweet Briar	Rosaceae	E	-	-	HTW														0.2	1
Rubus fruticosus sp. agg.	Blackberry complex	Rosaceae	E	-	-	HTW		0.1	1	0.1	4					0.1	1				
Rumex brownii	Swamp Dock	Polygonaceae	N	-	-		Forb											0.1	5		
Rumex spp.	Dock	Polygonaceae	N	-	-		Forb														
Rytidosperma carphoides	Short Wallaby Grass	Poaceae	N	-	-		Grass & grasslike							5	2000						
Rytidosperma erianthum	Wallaby Grass	Poaceae	N	-	-		Grass & grasslike			0.1	3										
Rytidosperma pallidum	Redanther Wallaby Grass; Silver	Poaceae	N	-	-		Grass & grasslike														
Rytidosperma spp.		Poaceae	N	-	-		Grass & grasslike													15	3000
Rytidosperma tenuius	A Wallaby Grass	Poaceae	N	-	-		Grass & grasslike	8	2000	0.1	10	6.3	1000	5	1900	7	4000				
Senecio spp.	Groundsel, Fireweed	Asteraceae	N	-	-		Forb														
Solanum nigrum	Black-berry Nightshade	Solanaceae	E	-	-											0.1	1				
Solenogyne dominii		Asteraceae	N	-	-		Forb													0.1	2
Stellaria media	Common Chickweed	Caryophyllaceae	E	-	-																
Taraxacum officinale	Dandelion	Asteraceae	E	-	-													0.1	2		
Themeda australis		Poaceae	N	-	-		Grass & grasslike														
Themeda triandra		Poaceae	N	-	-		Grass & grasslike														
Trifolium repens	White Clover	Fabaceae (Faboideae)	E	-	-													70	40000	10	4000
Vulpia bromoides	Squirrel Tail Fesque	Poaceae	E	-	-																
Vulpia spp.	Rat's-tail Fescue	Poaceae	E	-	-							1	200			0.1	100				

Scientific name	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	1031		1641		1244		1032		1643		1241		1243	
								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Acacia dealbata	Silver Wattle	Fabaceae (Mimosoideae)	N	-	-		Tree			1	1										
Acacia dealbata subsp. dealbata	Silver Wattle	Fabaceae (Mimosoideae)	N	-	-		Tree														
Acetosella vulgaris	Sheep Sorrel	Polygonaceae	E	-	-	HTW		0.2	10	0.1	20	1	400	0.2	10	0.2	20	0.2	10		
Agrostis stolonifera	Creeping Bent	Poaceae	E	-	-																
Amyema pendula subsp. pendula		Loranthaceae	N	-	-		Other					0.2	2								
Aristida ramosa	Purple Wiregrass	Poaceae	N	-	-		Grass & grasslike														
Asperula conferta	Common Woodruff	Rubiaceae	N	-	-		Forb														
Austrostipa scabra	Speargrass	Poaceae	N	-	-		Grass & grasslike														
Austrostipa scabra subsp. falcata	Rough Speargrass	Poaceae	N	-	-		Grass & grasslike														
Bothriochloa macra	Red Grass	Poaceae	N	-	-		Grass & grasslike														
Brassica spp.	Brassica	Brassicaceae	E	-	-					0.1	2										
Bromus catharticus	Praire Grass	Poaceae	E	-	-					15	800										
Bromus hordeaceus	Soft Brome	Poaceae	E	-	-													2	200	2	200
Bromus spp.	A Brome	Poaceae	N	-	-		Grass & grasslike														
Carex appressa	Tall Sedge	Cyperaceae	N	-	-		Grass & grasslike														
Carex bichenoviana		Cyperaceae	N	-	-		Grass & grasslike														
Carex spp.		Cyperaceae	N	-	-		Grass & grasslike														
Carthamus lanatus	Saffron Thistle	Asteraceae	E	-	-	HTW															
Cassinia arcuata	Sifton Bush	Asteraceae	N	-	-		Shrub														
Chenopodium album	Fat Hen	Chenopodiaceae	E	-	-																
Chloris gayana	Rhodes Grass	Poaceae	E	-	-	HTW															
Chloris truncata	Windmill Grass	Poaceae	N	-	-		Grass & grasslike			5	400										
Chondrilla juncea	Skeleton Weed	Asteraceae	E	-	-																
Cirsium vulgare	Spear Thistle	Asteraceae	E	-	-			0.3	50					0.1	20	0.1	10	0.1	10	0.1	10
Convolvulus angustissimus		Convolvulaceae	N	-	-		Other														
Convolvulus erubescens	Pink Bindweed	Convolvulaceae	N	-	-		Other														
Conyza bonariensis	Flaxleaf Fleabane	Asteraceae	E	-	-					0.2	20										
Cotula australis	Common Cotula	Asteraceae	N	-	-		Forb														
Cymbonotus lawsonianus	Bear's Ear	Asteraceae	N	-	-		Forb														
Cynodon dactylon	Common Couch	Poaceae	N	-	-		Grass & grasslike					5	2000								
Cynosurus echinatus	Rough Dog's Tail	Poaceae	E	-	-																
Dactylis glomerata	Cocksfoot	Poaceae	E	-	-			20	3000			10	1000	20	3000	20	2000	2	400	2	400
Desmodium varians	Slender Tick-trefoil	Fabaceae (Faboideae)	N	-	-		Other														
Dichondra repens	Kidney Weed	Convolvulaceae	N	-	-		Forb														
Dichondra spp.		Convolvulaceae	N	-	-		Forb														
Echium plantagineum	Patterson's Curse	Boraginaceae	E	-	-											0.2	50				
Einadia nutans	Climbing Saltbush	Chenopodiaceae	N	-	-		Forb														
Einadia nutans subsp. nutans	Climbing Saltbush	Chenopodiaceae	N	-	-		Forb														
Eleusine tristachya	Goose Grass	Poaceae	E	-	-			5	400					5	400						
Elymus scaber	Wheatgrass, Common Wheatgra	Poaceae	N	-	-		Grass & grasslike														
Elymus scaber var. scaber	Wheatgrass, Common Wheatgra	Poaceae	N	-	-		Grass & grasslike	5	800					5	800	5	400	5	500		
Eragrostis brownii	Brown's Lovegrass	Poaceae	N	-	-		Grass & grasslike														

Scientific name	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	1031		1641		1244		1032		1643		1241		1243	
								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Eragrostis leptostachya	Paddock Lovegrass	Poaceae	N	-	-		Grass & grasslike	3	400												
Eucalyptus bridgesiana	Apple Box	Myrtaceae	N	-	-		Tree														
Eucalyptus dives	Broad-leaved Peppermint	Myrtaceae	N	-	-		Tree					35	5								
Eucalyptus goniocalyx	Bundy	Myrtaceae	N	-	-		Tree														
Eucalyptus mannifera	Brittle Gum	Myrtaceae	N	-	-		Tree														
Eucalyptus melliodora	Yellow Box	Myrtaceae	N	-	-		Tree														
Eucalyptus viminalis	Ribbon Gum	Myrtaceae	N	-	-		Tree			50	20										
Euchiton sphaericus	Star Cudweed	Asteraceae	N	-	-		Forb														
Festuca arundinacea	Tall Fescue	Poaceae	E	-	-																
Galium spp.		Rubiaceae	N	-	-		Forb														
Geranium solanderi	Native Geranium	Geraniaceae	N	-	-		Forb														
Glycine clandestina	Twining glycine	Fabaceae (Faboideae)	N	-	-		Other														
Gonocarpus tetragynus	Poverty Raspwort	Haloragaceae	N	-	-		Forb														
Goodenia hederacea	Ivy Goodenia	Goodeniaceae	N	-	-		Forb														
Hibbertia obtusifolia	Hoary Guinea Flower	Dilleniaceae	N	-	-		Shrub														
Holcus lanatus	Yorkshire Fog	Poaceae	E	-	-													1	50		
Hordeum hystrix	Mediterranean Barley Grass	Poaceae	E	-	-																
Hydrocotyle laxiflora	Stinking Pennywort	Apiaceae	N	-	-		Forb														
Hypochaeris radicata	Catsear	Asteraceae	E	-	-			1	100	0.2	50			1	100			1	200	1	200
Isolepis spp.	Club-rush	Cyperaceae	N	-	-		Grass & grasslike														
Juncus spp.	A Rush	Juncaceae	N	-	-		Grass & grasslike														
Juncus subsecundus	Finger Rush	Juncaceae	N	-	-		Grass & grasslike	0.2	5												
Juncus usitatus		Juncaceae	N	-	-		Grass & grasslike											0.2	5		
Lactuca serriola	Prickly Lettuce	Asteraceae	E	-	-																
Lepidium bonariense	Argentine Peppercress	Brassicaceae	E	-	-																
Lolium perenne	Perennial Ryegrass	Poaceae	E	-	-											20	5000				
Lomandra filiformis	Wattle Matt-rush	Lomandraceae	N	-	-		Grass & grasslike														
Lomandra multiflora subsp. multiflora	Many-flowered Mat-rush	Lomandraceae	N	-	-		Grass & grasslike														
Lomandra spp.	Mat-rush	Lomandraceae	N	-	-		Grass & grasslike														
Malva parviflora	Small-flowered Mallow	Malvaceae	E	-	-					0.1	2										
Medicago spp.	A Medic	Fabaceae (Faboideae)	E	-	-			10	4000					10	4000	5	2000	5	2000	5	2000
Mentha diemenica	Slender Mint	Lamiaceae	N	-	-		Forb														
Microlaena stipoides	Weeping Grass	Poaceae	N	-	-		Grass & grasslike			3	1000	2	2000			5	2000				
Modiola caroliniana	Red-flowered Mallow	Malvaceae	E	-	-																
Nassella trichotoma	Serrated Tussock	Poaceae	E	-	-			5	200												
Onopordum illyricum	Illyrian Thistle	Asteraceae	E	-	-									0.2	20	0.2	10	0.2	20		
Oxalis corniculata	Creeping Oxalis	Oxalidaceae	E	-	-											0.1	10				
Oxalis perennans		Oxalidaceae	N	-	-		Forb														
Ozothamnus diosmifolius	White Dogwood	Asteraceae	N	-	-		Shrub			2	2										
Panicum effusum	Hairy Panic	Poaceae	N	-	-		Grass & grasslike														
Paspalum dilatatum	Paspalum	Poaceae	E	-	-	HTW															
Phalaris aquatica	Phalaris	Poaceae	E	-	-					15	400			10	100	5	50				

Scientific name	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	1031		1641		1244		1032		1643		1241		1243	
								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Poa labillardierei var. labillardierei	Tussock	Poaceae	N	-	-		Grass & grasslike														
Poa sieberiana	Snowgrass	Poaceae	N	-	-		Grass & grasslike			2	50										
Poa sieberiana var. sieberiana	Snowgrass	Poaceae	N	-	-		Grass & grasslike														
Poa spp.		Poaceae	N	-	-		Grass & grasslike														
Polygonum aviculare	Wireweed	Polygonaceae	E	-	-																
Polygonum plebeium	Small Knotweed	Polygonaceae	N	-	-		Forb														
Poranthera microphylla	Small Poranthera	Phyllanthaceae	N	-	-		Forb														
Rosa rubiginosa	Sweet Briar	Rosaceae	E	-	-	HTW										0.2	1				
Rubus fruticosus sp. agg.	Blackberry complex	Rosaceae	E	-	-	HTW				2	3										
Rumex brownii	Swamp Dock	Polygonaceae	N	-	-		Forb														
Rumex spp.	Dock	Polygonaceae	N	-	-		Forb														
Rytidosperma carphoides	Short Wallaby Grass	Poaceae	N	-	-		Grass & grasslike														
Rytidosperma erianthum	Wallaby Grass	Poaceae	N	-	-		Grass & grasslike														
Rytidosperma pallidum	Redanther Wallaby Grass; Silver	Poaceae	N	-	-		Grass & grasslike					1	20								
Rytidosperma spp.		Poaceae	N	-	-		Grass & grasslike	45	5000	20	2000	5	1000	40	4000	20	4000	20	2000	15	2000
Rytidosperma tenuius	A Wallaby Grass	Poaceae	N	-	-		Grass & grasslike														
Senecio spp.	Groundsel, Fireweed	Asteraceae	N	-	-		Forb														
Solanum nigrum	Black-berry Nightshade	Solanaceae	E	-	-																
Solenogyne dominii		Asteraceae	N	-	-		Forb							0.1	2	0.1	2	0.1	2		
Stellaria media	Common Chickweed	Caryophyllaceae	E	-	-																
Taraxacum officinale	Dandelion	Asteraceae	E	-	-																
Themeda australis		Poaceae	N	-	-		Grass & grasslike														
Themeda triandra		Poaceae	N	-	-		Grass & grasslike														
Trifolium repens	White Clover	Fabaceae (Faboideae)	E	-	-											10	4000				
Vulpia bromoides	Squirrel Tail Fesque	Poaceae	E	-	-																
Vulpia spp.	Rat's-tail Fescue	Poaceae	E	-	-																

Scientific name	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	1242		1246		1035		1245		1033		1248		1645	
								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Acacia dealbata	Silver Wattle	Fabaceae (Mimosoideae)	N	-	-		Tree			2	1							1	1		
Acacia dealbata subsp. dealbata	Silver Wattle	Fabaceae (Mimosoideae)	N	-	-		Tree														
Acetosella vulgaris	Sheep Sorrel	Polygonaceae	E	-	-	HTW						0.1	20	0.5	200			0.2	50		
Agrostis stolonifera	Creeping Bent	Poaceae	E	-	-																
Amyema pendula subsp. pendula		Loranthaceae	N	-	-		Other														
Aristida ramosa	Purple Wiregrass	Poaceae	N	-	-		Grass & grasslike			0.5	100										
Asperula conferta	Common Woodruff	Rubiaceae	N	-	-		Forb					0.1	5								
Austrostipa scabra	Speargrass	Poaceae	N	-	-		Grass & grasslike														
Austrostipa scabra subsp. falcata	Rough Speargrass	Poaceae	N	-	-		Grass & grasslike					2	200								
Bothriochloa macra	Red Grass	Poaceae	N	-	-		Grass & grasslike					15	2000			5	400				
Brassica spp.	Brassica	Brassicaceae	E	-	-																
Bromus catharticus	Praire Grass	Poaceae	E	-	-											10	2000				
Bromus hordeaceus	Soft Brome	Poaceae	E	-	-							10	2000								
Bromus spp.	A Brome	Poaceae	N	-	-		Grass & grasslike														
Carex appressa	Tall Sedge	Cyperaceae	N	-	-		Grass & grasslike					0.2	5							10	200
Carex bichenoviana		Cyperaceae	N	-	-		Grass & grasslike														
Carex spp.		Cyperaceae	N	-	-		Grass & grasslike														
Carthamus lanatus	Saffron Thistle	Asteraceae	E	-	-	HTW															
Cassinia arcuata	Sifton Bush	Asteraceae	N	-	-		Shrub	0.3	1												
Chenopodium album	Fat Hen	Chenopodiaceae	E	-	-											0.1	2				
Chloris gayana	Rhodes Grass	Poaceae	E	-	-	HTW															
Chloris truncata	Windmill Grass	Poaceae	N	-	-		Grass & grasslike			2	400			1	200						
Chondrilla juncea	Skeleton Weed	Asteraceae	E	-	-																
Cirsium vulgare	Spear Thistle	Asteraceae	E	-	-							0.1	5							0.2	20
Convolvulus angustissimus		Convolvulaceae	N	-	-		Other														
Convolvulus erubescens	Pink Bindweed	Convolvulaceae	N	-	-		Other					0.1	10								
Conyza bonariensis	Flaxleaf Fleabane	Asteraceae	E	-	-																
Cotula australis	Common Cotula	Asteraceae	N	-	-		Forb					0.2	50								
Cymbonotus lawsonianus	Bear's Ear	Asteraceae	N	-	-		Forb					0.1	2								
Cynodon dactylon	Common Couch	Poaceae	N	-	-		Grass & grasslike			2	400			2	400					2	2000
Cynosurus echinatus	Rough Dog's Tail	Poaceae	E	-	-																
Dactylis glomerata	Cocksfoot	Poaceae	E	-	-									5	400			2	200		
Desmodium varians	Slender Tick-trefoil	Fabaceae (Faboideae)	N	-	-		Other														
Dichondra repens	Kidney Weed	Convolvulaceae	N	-	-		Forb					0.2	200								
Dichondra spp.		Convolvulaceae	N	-	-		Forb														
Echium plantagineum	Patterson's Curse	Boraginaceae	E	-	-									2	200	0.2	50				
Einadia nutans	Climbing Saltbush	Chenopodiaceae	N	-	-		Forb														
Einadia nutans subsp. nutans	Climbing Saltbush	Chenopodiaceae	N	-	-		Forb			0.1	5	0.2	5			0.1	2				
Eleusine tristachya	Goose Grass	Poaceae	E	-	-							5	800								
Elymus scaber	Wheatgrass, Common Wheatgra	Poaceae	N	-	-		Grass & grasslike														
Elymus scaber var. scaber	Wheatgrass, Common Wheatgra	Poaceae	N	-	-		Grass & grasslike					2	400								
Eragrostis brownii	Brown's Lovegrass	Poaceae	N	-	-		Grass & grasslike					1	200								

Scientific name	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	1242		1246		1035		1245		1033		1248		1645	
								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Eragrostis leptostachya	Paddock Lovegrass	Poaceae	N	-	-		Grass & grasslike														
Eucalyptus bridgesiana	Apple Box	Myrtaceae	N	-	-		Tree			10	1	10	1	5	1						
Eucalyptus dives	Broad-leaved Peppermint	Myrtaceae	N	-	-		Tree	10	2	15	2			20	2			50	20		
Eucalyptus goniocalyx	Bundy	Myrtaceae	N	-	-		Tree	15	3									10	2		
Eucalyptus mannifera	Brittle Gum	Myrtaceae	N	-	-		Tree														
Eucalyptus melliodora	Yellow Box	Myrtaceae	N	-	-		Tree					5	1			30	3				
Eucalyptus viminalis	Ribbon Gum	Myrtaceae	N	-	-		Tree													25	1
Euchiton sphaericus	Star Cudweed	Asteraceae	N	-	-		Forb														
Festuca arundinacea	Tall Fescue	Poaceae	E	-	-															15	4000
Galium spp.		Rubiaceae	N	-	-		Forb														
Geranium solanderi	Native Geranium	Geraniaceae	N	-	-		Forb					0.1	20							0.1	20
Glycine clandestina	Twining glycine	Fabaceae (Faboideae)	N	-	-		Other					0.1	10								
Gonocarpus tetragynus	Poverty Raspwort	Haloragaceae	N	-	-		Forb	0.1	5												
Goodenia hederacea	Ivy Goodenia	Goodeniaceae	N	-	-		Forb	0.1	20									0.1	20		
Hibbertia obtusifolia	Hoary Guinea Flower	Dilleniaceae	N	-	-		Shrub														
Holcus lanatus	Yorkshire Fog	Poaceae	E	-	-																
Hordeum hystrix	Mediterranean Barley Grass	Poaceae	E	-	-																
Hydrocotyle laxiflora	Stinking Pennywort	Apiaceae	N	-	-		Forb														
Hypochaeris radicata	Catsear	Asteraceae	E	-	-			0.1	5									0.2	50	0.2	100
Isolepis spp.	Club-rush	Cyperaceae	N	-	-		Grass & grasslike											0.1	20		
Juncus spp.	A Rush	Juncaceae	N	-	-		Grass & grasslike														
Juncus subsecundus	Finger Rush	Juncaceae	N	-	-		Grass & grasslike														
Juncus usitatus		Juncaceae	N	-	-		Grass & grasslike			0.1	5	0.1	5					0.1	5	0.2	40
Lactuca serriola	Prickly Lettuce	Asteraceae	E	-	-																
Lepidium bonariense	Argentine Peppercress	Brassicaceae	E	-	-											0.1	10				
Lolium perenne	Perennial Ryegrass	Poaceae	E	-	-									2	200					20	5000
Lomandra filiformis	Wattle Matt-rush	Lomandraceae	N	-	-		Grass & grasslike														
Lomandra multiflora subsp. multiflora	Many-flowered Mat-rush	Lomandraceae	N	-	-		Grass & grasslike											0.1	2		
Lomandra spp.	Mat-rush	Lomandraceae	N	-	-		Grass & grasslike					0.1	2								
Malva parviflora	Small-flowered Mallow	Malvaceae	E	-	-															0.1	10
Medicago spp.	A Medic	Fabaceae (Faboideae)	E	-	-											20	5000				
Mentha diemenica	Slender Mint	Lamiaceae	N	-	-		Forb					0.1	10								
Microlaena stipoides	Weeping Grass	Poaceae	N	-	-		Grass & grasslike					2	800					10	4000		
Modiola caroliniana	Red-flowered Mallow	Malvaceae	E	-	-															0.1	10
Nassella trichotoma	Serrated Tussock	Poaceae	E	-	-																
Onopordum illyricum	Illyrian Thistle	Asteraceae	E	-	-																
Oxalis corniculata	Creeping Oxalis	Oxalidaceae	E	-	-																
Oxalis perennans		Oxalidaceae	N	-	-		Forb					0.1	5								
Ozothamnus diosmifolius	White Dogwood	Asteraceae	N	-	-		Shrub														
Panicum effusum	Hairy Panic	Poaceae	N	-	-		Grass & grasslike							2	500						
Paspalum dilatatum	Paspalum	Poaceae	E	-	-	HTW										2	20				
Phalaris aquatica	Phalaris	Poaceae	E	-	-									1	10					40	800

Scientific name	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	1242		1246		1035		1245		1033		1248		1645	
								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Poa labillardierei var. labillardierei	Tussock	Poaceae	N	-	-		Grass & grasslike					0.5	20								
Poa sieberiana	Snowgrass	Poaceae	N	-	-		Grass & grasslike														
Poa sieberiana var. sieberiana	Snowgrass	Poaceae	N	-	-		Grass & grasslike														
Poa spp.		Poaceae	N	-	-		Grass & grasslike														
Polygonum aviculare	Wireweed	Polygonaceae	E	-	-															0.2	20
Polygonum plebeium	Small Knotweed	Polygonaceae	N	-	-		Forb														
Poranthera microphylla	Small Poranthera	Phyllanthaceae	N	-	-		Forb					0.1	10								
Rosa rubiginosa	Sweet Briar	Rosaceae	E	-	-	HTW															
Rubus fruticosus sp. agg.	Blackberry complex	Rosaceae	E	-	-	HTW						0.1	1								
Rumex brownii	Swamp Dock	Polygonaceae	N	-	-		Forb													0.1	10
Rumex spp.	Dock	Polygonaceae	N	-	-		Forb														
Rytidosperma carphoides	Short Wallaby Grass	Poaceae	N	-	-		Grass & grasslike														
Rytidosperma erianthum	Wallaby Grass	Poaceae	N	-	-		Grass & grasslike														
Rytidosperma pallidum	Redanther Wallaby Grass; Silver	Poaceae	N	-	-		Grass & grasslike	50	200	10	20							10	100		
Rytidosperma spp.		Poaceae	N	-	-		Grass & grasslike			5	1000	15	3000	2	800	10	1000				
Rytidosperma tenuius	A Wallaby Grass	Poaceae	N	-	-		Grass & grasslike														
Senecio spp.	Groundsel, Fireweed	Asteraceae	N	-	-		Forb	0.1	2												
Solanum nigrum	Black-berry Nightshade	Solanaceae	E	-	-											0.1	2				
Solenogyne dominii		Asteraceae	N	-	-		Forb					0.1	2								
Stellaria media	Common Chickweed	Caryophyllaceae	E	-	-			0.1	50												
Taraxacum officinale	Dandelion	Asteraceae	E	-	-															0.1	50
Themeda australis		Poaceae	N	-	-		Grass & grasslike					5	1000								
Themeda triandra		Poaceae	N	-	-		Grass & grasslike														
Trifolium repens	White Clover	Fabaceae (Faboideae)	E	-	-							5	1000							2	800
Vulpia bromoides	Squirrel Tail Fesque	Poaceae	E	-	-																
Vulpia spp.	Rat's-tail Fescue	Poaceae	E	-	-																

Scientific name	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	1036	
								Cover	Abundance
Acacia dealbata	Silver Wattle	Fabaceae (Mimosoideae)	N	-	-		Tree		
Acacia dealbata subsp. dealbata	Silver Wattle	Fabaceae (Mimosoideae)	N	-	-		Tree		
Acetosella vulgaris	Sheep Sorrel	Polygonaceae	E	-	-	HTW		0.5	50
Agrostis stolonifera	Creeping Bent	Poaceae	E	-	-				
Amyema pendula subsp. pendula		Loranthaceae	N	-	-		Other		
Aristida ramosa	Purple Wiregrass	Poaceae	N	-	-		Grass & grasslike		
Asperula conferta	Common Woodruff	Rubiaceae	N	-	-		Forb		
Austrostipa scabra	Speargrass	Poaceae	N	-	-		Grass & grasslike		
Austrostipa scabra subsp. falcata	Rough Speargrass	Poaceae	N	-	-		Grass & grasslike		
Bothriochloa macra	Red Grass	Poaceae	N	-	-		Grass & grasslike		
Brassica spp.	Brassica	Brassicaceae	E	-	-				
Bromus catharticus	Praire Grass	Poaceae	E	-	-				
Bromus hordeaceus	Soft Brome	Poaceae	E	-	-			5	800
Bromus spp.	A Brome	Poaceae	N	-	-		Grass & grasslike		
Carex appressa	Tall Sedge	Cyperaceae	N	-	-		Grass & grasslike		
Carex bichenoviana		Cyperaceae	N	-	-		Grass & grasslike		
Carex spp.		Cyperaceae	N	-	-		Grass & grasslike		
Carthamus lanatus	Saffron Thistle	Asteraceae	E	-	-	HTW		0.5	20
Cassinia arcuata	Sifton Bush	Asteraceae	N	-	-		Shrub		
Chenopodium album	Fat Hen	Chenopodiaceae	E	-	-				
Chloris gayana	Rhodes Grass	Poaceae	E	-	-	HTW			
Chloris truncata	Windmill Grass	Poaceae	N	-	-		Grass & grasslike	5	100
Chondrilla juncea	Skeleton Weed	Asteraceae	E	-	-				
Cirsium vulgare	Spear Thistle	Asteraceae	E	-	-				
Convolvulus angustissimus		Convolvulaceae	N	-	-		Other		
Convolvulus erubescens	Pink Bindweed	Convolvulaceae	N	-	-		Other		
Conyza bonariensis	Flaxleaf Fleabane	Asteraceae	E	-	-				
Cotula australis	Common Cotula	Asteraceae	N	-	-		Forb		
Cymbonotus lawsonianus	Bear's Ear	Asteraceae	N	-	-		Forb		
Cynodon dactylon	Common Couch	Poaceae	N	-	-		Grass & grasslike		
Cynosurus echinatus	Rough Dog's Tail	Poaceae	E	-	-				
Dactylis glomerata	Cocksfoot	Poaceae	E	-	-			20	1000
Desmodium varians	Slender Tick-trefoil	Fabaceae (Faboideae)	N	-	-		Other		
Dichondra repens	Kidney Weed	Convolvulaceae	N	-	-		Forb		
Dichondra spp.		Convolvulaceae	N	-	-		Forb		
Echium plantagineum	Patterson's Curse	Boraginaceae	E	-	-				
Einadia nutans	Climbing Saltbush	Chenopodiaceae	N	-	-		Forb		
Einadia nutans subsp. nutans	Climbing Saltbush	Chenopodiaceae	N	-	-		Forb	0.5	10
Eleusine tristachya	Goose Grass	Poaceae	E	-	-			2	800
Elymus scaber	Wheatgrass, Common Wheatgra	Poaceae	N	-	-		Grass & grasslike		
Elymus scaber var. scaber	Wheatgrass, Common Wheatgra	Poaceae	N	-	-		Grass & grasslike		
Eragrostis brownii	Brown's Lovegrass	Poaceae	N	-	-		Grass & grasslike		

Scientific name	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	1036	
								Cover	Abundance
Eragrostis leptostachya	Paddock Lovegrass	Poaceae	N	-	-		Grass & grasslike		
Eucalyptus bridgesiana	Apple Box	Myrtaceae	N	-	-		Tree	15	2
Eucalyptus dives	Broad-leaved Peppermint	Myrtaceae	N	-	-		Tree		
Eucalyptus goniocalyx	Bundy	Myrtaceae	N	-	-		Tree		
Eucalyptus mannifera	Brittle Gum	Myrtaceae	N	-	-		Tree		
Eucalyptus melliodora	Yellow Box	Myrtaceae	N	-	-		Tree	15	2
Eucalyptus viminalis	Ribbon Gum	Myrtaceae	N	-	-		Tree		
Euchiton sphaericus	Star Cudweed	Asteraceae	N	-	-		Forb		
Festuca arundinacea	Tall Fescue	Poaceae	E	-	-				
Galium spp.		Rubiaceae	N	-	-		Forb	0.1	2
Geranium solanderi	Native Geranium	Geraniaceae	N	-	-		Forb		
Glycine clandestina	Twining glycine	Fabaceae (Faboideae)	N	-	-		Other		
Gonocarpus tetragynus	Poverty Raspwort	Haloragaceae	N	-	-		Forb		
Goodenia hederacea	Ivy Goodenia	Goodeniaceae	N	-	-		Forb		
Hibbertia obtusifolia	Hoary Guinea Flower	Dilleniaceae	N	-	-		Shrub		
Holcus lanatus	Yorkshire Fog	Poaceae	E	-	-				
Hordeum hystrix	Mediterranean Barley Grass	Poaceae	E	-	-				
Hydrocotyle laxiflora	Stinking Pennywort	Apiaceae	N	-	-		Forb	1	100
Hypochaeris radicata	Catsear	Asteraceae	E	-	-			3	100
Isolepis spp.	Club-rush	Cyperaceae	N	-	-		Grass & grasslike		
Juncus spp.	A Rush	Juncaceae	N	-	-		Grass & grasslike		
Juncus subsecundus	Finger Rush	Juncaceae	N	-	-		Grass & grasslike		
Juncus usitatus		Juncaceae	N	-	-		Grass & grasslike		
Lactuca serriola	Prickly Lettuce	Asteraceae	E	-	-				
Lepidium bonariense	Argentine Peppercress	Brassicaceae	E	-	-				
Lolium perenne	Perennial Ryegrass	Poaceae	E	-	-				
Lomandra filiformis	Wattle Matt-rush	Lomandraceae	N	-	-		Grass & grasslike		
Lomandra multiflora subsp. multiflora	Many-flowered Mat-rush	Lomandraceae	N	-	-		Grass & grasslike		
Lomandra spp.	Mat-rush	Lomandraceae	N	-	-		Grass & grasslike		
Malva parviflora	Small-flowered Mallow	Malvaceae	E	-	-			0.1	2
Medicago spp.	A Medic	Fabaceae (Faboideae)	E	-	-			15	4000
Mentha diemenica	Slender Mint	Lamiaceae	N	-	-		Forb		
Microlaena stipoides	Weeping Grass	Poaceae	N	-	-		Grass & grasslike		
Modiola caroliniana	Red-flowered Mallow	Malvaceae	E	-	-				
Nassella trichotoma	Serrated Tussock	Poaceae	E	-	-				
Onopordum illyricum	Illyrian Thistle	Asteraceae	E	-	-				
Oxalis corniculata	Creeping Oxalis	Oxalidaceae	E	-	-				
Oxalis perennans		Oxalidaceae	N	-	-		Forb	0.5	10
Ozothamnus diosmifolius	White Dogwood	Asteraceae	N	-	-		Shrub		
Panicum effusum	Hairy Panic	Poaceae	N	-	-		Grass & grasslike		
Paspalum dilatatum	Paspalum	Poaceae	E	-	-	HTW			
Phalaris aquatica	Phalaris	Poaceae	E	-	-				

Scientific name	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	1036	
								Cover	Abundance
Poa labillardierei var. labillardierei	Tussock	Poaceae	N	-	-		Grass & grasslike		
Poa sieberiana	Snowgrass	Poaceae	N	-	-		Grass & grasslike		
Poa sieberiana var. sieberiana	Snowgrass	Poaceae	N	-	-		Grass & grasslike		
Poa spp.		Poaceae	N	-	-		Grass & grasslike		
Polygonum aviculare	Wireweed	Polygonaceae	E	-	-				
Polygonum plebeium	Small Knotweed	Polygonaceae	N	-	-		Forb		
Poranthera microphylla	Small Poranthera	Phyllanthaceae	N	-	-		Forb		
Rosa rubiginosa	Sweet Briar	Rosaceae	E	-	-	HTW		2	2
Rubus fruticosus sp. agg.	Blackberry complex	Rosaceae	E	-	-	HTW		2	2
Rumex brownii	Swamp Dock	Polygonaceae	N	-	-		Forb		
Rumex spp.	Dock	Polygonaceae	N	-	-		Forb		
Rytidosperma carphoides	Short Wallaby Grass	Poaceae	N	-	-		Grass & grasslike		
Rytidosperma erianthum	Wallaby Grass	Poaceae	N	-	-		Grass & grasslike		
Rytidosperma pallidum	Redanther Wallaby Grass; Silver	Poaceae	N	-	-		Grass & grasslike		
Rytidosperma spp.		Poaceae	N	-	-		Grass & grasslike	15	2000
Rytidosperma tenuius	A Wallaby Grass	Poaceae	N	-	-		Grass & grasslike		
Senecio spp.	Groundsel, Fireweed	Asteraceae	N	-	-		Forb		
Solanum nigrum	Black-berry Nightshade	Solanaceae	E	-	-				
Solenogyne dominii		Asteraceae	N	-	-		Forb		
Stellaria media	Common Chickweed	Caryophyllaceae	E	-	-				
Taraxacum officinale	Dandelion	Asteraceae	E	-	-				
Themeda australis		Poaceae	N	-	-		Grass & grasslike		
Themeda triandra		Poaceae	N	-	-		Grass & grasslike		
Trifolium repens	White Clover	Fabaceae (Faboideae)	E	-	-				
Vulpia bromoides	Squirrel Tail Fesque	Poaceae	E	-	-				
Vulpia spp.	Rat's-tail Fescue	Poaceae	E	-	-			5	1000

B.2 Pipeline development

ScientificName	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	29011901		29011902		29011903		30011901		30011902		30011903		30011904		30011905		30011906	
								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Acacia acinacea	Gold-dust Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia buxifolia	Box-leaved Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub									0.1	0								
Acacia dealbata	Silver Wattle	Fabaceae (Mimosoideae)	N	-	-		Tree			1	2	10	0	0.1	1	0.1	10	0.1	10	0.1	10	0.5	1	1	2
Acacia deanei	Green Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia falciformis	Broad-leaved Hickory	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia gunnii	Ploughshare Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia implexa	Hickory Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia melanoxylon	Blackwood	Fabaceae (Mimosoideae)	N	-	-		Tree																		
Acacia nana	Small Red-leaved Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub							20	0										
Acacia obliquinervia	Mountain Hickory	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia spp.	Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub									5	0					0.5	1		
Acaena agnipila	Hairy Sheep's Burr	Rosaceae	N	-	-		Forb																		
Acaena echinata	Sheep's Burr	Rosaceae	N	-	-		Forb									0.1	200			0.5	100				
Acaena novae-zelandiae	Bidgee-widgee	Rosaceae	N	-	-		Forb													0.1	200			1	0
Acaena ovina	Acaena	Rosaceae	N	-	-		Forb																		
Acaena spp.	Sheep's Burr	Rosaceae	N	-	-		Forb															0.1	50		
Acetosella vulgaris	Sheep Sorrel	Polygonaceae	E	-	-	HTE																			
Acrotriche serrulata	Honeypots	Ericaceae	N	-	-		Shrub																		
Acrotriche spp.		Ericaceae	N	-	-		Shrub													0.1	5			1	0
Aira cupaniana	Silvery Hairgrass	Poaceae	E	-	-																				
Alternanthera angustifolia		Amaranthaceae	N	-	-		Forb																		
Amperea xiphoclada		Euphorbiaceae	N	-	-		Shrub																		
Amyema miquelii	Box Mistletoe	Loranthaceae	N	-	-		Other																		
Amyema pendula		Loranthaceae	N	-	-		Other																		
Amyema spp.	Mistletoe	Loranthaceae	N	-	-		Other																		
Anagallis arvensis	Scarlet Pimpernel	Primulaceae	E	-	-													0.1	100			0.1	200		
Anthosachne scabra	Common Wheatgrass	Poaceae	N	-	-		Grass & grasslike																		
Anthoxanthum odoratum	Sweet Vernal Grass	Poaceae	E	-	-																				
Anthoxanthum spp.	Vernal Grass	Poaceae	E	-	-																				
Arctotheca calendula	Capeweed	Asteraceae	E	-	-																				
Aristida ramosa	Purple Wiregrass	Poaceae	N	-	-		Grass & grasslike					0.5	20	0.1	5										
Aristida spp.	A Wiregrass	Poaceae	N	-	-		Grass & grasslike			0.5	20														
Aristida vagans	Threeawn Speargrass	Poaceae	N	-	-		Grass & grasslike																		
Asperula conferta	Common Woodruff	Rubiaceae	N	-	-		Forb																		
Asperula scoparia	Prickly Woodruff	Rubiaceae	N	-	-		Forb																		
Asperula spp.	Woodruff	Rubiaceae	N	-	-		Forb																		
Asphodelus fistulosus	Onion Weed	Asphodelaceae	E	-	-																				
Astroloma humifusum	Native Cranberry	Ericaceae	N	-	-		Shrub																		
Austrodanthonia spp.		Poaceae	N	-	-		Grass & grasslike																		
Austrostipa nodosa	A Speargrass	Poaceae	N	-	-		Grass & grasslike																		
Austrostipa scabra	Speargrass	Poaceae	N	-	-		Grass & grasslike			5	0	10	0					0.1	100	5	0	25	0	1	0
Austrostipa spp.	A Speargrass	Poaceae	N	-	-		Grass & grasslike																		
Avena barbata	Bearded Oats	Poaceae	E	-	-																				

ScientificName	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	29011901		29011902		29011903		30011901		30011902		30011903		30011904		30011905		30011906	
								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Avena fatua	Wild Oats	Poaceae	E	-	-																				
Avena sativa	Oats	Poaceae	E	-	-																				
Avena spp.	Oats	Poaceae	E	-	-																				
Bidens subalternans	Greater Beggar's Ticks	Asteraceae	E	-	-																				
Billardiera scandens	Hairy Apple Berry	Pittosporaceae	N	-	-		Other																		
Blechnum spp.		Blechnaceae	N	-	-		Fern																		
Bossiaea buxifolia		Fabaceae (Faboideae)	N	-	-		Shrub																		
Bossiaea prostrata		Fabaceae (Faboideae)	N	-	-		Forb									0.1	200								
Bothriochloa macra	Red Grass	Poaceae	N	-	-		Grass & grasslike																		
Brachyloma daphnoides	Daphne Heath	Ericaceae	N	-	-		Shrub																		
Brachyscome rigidula	Hairy Cutleaf Daisy	Asteraceae	N	-	-		Forb							0.5	5										
Brachyscome spp.		Asteraceae	N	-	-		Forb									0.1	5								
Brassica oleracea	Collards	Brassicaceae	E	-	-																				
Brassica spp.	Brassica	Brassicaceae	E	-	-																				
Brassica tournefortii	Mediterranean Turnip	Brassicaceae	E	-	-	HTE		0.1	10																
Bromus catharticus	Praire Grass	Poaceae	E	-	-																				
Bromus diandrus	Great Brome	Poaceae	E	-	-	HTE																			
Bromus hordeaceus	Soft Brome	Poaceae	E	-	-																				
Bulbine bulbosa	Bulbine Lily	Asphodelaceae	N	-	-		Forb			0.1	5														
Bursaria spinosa	Native Blackthorn	Pittosporaceae	N	-	-		Shrub																		
Caesia spp.		Anthericaceae	N	-	-		Forb																		
Callistemon citrinus	Crimson Bottlebrush	Myrtaceae	N	-	-		Shrub																		
Calotis lappulacea	Yellow Burr-daisy	Asteraceae	N	-	-		Forb																		
Calotis spp.	A Burr-daisy	Asteraceae	N	-	-		Forb																		
Carex appressa	Tall Sedge	Cyperaceae	N	-	-		Grass & grasslike																		
Carex bichenoviana		Cyperaceae	N	-	-		Grass & grasslike																		
Carex fascicularis	Tassel Sedge	Cyperaceae	N	-	-		Grass & grasslike																		
Carex gaudichaudiana		Cyperaceae	N	-	-		Grass & grasslike																		
Carex spp.		Cyperaceae	N	-	-		Grass & grasslike																		
Cassinia aculeata	Dolly Bush	Asteraceae	N	-	-		Shrub																		
Cassinia arcuata	Sifton Bush	Asteraceae	N	-	-		Shrub																		
Cassinia laevis	Cough Bush	Asteraceae	N	-	-		Shrub	0.1	5	20	0	25	0	0.5	10	10	0	25	0	0.1	1	20	0		
Cassinia longifolia		Asteraceae	N	-	-		Shrub																		
Cassinia quinquefaria		Asteraceae	N	-	-		Shrub																		
Cassinia spp.		Asteraceae	N	-	-		Shrub																		
Casuarina cunninghamiana	River Oak	Casuarinaceae	N	-	-		Tree																		
Centaurium spp.		Gentianaceae	E	-	-																				
Centella asiatica	Indian Pennywort	Apiaceae	N	-	-		Forb															0.1	100		
Cheilanthes austrotenuifolia	Rock Fern	Pteridaceae	N	-	-		Fern																		
Cheilanthes spp.	Rock Fern	Pteridaceae	N	-	-		Fern											0.1	100	0.1	50	0.1	100	0.1	0
Chenopodium album	Fat Hen	Chenopodiaceae	E	-	-																				
Chloris spp.		Poaceae	N	-	-		Grass & grasslike																		
Chloris truncata	Windmill Grass	Poaceae	N	-	-		Grass & grasslike																		

ScientificName	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	29011901		29011902		29011903		30011901		30011902		30011903		30011904		30011905		30011906	
								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Chloris ventricosa	Tall Chloris	Poaceae	N	-	-		Grass & grasslike																		
Chondrilla juncea	Skeleton Weed	Asteraceae	E	-	-																				
Chrysocephalum apiculatum	Common Everlasting	Asteraceae	N	-	-		Forb																		
Chrysocephalum semicalvum		Asteraceae	N	-	-		Forb																		
Cirsium vulgare	Spear Thistle	Asteraceae	E	-	-																				
Clematis aristata	Old Man's Beard	Ranunculaceae	N	-	-		Other																		
Convolvulus angustissimus		Convolvulaceae	N	-	-		Other																		
Conyza bonariensis	Flaxleaf Fleabane	Asteraceae	E	-	-																				
Conyza spp.	A Fleabane	Asteraceae	E	-	-			0.1	10																
Coronidium elatum		Asteraceae	N	-	-		Shrub																		
Coronidium rutidolepis		Asteraceae	N	-	-							0.1	20			0.1	50	0.1	50						
Coronidium scorpioides	Button Everlasting	Asteraceae	N	-	-		Forb																		
Coronidium spp.		Asteraceae	N	-	-		Forb																		
Cotoneaster spp.		Malaceae	E	-	-	HTE																			
Crassula sieberiana	Australian Stonecrop	Crassulaceae	N	-	-		Forb																		
Crataegus monogyna	Hawthorn	Malaceae	E	-	-	HTE																			
Crepis capillaris	Smooth Hawksbeard	Asteraceae	E	-	-																				
Cullen tenax	Emu-foot	Fabaceae (Faboideae)	N	-	-		Forb					0.1	5												
Cymbonotus lawsonianus	Bear's Ear	Asteraceae	N	-	-		Forb																		
Cymbonotus preissianus	Austral Bear's Ear	Asteraceae	N	-	-		Forb																		
Cynodon dactylon	Common Couch	Poaceae	N	-	-		Grass & grasslike																		
Cynodon spp.		Poaceae	N	-	-		Grass & grasslike																		
Cynodon transvaalensis	South African Couch	Poaceae	E	-	-																				
Cyperus brevifolius		Cyperaceae	E	-	-																				
Cyperus eragrostis	Umbrella Sedge	Cyperaceae	E	-	-	HTE																			
Cyperus lhotskyanus		Cyperaceae	N	-	-		Grass & grasslike																		
Cyperus spp.		Cyperaceae	N	-	-		Grass & grasslike																		
Cytisus scoparius	English Broom	Fabaceae (Faboideae)	E	-	-	HTE																			
Dactylis glomerata	Cocksfoot	Poaceae	E	-	-																				
Daucus glochidiatus	Native Carrot	Apiaceae	N	-	-		Forb																		
Daviesia corymbosa		Fabaceae (Faboideae)	N	-	-		Shrub																		
Daviesia latifolia	Bitter-pea	Fabaceae (Faboideae)	N	-	-		Shrub																		
Daviesia leptophylla		Fabaceae (Faboideae)	N	-	-		Shrub																		
Daviesia spp.		Fabaceae (Faboideae)	N	-	-		Shrub																		
Desmodium gunnii	Slender Tick-trefoil	Fabaceae (Faboideae)	N	-	-		Forb																		
Desmodium spp.	Tick-trefoil	Fabaceae (Faboideae)	N	-	-		Other																		
Dianella longifolia	Blueberry Lily	Phormiaceae	N	-	-		Forb																		
Dianella revoluta	Blueberry Lily	Phormiaceae	N	-	-		Forb			0.5	20					0.1	50			1	100			1	0
Dianella spp.		Phormiaceae	N	-	-		Forb																		
Dichanthium spp.		Poaceae	N	-	-		Grass & grasslike																		
Dichondra repens	Kidney Weed	Convolvulaceae	N	-	-		Forb			0.5	100									5	0			5	0
Dichopogon spp.	Chocolate Lily	Anthericaceae	N	-	-		Forb																		
Digitaria brownii	Cotton Panic Grass	Poaceae	N	-	-		Grass & grasslike																		

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								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Dillwynia cinerascens		Fabaceae (Faboideae)	N	-	-		Shrub					5	0												
Dillwynia phylicoides	Parrot-pea	Fabaceae (Faboideae)	N	-	-		Shrub																		
Dillwynia sericea	Egg and Bacon Pea	Fabaceae (Faboideae)	N	-	-		Shrub																		
Dillwynia spp.		Fabaceae (Faboideae)	N	-	-		Shrub																		
Dipodium hamiltonianum	Yellow Hyacinth-orchid	Orchidaceae	N	-	-		Forb									0.1	1								
Dipsacus spp.		Dipsacaceae	E	-	-																				
Drosera spp.		Droseraceae	N	-	-		Forb																		
Dysphania pumilio	Small Crumbweed	Chenopodiaceae	N	-	-		Forb																		
Dysphania spp.		Chenopodiaceae	N	-	-		Forb															0.1	10		
Echinopogon ovatus	Forest Hedgehog Grass	Poaceae	N	-	-		Grass & grasslike													5	0			5	0
Echium plantagineum	Patterson's Curse	Boraginaceae	E	-	-							0.1	10												
Echium spp.		Boraginaceae	E	-	-															0.1	20	5	0		
Echium vulgare	Viper's Bugloss	Boraginaceae	E	-	-																				
Einadia hastata	Berry Saltbush	Chenopodiaceae	N	-	-		Forb																		
Einadia nutans	Climbing Saltbush	Chenopodiaceae	N	-	-		Forb																		
Einadia polygonoides	Knotweed Goosefoot	Chenopodiaceae	N	-	-		Forb																		
Eleocharis acuta		Cyperaceae	N	-	-		Grass & grasslike																		
Eleusine tristachya	Goose Grass	Poaceae	E	-	-																				
Elymus scaber	Common Wheatgrass	Poaceae	N	-	-		Grass & grasslike											0.1	20						
Enneapogon nigricans	Niggerheads	Poaceae	N	-	-		Grass & grasslike																		
Enteropogon acicularis	Curly Windmill Grass	Poaceae	N	-	-		Grass & grasslike																		
Epacris spp.		Ericaceae	N	-	-		Shrub									5	0	0.5	20	1	10			1	10
Epilobium spp.		Onagraceae	N	-	-		Forb																		
Eragrostis cilianensis	Stinkgrass	Poaceae	E	-	-																				
Eragrostis curvula	African Lovegrass	Poaceae	E	-	-	HTE						5	0					1	300						
Eragrostis leptostachya	Paddock Lovegrass	Poaceae	N	-	-		Grass & grasslike																		
Eragrostis parviflora	Weeping Lovegrass	Poaceae	N	-	-		Grass & grasslike							0.1	10										
Eragrostis spp.	A Lovegrass	Poaceae	N	-	-		Grass & grasslike																		
Erodium botrys	Long Storksbill	Geraniaceae	E	-	-																				
Erodium cicutarium	Common Crowfoot	Geraniaceae	E	-	-																				
Erodium crinitum	Blue Crowfoot	Geraniaceae	N	-	-		Forb																		
Erodium malacoides		Geraniaceae	E	-	-																				
Erodium spp.	Crowfoot	Geraniaceae	N	-	-		Forb																		
Eucalyptus blakelyi	Blakely's Red Gum	Myrtaceae	N	-	-		Tree																		
Eucalyptus bridgesiana	Apple Box	Myrtaceae	N	-	-		Tree							10	0										
Eucalyptus cannonii	Capertee Stringybark	Myrtaceae	N	V	-		Tree									5	1								
Eucalyptus dalrympleana	Mountain Gum	Myrtaceae	N	-	-		Tree			10	0	25	0												
Eucalyptus dives	Broad-leaved Peppermint	Myrtaceae	N	-	-		Tree													5	0			10	0
Eucalyptus fastigata	Brown Barrel	Myrtaceae	N	-	-		Tree																		
Eucalyptus goniocalyx	Bundy	Myrtaceae	N	-	-		Tree																		
Eucalyptus macrorhyncha	Red Stringybark	Myrtaceae	N	-	-		Tree			10	0					5	0								
Eucalyptus mannifera	Brittle Gum	Myrtaceae	N	-	-		Tree							25	0	50	0	0.5	5			0.1	5	45	0
Eucalyptus melliodora	Yellow Box	Myrtaceae	N	-	-		Tree																		

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								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Eucalyptus pauciflora	White Sally	Myrtaceae	N	-	-		Tree			25	0														
Eucalyptus rossii	Inland Scribbly Gum	Myrtaceae	N	-	-		Tree																		
Eucalyptus spp.		Myrtaceae	N	-	-		Tree									5	0			60	0			5	1
Eucalyptus stellulata	Black Sally	Myrtaceae	N	-	-		Tree																		
Eucalyptus viminalis	Ribbon Gum	Myrtaceae	N	-	-		Tree																		
Euchiton japonicus		Asteraceae	N	-	-		Forb																		
Euchiton sphaericus	Star Cudweed	Asteraceae	N	-	-		Forb																		
Euchiton spp.	A Cudweed	Asteraceae	N	-	-		Forb																		
Euphorbia dallachyana		Euphorbiaceae	N	-	-		Forb																		
Euphorbia drummondii	Caustic Weed	Euphorbiaceae	N	-	-		Forb																		
Euphorbia spp.		Euphorbiaceae	N	-	-		Forb																		
Exocarpos cupressiformis	Cherry Ballart	Santalaceae	N	-	-		Shrub													1	0				
Exocarpos strictus	Dwarf Cherry	Santalaceae	N	-	-		Shrub																		
Foeniculum vulgare	Fennel	Apiaceae	E	-	-																				
Galium murale	Small Bedstraw	Rubiaceae	E	-	-																				
Gamochaeta calviceps	Cudweed	Asteraceae	E	-	-					0.1	10														
Geranium graniticola		Geraniaceae	N	-	-		Forb																		
Geranium molle	Cranesbill Geranium	Geraniaceae	E	-	-																				
Geranium solanderi	Native Geranium	Geraniaceae	N	-	-		Forb	0.1	5																
Geranium spp.		Geraniaceae	N	-	-		Forb																		
Glycine clandestina	Twining glycine	Fabaceae (Faboideae)	N	-	-		Other													0.1	50				
Glycine microphylla	Small-leaf Glycine	Fabaceae (Faboideae)	N	-	-		Other													0.1	10				
Gonocarpus humilis		Haloragaceae	N	-	-		Forb																		
Gonocarpus spp.	Raspwort	Haloragaceae	N	-	-		Forb																		
Gonocarpus tetragynus	Poverty Raspwort	Haloragaceae	N	-	-		Forb			0.1	20	0.1	20							0.1	100			0.1	5
Gonocarpus teucrioides	Germander Raspwort	Haloragaceae	N	-	-		Forb																		
Goodenia hederacea	Ivy Goodenia	Goodeniaceae	N	-	-		Forb																		
Goodenia spp.		Goodeniaceae	N	-	-		Forb									0.1	1000								
Haloragis heterophylla	Variable Raspwort	Haloragaceae	N	-	-		Forb																		
Haloragis spp.	A Raspwort	Haloragaceae	N	-	-		Forb									1	1000	0.1	100						
Hardenbergia violacea	False Sarsaparilla	Fabaceae (Faboideae)	N	-	-		Other									0.1	1								
Helichrysum leucopsideum	Satin Everlasting	Asteraceae	N	-	-		Forb																		
Helichrysum spp.		Asteraceae	N	-	-		Forb																		
Heliotropium amplexicaule	Blue Heliotrope	Boraginaceae	E	-	-	HTE																			
Hibbertia obtusifolia	Hoary Guinea Flower	Dilleniaceae	N	-	-		Shrub																	0.1	5
Holcus lanatus	Yorkshire Fog	Poaceae	E	-	-																				
Hordeum leporinum	Barley Grass	Poaceae	E	-	-																				
Hovea heterophylla		Fabaceae (Faboideae)	N	-	-		Forb																		
Hovea spp.		Fabaceae (Faboideae)	N	-	-		Forb									0.1	20								
Hydrocotyle laxiflora	Stinking Pennywort	Apiaceae	N	-	-		Forb													0.1	200				
Hydrocotyle sibthorpioides		Apiaceae	N	-	-		Forb																		
Hydrocotyle spp.		Apiaceae	N	-	-		Forb																		
Hypericum gramineum	Small St John's Wort	Clusiaceae	N	-	-		Forb					5	0	0.1	25	0.1	50	0.1	300						

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								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Hypericum perforatum	St. Johns Wort	Clusiaceae	E	-	-	HTE		0.5	50			0.1	50	0.1	10			0.1	200			0.1	100		
Hypericum spp.		Clusiaceae	N	-	-		Forb											0.1	200	0.1	100				
Hypochaeris glabra	Smooth Catsear	Asteraceae	E	-	-			0.1	50	0.1	50	0.1	200	0.1	10	0.1	20	0.1	500	0.1	50	0.5	100		
Hypochaeris radicata	Catsear	Asteraceae	E	-	-																				
Hypochaeris spp.	A Catsear	Asteraceae	E	-	-																				
Hypochoeris radicata	Catsear	Asteraceae	E	-	-																				
Hypoxis spp.		Hypoxidaceae	N	-	-		Forb																		
Isolepis hookeriana		Cyperaceae	N	-	-		Grass & grasslike																		
Joycea pallida	Redanther Wallaby Grass	Poaceae	N	-	-		Grass & grasslike																		
Juncus effusus		Juncaceae	E	-	-																				
Juncus gregiflorus		Juncaceae	N	-	-		Grass & grasslike																		
Juncus homalocaulis		Juncaceae	N	-	-		Grass & grasslike																		
Juncus spp.	A Rush	Juncaceae	N	-	-		Grass & grasslike																		
Lactuca serriola	Prickly Lettuce	Asteraceae	E	-	-			0.1	20																
Lagenifera spp.		Asteraceae	N	-	-		Forb																		
Lamarckia aurea	Goldentop	Poaceae	E	-	-																				
Lepidium africanum	Common Peppercress	Brassicaceae	E	-	-																				
Lepidium spp.	A Peppercress	Brassicaceae	N	-	-		Forb																		
Leptospermum myrtifolium		Myrtaceae	N	-	-		Shrub			10	0	0.5	5												
Leptospermum spp.	Tea-tree	Myrtaceae	N	-	-		Shrub											25	0						
Leucopogon appressus		Ericaceae	N	-	-		Shrub																		
Leucopogon fletcheri		Ericaceae	N	-	-		Shrub																		
Leucopogon virgatus		Ericaceae	N	-	-		Shrub																		
Linum marginale	Native Flax	Linaceae	N	-	-		Forb																		
Lissanthe spp.		Ericaceae	N	-	-		Shrub																		
Lolium perenne	Perennial Ryegrass	Poaceae	E	-	-																				
Lomandra cylindrica		Lomandraceae	N	-	-		Grass & grasslike																		
Lomandra filiformis	Wattle Matt-rush	Lomandraceae	N	-	-		Grass & grasslike			0.1	20	0.5	0			15	0	10	0	5	0	1	0	5	0
Lomandra longifolia	Spiny-headed Mat-rush	Lomandraceae	N	-	-		Grass & grasslike					0.5	5												
Lomandra multiflora	Many-flowered Mat-rush	Lomandraceae	N	-	-		Grass & grasslike																		
Lomandra spp.	Mat-rush	Lomandraceae	N	-	-		Grass & grasslike													0.1	10				
Lomatia ilicifolia	Holly Lomatia	Proteaceae	N	-	-		Shrub																		
Lomatia myricoides	River Lomatia	Proteaceae	N	-	-		Shrub																		
Luzula spp.		Juncaceae	N	-	-		Grass & grasslike																		
Lycium ferocissimum	African Boxthorn	Solanaceae	E	-	-	HTE																			
Lysimachia arvensis	Scarlet Pimpernel	Primulaceae	E	-	-							0.1	50	0.1	50										
Lythrum hyssopifolia	Hyssop Loosestrife	Lythraceae	N	-	-		Forb																		
Malus pumila	Apple	Malaceae	E	-	-																				
Malva neglecta	Dwarf Mallow	Malvaceae	E	-	-																				
Marrubium spp.		Lamiaceae	E	-	-																				
Marrubium vulgare	White Horehound	Lamiaceae	E	-	-																				
Medicago polymorpha	Burr Medic	Fabaceae (Faboideae)	E	-	-																				
Medicago spp.	A Medic	Fabaceae (Faboideae)	E	-	-																				

ScientificName	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	29011901		29011902		29011903		30011901		30011902		30011903		30011904		30011905		30011906	
								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Melichrus urceolatus	Urn Heath	Ericaceae	N	-	-		Shrub																		
Melicytus dentatus	Tree Violet	Violaceae	N	-	-		Shrub																		
Microlaena stipoides	Weeping Grass	Poaceae	N	-	-		Grass & grasslike																		
Modiola caroliniana	Red-flowered Mallow	Malvaceae	E	-	-																				
Modiola spp.		Malvaceae	E	-	-																				
Moenchia erecta	Erect Chickweed	Caryophyllaceae	E	-	-																				
Monoculus monstrosus		Asteraceae	E	-	-																				
Monotoca scoparia		Ericaceae	N	-	-		Shrub																		
Nassella trichotoma	Serrated Tussock	Poaceae	E	-	-																				
Notothixos spp.		Viscaceae	N	-	-		Other																		
Olearia spp.		Asteraceae	N	-	-		Shrub																		
Onopordum acanthium	Scotch Thistle	Asteraceae	E	-	-			0.5	50			0.5	10												
Ophioglossum lusitanicum	Adder's Tongue	Ophioglossaceae	N	-	-		Fern																		
Orobanche spp.		Scrophulariaceae	N	-	-		Forb																		
Oxalis perennans		Oxalidaceae	N	-	-		Forb			0.1	20	0.5	0	0.1	10	0.1	50			0.1	50	0.1	100		
Oxalis spp.		Oxalidaceae	N	-	-		Forb																		
Ozothamnus diosmifolius	White Dogwood	Asteraceae	N	-	-		Shrub																		
Panicum effusum	Hairy Panic	Poaceae	N	-	-		Grass & grasslike			0.1	5	0.1	100					1	300			0.5	50		
Paspalum dilatatum	Paspalum	Poaceae	E	-	-	HTE																			
Paspalum spp.		Poaceae	N	-	-		Grass & grasslike																		
Pennisetum clandestinum	Kikuyu Grass	Poaceae	E	-	-																				
Pentaschistis airoides	False Hairgrass	Poaceae	E	-	-																				
Persicaria prostrata	Creeping Knotweed	Polygonaceae	N	-	-		Forb																		
Petrorhagia spp.		Caryophyllaceae	E	-	-																				
Phalaris aquatica	Phalaris	Poaceae	E	-	-																				
Phalaris minor	Lesser Canary Grass	Poaceae	E	-	-																				
Phalaris spp.		Poaceae	E	-	-																				
Phragmites australis	Common Reed	Poaceae	N	-	-		Grass & grasslike																		
Phragmites spp.		Poaceae	N	-	-		Grass & grasslike																		
Pinus radiata	Radiata Pine	Pinaceae	E	-	-																				
Plantago gaudichaudii	Narrow Plantain	Plantaginaceae	N	-	-		Forb																		
Plantago lanceolata	Lamb's Tongues	Plantaginaceae	E	-	-					0.1	50	5	0												
Plantago spp.	Plantain	Plantaginaceae	N	-	-		Forb																		
Platylobium formosum		Fabaceae (Faboideae)	N	-	-		Shrub																		
Poa annua	Winter Grass	Poaceae	E	-	-																				
Poa induta		Poaceae	N	-	-		Grass & grasslike																		
Poa labillardierei	Tussock	Poaceae	N	-	-		Grass & grasslike	95	0							5	100			0.1	5			5	0
Poa meionectes		Poaceae	N	-	-		Grass & grasslike																		
Poa sieberiana	Snowgrass	Poaceae	N	-	-		Grass & grasslike			20	0							0.1	30	5	0				
Poa spp.		Poaceae	N	-	-		Grass & grasslike											0.1	10						
Polycarpon tetraphyllum	Four-leaved Allseed	Caryophyllaceae	E	-	-																				
Polyscias sambucifolia	Elderberry Panax	Araliaceae	N	-	-		Shrub																		
Populus spp.		Salicaceae	N	-	-		Tree																		

ScientificName	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	29011901		29011902		29011903		30011901		30011902		30011903		30011904		30011905		30011906	
								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Poranthera microphylla	Small Poranthera	Phyllanthaceae	N	-	-		Forb																		
Portulaca oleracea	Pigweed	Portulacaceae	N	-	-		Forb																		
Potentilla spp.		Rosaceae	E	-	-																				
Pseudognaphalium luteoalbum	Jersey Cudweed	Asteraceae	N	-	-		Forb																		
Pteridium esculentum	Bracken	Dennstaedtiaceae	N	-	-		Fern																		
Pteridium spp.		Dennstaedtiaceae	N	-	-		Fern																		
Pultenaea microphylla	A Bush Pea	Fabaceae (Faboideae)	N	-	-		Shrub			0.5	10	1	25							0.1	10				
Rosa rubiginosa	Sweet Briar	Rosaceae	E	-	-	HTE				0.5	5			0.1	1					0.1	1				
Rosa spp.		Rosaceae	E	-	-																				
Rubus fruticosus	Blackberry complex	Rosaceae	E	-	-					1	5	5	0					1	0	0.1	1	0.1	5		
Rubus parvifolius	Native Raspberry	Rosaceae	N	-	-		Shrub																		
Rumex acetosella	Sheep Sorrel	Polygonaceae	E	-	-																				
Rumex brownii	Swamp Dock	Polygonaceae	N	-	-		Forb																		
Rumex crispus	Curled Dock	Polygonaceae	E	-	-																				
Rumex spp.	Dock	Polygonaceae	N	-	-		Forb																		
Rytidosperma caespitosum	Ringed Wallaby Grass	Poaceae	N	-	-		Grass & grasslike																		
Rytidosperma longifolium	Long-leaved Wallaby Grass	Poaceae	N	-	-		Grass & grasslike																		
Rytidosperma monticola	Mountain Wallaby Grass	Poaceae	N	-	-		Grass & grasslike																		
Rytidosperma pallidum	Redanther Wallaby Grass	Poaceae	N	-	-		Grass & grasslike			0.5	50	15	0	5	0					5	0	10	0	5	0
Rytidosperma spp.		Poaceae	N	-	-		Grass & grasslike									1	100	10	0						
Salix fragilis	Crack Willow	Salicaceae	E	-	-																				
Schoenus apogon	Fluke Bogrush	Cyperaceae	N	-	-		Grass & grasslike																		
Scleranthus biflorus	Two-flowered Knawel	Caryophyllaceae	N	-	-		Forb																		
Scolymus hispanicus	Golden Thistle	Asteraceae	E	-	-																				
Senecio diaschides		Asteraceae	N	-	-		Forb																		
Senecio gunnii		Asteraceae	N	-	-		Forb																		
Senecio prenanthoides		Asteraceae	N	-	-		Forb																		
Senecio quadridentatus	Cotton Fireweed	Asteraceae	N	-	-		Forb																		
Senecio spp.	Fireweed	Asteraceae	N	-	-		Forb					0.1	10									0.5	100		
Setaria gracilis		Poaceae	E	-	-																				
Setaria pumila	Pale Pigeon Grass	Poaceae	E	-	-																				
Solanum nigrum	Black-berry Nightshade	Solanaceae	E	-	-																				
Solenogyne spp.		Asteraceae	N	-	-		Forb																		
Sonchus asper	Prickly Sowthistle	Asteraceae	E	-	-																				
Sonchus spp.	Sowthistle	Asteraceae	N	-	-		Forb																		
Spergularia rubra	Sandspurry	Caryophyllaceae	E	-	-																				
Sporobolus caroli	Fairy Grass	Poaceae	N	-	-		Grass & grasslike																		
Sporobolus creber	Slender Rat's Tail Grass	Poaceae	N	-	-		Grass & grasslike																		
Stackhousia viminea	Slender Stackhousia	Stackhousiaceae	N	-	-		Forb																		
Stellaria media	Common Chickweed	Caryophyllaceae	E	-	-																				
Stellaria pungens	Prickly Starwort	Caryophyllaceae	N	-	-		Forb																		
Stylidium graminifolium	Grass Triggerplant	Stylidiaceae	N	-	-		Forb																		
Styphelia spp.		Ericaceae	N	-	-		Shrub																		

ScientificName	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	29011901		29011902		29011903		30011901		30011902		30011903		30011904		30011905		30011906	
								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Styphelia triflora	Pink Five-Corners	Ericaceae	N	-	-		Shrub																		
Taraxacum officinale	Dandelion	Asteraceae	E	-	-																				
Taraxacum spp.	Dandelion	Asteraceae	N	-	-		Forb																		
Themeda australis		Poaceae	N	-	-		Grass & grasslike																		
Themeda triandra		Poaceae	N	-	-		Grass & grasslike			5	0	5	0												
Thinopyrum ponticum	Tall Wheat Grass	Poaceae	E	-	-																				
Tribulus terrestris	Cat-head	Zygophyllaceae	E	-	-																				
Tricoryne elatior	Yellow Autumn-lily	Anthericaceae	N	-	-		Forb													0.1	20				
Trifolium angustifolium	Narrow-leaved Clover	Fabaceae (Faboideae)	E	-	-																				
Trifolium arvense	Haresfoot Clover	Fabaceae (Faboideae)	E	-	-																				
Trifolium repens	White Clover	Fabaceae (Faboideae)	E	-	-																				
Trifolium spp.	A Clover	Fabaceae (Faboideae)	E	-	-																				
Urtica incisa	Stinging Nettle	Urticaceae	N	-	-		Forb																		
Verbascum spp.		Scrophulariaceae	E	-	-																				
Verbascum virgatum	Twiggy Mullein	Scrophulariaceae	E	-	-																				
Veronica calycina	Hairy Speedwell	Plantaginaceae	N	-	-		Forb																		
Veronica plebeia	Trailing Speedwell	Plantaginaceae	N	-	-		Forb																		
Veronica spp.		Plantaginaceae	N	-	-		Forb																		
Vicia sativa	Common vetch	Fabaceae (Faboideae)	E	-	-																				
Vicia spp.	Vetch	Fabaceae (Faboideae)	E	-	-																				
Viola betonicifolia	Native Violet	Violaceae	N	-	-		Forb									0	200	0.1	5	0.1	200			0.1	0
Viola spp.		Violaceae	N	-	-		Forb																		
Vittadinia dissecta		Asteraceae	N	-	-		Forb																		
Vittadinia spp.	Fuzzweed	Asteraceae	N	-	-		Forb									0.1	5								
Vulpia myuros	Rat's Tail Fescue	Poaceae	E	-	-																				
Wahlenbergia communis	Tufted Bluebell	Campanulaceae	N	-	-		Forb																		
Wahlenbergia gracilenta	Annual Bluebell	Campanulaceae	N	-	-		Forb					0.1	10												
Wahlenbergia gracilis	Sprawling Bluebell	Campanulaceae	N	-	-		Forb																		
Wahlenbergia spp.	Bluebell	Campanulaceae	N	-	-		Forb											0.1	5	0.1	5			0.1	5
Wahlenbergia stricta	Tall Bluebell	Campanulaceae	N	-	-		Forb																		
Wurmbea dioica	Early Nancy	Colchicaceae	N	-	-		Forb																		
Xerochrysum spp.		Asteraceae	N	-	-		Forb									0.1	200								
Xerochrysum viscosum	Sticky Everlasting	Asteraceae	N	-	-		Forb																		
Zieria cytisoides	Downy Zieria	Rutaceae	N	-	-		Shrub																		

ScientificName	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	30011907		31011901		31011903		31011904		31011905		MAC01		MAC02		MAC03		MAC04	
								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Acacia acinacea	Gold-dust Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia buxifolia	Box-leaved Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia dealbata	Silver Wattle	Fabaceae (Mimosoideae)	N	-	-		Tree	5	0					0.5	10	0.1	5								
Acacia deanei	Green Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																	10	0
Acacia falciformis	Broad-leaved Hickory	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia gunnii	Ploughshare Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia implexa	Hickory Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia melanoxylon	Blackwood	Fabaceae (Mimosoideae)	N	-	-		Tree																		
Acacia nana	Small Red-leaved Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia obliquinervia	Mountain Hickory	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia spp.	Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acaena agnipila	Hairy Sheep's Burr	Rosaceae	N	-	-		Forb																		
Acaena echinata	Sheep's Burr	Rosaceae	N	-	-		Forb					5	0	5	0										
Acaena novae-zelandiae	Bidgee-widgee	Rosaceae	N	-	-		Forb	0.1	1000			5	0												
Acaena ovina	Acaena	Rosaceae	N	-	-		Forb																		
Acaena spp.	Sheep's Burr	Rosaceae	N	-	-		Forb			5	0														
Acetosella vulgaris	Sheep Sorrel	Polygonaceae	E	-	-	HTE																0.1	50		
Acrotriche serrulata	Honeypots	Ericaceae	N	-	-		Shrub																		
Acrotriche spp.		Ericaceae	N	-	-		Shrub																		
Aira cupaniana	Silvery Hairgrass	Poaceae	E	-	-																				
Alternanthera angustifolia		Amaranthaceae	N	-	-		Forb																		
Amperea xiphoclada		Euphorbiaceae	N	-	-		Shrub																		
Amyema miquelii	Box Mistletoe	Loranthaceae	N	-	-		Other																		
Amyema pendula		Loranthaceae	N	-	-		Other																		
Amyema spp.	Mistletoe	Loranthaceae	N	-	-		Other											0.5	5						
Anagallis arvensis	Scarlet Pimpernel	Primulaceae	E	-	-					0	300														
Anthosachne scabra	Common Wheatgrass	Poaceae	N	-	-		Grass & grasslike																		
Anthoxanthum odoratum	Sweet Vernal Grass	Poaceae	E	-	-																				
Anthoxanthum spp.	Vernal Grass	Poaceae	E	-	-																				
Arctotheca calendula	Capeweed	Asteraceae	E	-	-																				
Aristida ramosa	Purple Wiregrass	Poaceae	N	-	-		Grass & grasslike					0.1	10			20	0							1	10
Aristida spp.	A Wiregrass	Poaceae	N	-	-		Grass & grasslike																		
Aristida vagans	Threeawn Speargrass	Poaceae	N	-	-		Grass & grasslike					5	0												
Asperula conferta	Common Woodruff	Rubiaceae	N	-	-		Forb																		
Asperula scoparia	Prickly Woodruff	Rubiaceae	N	-	-		Forb					0.5	500												
Asperula spp.	Woodruff	Rubiaceae	N	-	-		Forb																		
Asphodelus fistulosus	Onion Weed	Asphodelaceae	E	-	-											0.1	20								
Astroloma humifusum	Native Cranberry	Ericaceae	N	-	-		Shrub									1	0								
Austrodanthonia spp.		Poaceae	N	-	-		Grass & grasslike																		
Austrostipa nodosa	A Speargrass	Poaceae	N	-	-		Grass & grasslike																		
Austrostipa scabra	Speargrass	Poaceae	N	-	-		Grass & grasslike	1	50					0.1	20										
Austrostipa spp.	A Speargrass	Poaceae	N	-	-		Grass & grasslike																		
Avena barbata	Bearded Oats	Poaceae	E	-	-															5	0			0.1	100

ScientificName	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	30011907		31011901		31011903		31011904		31011905		MAC01		MAC02		MAC03		MAC04	
								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Avena fatua	Wild Oats	Poaceae	E	-	-																				
Avena sativa	Oats	Poaceae	E	-	-																				
Avena spp.	Oats	Poaceae	E	-	-																				
Bidens subalternans	Greater Beggar's Ticks	Asteraceae	E	-	-																				
Billardiera scandens	Hairy Apple Berry	Pittosporaceae	N	-	-		Other																		
Blechnum spp.		Blechnaceae	N	-	-		Fern																		
Bossiaea buxifolia		Fabaceae (Faboideae)	N	-	-		Shrub																		
Bossiaea prostrata		Fabaceae (Faboideae)	N	-	-		Forb																		
Bothriochloa macra	Red Grass	Poaceae	N	-	-		Grass & grasslike											5	0	5	0			10	0
Brachyloma daphnoides	Daphne Heath	Ericaceae	N	-	-		Shrub									5	0								
Brachyscome rigidula	Hairy Cutleaf Daisy	Asteraceae	N	-	-		Forb																		
Brachyscome spp.		Asteraceae	N	-	-		Forb																		
Brassica oleracea	Collards	Brassicaceae	E	-	-																				
Brassica spp.	Brassica	Brassicaceae	E	-	-																				
Brassica tournefortii	Mediterranean Turnip	Brassicaceae	E	-	-	HTE												5	0	10	0	0.5	50		
Bromus catharticus	Praire Grass	Poaceae	E	-	-																				
Bromus diandrus	Great Brome	Poaceae	E	-	-	HTE																			
Bromus hordeaceus	Soft Brome	Poaceae	E	-	-																				
Bulbine bulbosa	Bulbine Lily	Asphodelaceae	N	-	-		Forb																		
Bursaria spinosa	Native Blackthorn	Pittosporaceae	N	-	-		Shrub					0.1	1			0.1	1								
Caesia spp.		Anthericaceae	N	-	-		Forb																		
Callistemon citrinus	Crimson Bottlebrush	Myrtaceae	N	-	-		Shrub																		
Calotis lappulacea	Yellow Burr-daisy	Asteraceae	N	-	-		Forb																		
Calotis spp.	A Burr-daisy	Asteraceae	N	-	-		Forb																		
Carex appressa	Tall Sedge	Cyperaceae	N	-	-		Grass & grasslike																		
Carex bichenoviana		Cyperaceae	N	-	-		Grass & grasslike																		
Carex fascicularis	Tassel Sedge	Cyperaceae	N	-	-		Grass & grasslike																		
Carex gaudichaudiana		Cyperaceae	N	-	-		Grass & grasslike																		
Carex spp.		Cyperaceae	N	-	-		Grass & grasslike																		
Cassinia aculeata	Dolly Bush	Asteraceae	N	-	-		Shrub									1	5								
Cassinia arcuata	Sifton Bush	Asteraceae	N	-	-		Shrub																		
Cassinia laevis	Cough Bush	Asteraceae	N	-	-		Shrub							0.1	2										
Cassinia longifolia		Asteraceae	N	-	-		Shrub																		
Cassinia quinquefaria		Asteraceae	N	-	-		Shrub																		
Cassinia spp.		Asteraceae	N	-	-		Shrub																		
Casuarina cunninghamiana	River Oak	Casuarinaceae	N	-	-		Tree															5	1		
Centaurium spp.		Gentianaceae	E	-	-																				
Centella asiatica	Indian Pennywort	Apiaceae	N	-	-		Forb																		
Cheilanthes austrotenuifolia	Rock Fern	Pteridaceae	N	-	-		Fern																		
Cheilanthes spp.	Rock Fern	Pteridaceae	N	-	-		Fern									0.1	50							0.1	10
Chenopodium album	Fat Hen	Chenopodiaceae	E	-	-																				
Chloris spp.		Poaceae	N	-	-		Grass & grasslike																		
Chloris truncata	Windmill Grass	Poaceae	N	-	-		Grass & grasslike																		

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								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Chloris ventricosa	Tall Chloris	Poaceae	N	-	-		Grass & grasslike																		
Chondrilla juncea	Skeleton Weed	Asteraceae	E	-	-																				
Chrysocephalum apiculatum	Common Everlasting	Asteraceae	N	-	-		Forb									0.1	30	0.1	20						
Chrysocephalum semicalvum		Asteraceae	N	-	-		Forb					0.1	5												
Cirsium vulgare	Spear Thistle	Asteraceae	E	-	-																				
Clematis aristata	Old Man's Beard	Ranunculaceae	N	-	-		Other																		
Convolvulus angustissimus		Convolvulaceae	N	-	-		Other																		
Conyza bonariensis	Flaxleaf Fleabane	Asteraceae	E	-	-																				
Conyza spp.	A Fleabane	Asteraceae	E	-	-																				
Coronidium elatum		Asteraceae	N	-	-		Shrub																		
Coronidium rutidolepis		Asteraceae	N	-	-																				
Coronidium scorpioides	Button Everlasting	Asteraceae	N	-	-		Forb																		
Coronidium spp.		Asteraceae	N	-	-		Forb																		
Cotoneaster spp.		Malaceae	E	-	-	HTE																			
Crassula sieberiana	Australian Stonecrop	Crassulaceae	N	-	-		Forb																		
Crataegus monogyna	Hawthorn	Malaceae	E	-	-	HTE																			
Crepis capillaris	Smooth Hawksbeard	Asteraceae	E	-	-																				
Cullen tenax	Emu-foot	Fabaceae (Faboideae)	N	-	-		Forb																		
Cymbonotus lawsonianus	Bear's Ear	Asteraceae	N	-	-		Forb																		
Cymbonotus preissianus	Austral Bear's Ear	Asteraceae	N	-	-		Forb																		
Cynodon dactylon	Common Couch	Poaceae	N	-	-		Grass & grasslike																	1	300
Cynodon spp.		Poaceae	N	-	-		Grass & grasslike																		
Cynodon transvaalensis	South African Couch	Poaceae	E	-	-																				
Cyperus brevifolius		Cyperaceae	E	-	-																				
Cyperus eragrostis	Umbrella Sedge	Cyperaceae	E	-	-	HTE																			
Cyperus lhotskyanus		Cyperaceae	N	-	-		Grass & grasslike																		
Cyperus spp.		Cyperaceae	N	-	-		Grass & grasslike																		
Cytisus scoparius	English Broom	Fabaceae (Faboideae)	E	-	-	HTE																			
Dactylis glomerata	Cocksfoot	Poaceae	E	-	-			1	100	5	0	1	0												
Daucus glochidiatus	Native Carrot	Apiaceae	N	-	-		Forb																		
Daviesia corymbosa		Fabaceae (Faboideae)	N	-	-		Shrub																		
Daviesia latifolia	Bitter-pea	Fabaceae (Faboideae)	N	-	-		Shrub																		
Daviesia leptophylla		Fabaceae (Faboideae)	N	-	-		Shrub																		
Daviesia spp.		Fabaceae (Faboideae)	N	-	-		Shrub																		
Desmodium gunnii	Slender Tick-trefoil	Fabaceae (Faboideae)	N	-	-		Forb																		
Desmodium spp.	Tick-trefoil	Fabaceae (Faboideae)	N	-	-		Other	0	0																
Dianella longifolia	Blueberry Lily	Phormiaceae	N	-	-		Forb																		
Dianella revoluta	Blueberry Lily	Phormiaceae	N	-	-		Forb									1	50								
Dianella spp.		Phormiaceae	N	-	-		Forb																		
Dichanthium spp.		Poaceae	N	-	-		Grass & grasslike																		
Dichondra repens	Kidney Weed	Convolvulaceae	N	-	-		Forb					5	0												
Dichopogon spp.	Chocolate Lily	Anthericaceae	N	-	-		Forb																		
Digitaria brownii	Cotton Panic Grass	Poaceae	N	-	-		Grass & grasslike																		

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								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Dillwynia cinerascens		Fabaceae (Faboideae)	N	-	-		Shrub																		
Dillwynia phylicoides	Parrot-pea	Fabaceae (Faboideae)	N	-	-		Shrub									0.5	20								
Dillwynia sericea	Egg and Bacon Pea	Fabaceae (Faboideae)	N	-	-		Shrub																		
Dillwynia spp.		Fabaceae (Faboideae)	N	-	-		Shrub																		
Dipodium hamiltonianum	Yellow Hyacinth-orchid	Orchidaceae	N	-	-		Forb																		
Dipsacus spp.		Dipsacaceae	E	-	-																				
Drosera spp.		Droseraceae	N	-	-		Forb																		
Dysphania pumilio	Small Crumbweed	Chenopodiaceae	N	-	-		Forb																		
Dysphania spp.		Chenopodiaceae	N	-	-		Forb																		
Echinopogon ovatus	Forest Hedgehog Grass	Poaceae	N	-	-		Grass & grasslike																		
Echium plantagineum	Patterson's Curse	Boraginaceae	E	-	-													0.5	20	0.3	50				
Echium spp.		Boraginaceae	E	-	-							0.1	20	1	100										
Echium vulgare	Viper's Bugloss	Boraginaceae	E	-	-																				
Einadia hastata	Berry Saltbush	Chenopodiaceae	N	-	-		Forb																		
Einadia nutans	Climbing Saltbush	Chenopodiaceae	N	-	-		Forb																		
Einadia polygonoides	Knotweed Goosefoot	Chenopodiaceae	N	-	-		Forb																		
Eleocharis acuta		Cyperaceae	N	-	-		Grass & grasslike																		
Eleusine tristachya	Goose Grass	Poaceae	E	-	-																				
Elymus scaber	Common Wheatgrass	Poaceae	N	-	-		Grass & grasslike																		
Enneapogon nigricans	Niggerheads	Poaceae	N	-	-		Grass & grasslike																		
Enteropogon acicularis	Curly Windmill Grass	Poaceae	N	-	-		Grass & grasslike																		
Epacris spp.		Ericaceae	N	-	-		Shrub																		
Epilobium spp.		Onagraceae	N	-	-		Forb																		
Eragrostis cilianensis	Stinkgrass	Poaceae	E	-	-																				
Eragrostis curvula	African Lovegrass	Poaceae	E	-	-	HTE																			
Eragrostis leptostachya	Paddock Lovegrass	Poaceae	N	-	-		Grass & grasslike													0.5	50				
Eragrostis parviflora	Weeping Lovegrass	Poaceae	N	-	-		Grass & grasslike																		
Eragrostis spp.	A Lovegrass	Poaceae	N	-	-		Grass & grasslike																		
Erodium botrys	Long Storksbill	Geraniaceae	E	-	-																			0.1	5
Erodium cicutarium	Common Crowfoot	Geraniaceae	E	-	-													10	0						
Erodium crinitum	Blue Crowfoot	Geraniaceae	N	-	-		Forb																		
Erodium malacoides		Geraniaceae	E	-	-																				
Erodium spp.	Crowfoot	Geraniaceae	N	-	-		Forb																		
Eucalyptus blakelyi	Blakely's Red Gum	Myrtaceae	N	-	-		Tree																		
Eucalyptus bridgesiana	Apple Box	Myrtaceae	N	-	-		Tree											30	0						
Eucalyptus cannonii	Capertee Stringybark	Myrtaceae	N	V	-		Tree																		
Eucalyptus dalrympleana	Mountain Gum	Myrtaceae	N	-	-		Tree																		
Eucalyptus dives	Broad-leaved Peppermint	Myrtaceae	N	-	-		Tree																		
Eucalyptus fastigata	Brown Barrel	Myrtaceae	N	-	-		Tree																		
Eucalyptus goniocalyx	Bundy	Myrtaceae	N	-	-		Tree																		
Eucalyptus macrorhyncha	Red Stringybark	Myrtaceae	N	-	-		Tree																		
Eucalyptus mannifera	Brittle Gum	Myrtaceae	N	-	-		Tree																		
Eucalyptus melliodora	Yellow Box	Myrtaceae	N	-	-		Tree																		

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								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Eucalyptus pauciflora	White Sally	Myrtaceae	N	-	-		Tree	25	0	5	0	25	0	20	0										
Eucalyptus rossii	Inland Scribbly Gum	Myrtaceae	N	-	-		Tree							30	0										
Eucalyptus spp.		Myrtaceae	N	-	-		Tree			1	4	25	0			5	0								
Eucalyptus stellulata	Black Sally	Myrtaceae	N	-	-		Tree					5	0												
Eucalyptus viminalis	Ribbon Gum	Myrtaceae	N	-	-		Tree																		
Euchiton japonicus		Asteraceae	N	-	-		Forb																		
Euchiton sphaericus	Star Cudweed	Asteraceae	N	-	-		Forb																		
Euchiton spp.	A Cudweed	Asteraceae	N	-	-		Forb																		
Euphorbia dallachyana		Euphorbiaceae	N	-	-		Forb																		
Euphorbia drummondii	Caustic Weed	Euphorbiaceae	N	-	-		Forb																		
Euphorbia spp.		Euphorbiaceae	N	-	-		Forb																		
Exocarpos cupressiformis	Cherry Ballart	Santalaceae	N	-	-		Shrub																		
Exocarpos strictus	Dwarf Cherry	Santalaceae	N	-	-		Shrub																		
Foeniculum vulgare	Fennel	Apiaceae	E	-	-																				
Galium murale	Small Bedstraw	Rubiaceae	E	-	-																				
Gamochaeta calviceps	Cudweed	Asteraceae	E	-	-																				
Geranium graniticola		Geraniaceae	N	-	-		Forb																		
Geranium molle	Cranesbill Geranium	Geraniaceae	E	-	-																				
Geranium solanderi	Native Geranium	Geraniaceae	N	-	-		Forb			0.1	50	5	0												
Geranium spp.		Geraniaceae	N	-	-		Forb																		
Glycine clandestina	Twining glycine	Fabaceae (Faboideae)	N	-	-		Other																		
Glycine microphylla	Small-leaf Glycine	Fabaceae (Faboideae)	N	-	-		Other																		
Gonocarpus humilis		Haloragaceae	N	-	-		Forb																		
Gonocarpus spp.	Raspwort	Haloragaceae	N	-	-		Forb																		
Gonocarpus tetragynus	Poverty Raspwort	Haloragaceae	N	-	-		Forb																		
Gonocarpus teucrioides	Germander Raspwort	Haloragaceae	N	-	-		Forb																		
Goodenia hederacea	Ivy Goodenia	Goodeniaceae	N	-	-		Forb									0.1	30								
Goodenia spp.		Goodeniaceae	N	-	-		Forb																		
Haloragis heterophylla	Variable Raspwort	Haloragaceae	N	-	-		Forb																		
Haloragis spp.	A Raspwort	Haloragaceae	N	-	-		Forb																		
Hardenbergia violacea	False Sarsaparilla	Fabaceae (Faboideae)	N	-	-		Other																		
Helichrysum leucopsideum	Satin Everlasting	Asteraceae	N	-	-		Forb																		
Helichrysum spp.		Asteraceae	N	-	-		Forb																		
Heliotropium amplexicaule	Blue Heliotrope	Boraginaceae	E	-	-	HTE																			
Hibbertia obtusifolia	Hoary Guinea Flower	Dilleniaceae	N	-	-		Shrub									0.1	5								
Holcus lanatus	Yorkshire Fog	Poaceae	E	-	-																				
Hordeum leporinum	Barley Grass	Poaceae	E	-	-																				
Hovea heterophylla		Fabaceae (Faboideae)	N	-	-		Forb																		
Hovea spp.		Fabaceae (Faboideae)	N	-	-		Forb																		
Hydrocotyle laxiflora	Stinking Pennywort	Apiaceae	N	-	-		Forb																		
Hydrocotyle sibthorpioides		Apiaceae	N	-	-		Forb																		
Hydrocotyle spp.		Apiaceae	N	-	-		Forb																		
Hypericum gramineum	Small St John's Wort	Clusiaceae	N	-	-		Forb																		

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								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Hypericum perforatum	St. Johns Wort	Clusiaceae	E	-	-	HTE		0.1	50	0.1	100	0.1	50	0.1	100			0.1	30					0.5	100
Hypericum spp.		Clusiaceae	N	-	-		Forb																		
Hypochaeris glabra	Smooth Catsear	Asteraceae	E	-	-			0.1	500	5	0	0.5	500	0.1	20	0.1	10							5	0
Hypochaeris radicata	Catsear	Asteraceae	E	-	-																				
Hypochaeris spp.	A Catsear	Asteraceae	E	-	-																				
Hypochoeris radicata	Catsear	Asteraceae	E	-	-																				
Hypoxis spp.		Hypoxidaceae	N	-	-		Forb									0.1	100								
Isolepis hookeriana		Cyperaceae	N	-	-		Grass & grasslike																		
Joycea pallida	Redanther Wallaby Grass	Poaceae	N	-	-		Grass & grasslike																		
Juncus effusus		Juncaceae	E	-	-																				
Juncus gregiflorus		Juncaceae	N	-	-		Grass & grasslike																		
Juncus homalocaulis		Juncaceae	N	-	-		Grass & grasslike																		
Juncus spp.	A Rush	Juncaceae	N	-	-		Grass & grasslike															0.1	5		
Lactuca serriola	Prickly Lettuce	Asteraceae	E	-	-															70	0	0.5	100		
Lagenifera spp.		Asteraceae	N	-	-		Forb																		
Lamarckia aurea	Goldentop	Poaceae	E	-	-																				
Lepidium africanum	Common Peppercress	Brassicaceae	E	-	-																				
Lepidium spp.	A Peppercress	Brassicaceae	N	-	-		Forb																		
Leptospermum myrtifolium		Myrtaceae	N	-	-		Shrub																		
Leptospermum spp.	Tea-tree	Myrtaceae	N	-	-		Shrub																		
Leucopogon appressus		Ericaceae	N	-	-		Shrub																		
Leucopogon fletcheri		Ericaceae	N	-	-		Shrub																		
Leucopogon virgatus		Ericaceae	N	-	-		Shrub									0.1	1								
Linum marginale	Native Flax	Linaceae	N	-	-		Forb																		
Lissanthe spp.		Ericaceae	N	-	-		Shrub																		
Lolium perenne	Perennial Ryegrass	Poaceae	E	-	-																				
Lomandra cylindrica		Lomandraceae	N	-	-		Grass & grasslike																		
Lomandra filiformis	Wattle Matt-rush	Lomandraceae	N	-	-		Grass & grasslike	0.1	20					0.1	5	0.5	50								
Lomandra longifolia	Spiny-headed Mat-rush	Lomandraceae	N	-	-		Grass & grasslike	0.1	10																
Lomandra multiflora	Many-flowered Mat-rush	Lomandraceae	N	-	-		Grass & grasslike																		
Lomandra spp.	Mat-rush	Lomandraceae	N	-	-		Grass & grasslike																		
Lomatia ilicifolia	Holly Lomatia	Proteaceae	N	-	-		Shrub																		
Lomatia myricoides	River Lomatia	Proteaceae	N	-	-		Shrub																		
Luzula spp.		Juncaceae	N	-	-		Grass & grasslike																		
Lycium ferocissimum	African Boxthorn	Solanaceae	E	-	-	HTE																			
Lysimachia arvensis	Scarlet Pimpernel	Primulaceae	E	-	-																				
Lythrum hyssopifolia	Hyssop Loosestrife	Lythraceae	N	-	-		Forb																		
Malus pumila	Apple	Malaceae	E	-	-																			25	0
Malva neglecta	Dwarf Mallow	Malvaceae	E	-	-																				
Marrubium spp.		Lamiaceae	E	-	-																				
Marrubium vulgare	White Horehound	Lamiaceae	E	-	-																	0.1	3		
Medicago polymorpha	Burr Medic	Fabaceae (Faboideae)	E	-	-																				
Medicago spp.	A Medic	Fabaceae (Faboideae)	E	-	-																				

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								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Melichrus urceolatus	Urn Heath	Ericaceae	N	-	-		Shrub									1	20								
Melicytus dentatus	Tree Violet	Violaceae	N	-	-		Shrub																		
Microlaena stipoides	Weeping Grass	Poaceae	N	-	-		Grass & grasslike																		
Modiola caroliniana	Red-flowered Mallow	Malvaceae	E	-	-																				
Modiola spp.		Malvaceae	E	-	-																				
Moenchia erecta	Erect Chickweed	Caryophyllaceae	E	-	-																				
Monoculus monstrosus		Asteraceae	E	-	-																				
Monotoca scoparia		Ericaceae	N	-	-		Shrub																		
Nassella trichotoma	Serrated Tussock	Poaceae	E	-	-																				
Notothixos spp.		Viscaceae	N	-	-		Other																		
Olearia spp.		Asteraceae	N	-	-		Shrub									0.5	20								
Onopordum acanthium	Scotch Thistle	Asteraceae	E	-	-															1	50	0.1	5		
Ophioglossum lusitanicum	Adder's Tongue	Ophioglossaceae	N	-	-		Fern																		
Orobanche spp.		Scrophulariaceae	N	-	-		Forb																		
Oxalis perennans		Oxalidaceae	N	-	-		Forb	0.1	100	0.5	300	0.5	1000	0.1	50										
Oxalis spp.		Oxalidaceae	N	-	-		Forb																		
Ozothamnus diosmifolius	White Dogwood	Asteraceae	N	-	-		Shrub																		
Panicum effusum	Hairy Panic	Poaceae	N	-	-		Grass & grasslike							0.1	5									1	5
Paspalum dilatatum	Paspalum	Poaceae	E	-	-	HTE																			
Paspalum spp.		Poaceae	N	-	-		Grass & grasslike							1	100										
Pennisetum clandestinum	Kikuyu Grass	Poaceae	E	-	-																				
Pentaschistis airoides	False Hairgrass	Poaceae	E	-	-																				
Persicaria prostrata	Creeping Knotweed	Polygonaceae	N	-	-		Forb																		
Petrorhagia spp.		Caryophyllaceae	E	-	-																				
Phalaris aquatica	Phalaris	Poaceae	E	-	-															20	0	20	0		
Phalaris minor	Lesser Canary Grass	Poaceae	E	-	-																				
Phalaris spp.		Poaceae	E	-	-									1	100										
Phragmites australis	Common Reed	Poaceae	N	-	-		Grass & grasslike																		
Phragmites spp.		Poaceae	N	-	-		Grass & grasslike															5	0		
Pinus radiata	Radiata Pine	Pinaceae	E	-	-																				
Plantago gaudichaudii	Narrow Plantain	Plantaginaceae	N	-	-		Forb																		
Plantago lanceolata	Lamb's Tongues	Plantaginaceae	E	-	-													5	0						
Plantago spp.	Plantain	Plantaginaceae	N	-	-		Forb	0	0	60	0	5	0	5	500									5	0
Platylobium formosum		Fabaceae (Faboideae)	N	-	-		Shrub																		
Poa annua	Winter Grass	Poaceae	E	-	-																				
Poa induta		Poaceae	N	-	-		Grass & grasslike																		
Poa labillardierei	Tussock	Poaceae	N	-	-		Grass & grasslike			5	0	5	0									40	0		
Poa meionectes		Poaceae	N	-	-		Grass & grasslike																		
Poa sieberiana	Snowgrass	Poaceae	N	-	-		Grass & grasslike			25	4	5	0	5	0	10	0								
Poa spp.		Poaceae	N	-	-		Grass & grasslike																		
Polycarpon tetraphyllum	Four-leaved Allseed	Caryophyllaceae	E	-	-																				
Polyscias sambucifolia	Elderberry Panax	Araliaceae	N	-	-		Shrub																		
Populus spp.		Salicaceae	N	-	-		Tree			5	0														

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								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Poranthera microphylla	Small Poranthera	Phyllanthaceae	N	-	-		Forb																		
Portulaca oleracea	Pigweed	Portulacaceae	N	-	-		Forb																		
Potentilla spp.		Rosaceae	E	-	-																				
Pseudognaphalium luteoalbum	Jersey Cudweed	Asteraceae	N	-	-		Forb																		
Pteridium esculentum	Bracken	Dennstaedtiaceae	N	-	-		Fern																		
Pteridium spp.		Dennstaedtiaceae	N	-	-		Fern																		
Pultenaea microphylla	A Bush Pea	Fabaceae (Faboideae)	N	-	-		Shrub																		
Rosa rubiginosa	Sweet Briar	Rosaceae	E	-	-	HTE				0.1	5	0.5	5	0.1	1					0.1	2				
Rosa spp.		Rosaceae	E	-	-																				
Rubus fruticosus	Blackberry complex	Rosaceae	E	-	-			10	0	5	0	5	0	0.5	1										
Rubus parvifolius	Native Raspberry	Rosaceae	N	-	-		Shrub					1	5												
Rumex acetosella	Sheep Sorrel	Polygonaceae	E	-	-							0.1	50												
Rumex brownii	Swamp Dock	Polygonaceae	N	-	-		Forb																		
Rumex crispus	Curled Dock	Polygonaceae	E	-	-																	0.1	10		
Rumex spp.	Dock	Polygonaceae	N	-	-		Forb																		
Rytidosperma caespitosum	Ringed Wallaby Grass	Poaceae	N	-	-		Grass & grasslike																		
Rytidosperma longifolium	Long-leaved Wallaby Grass	Poaceae	N	-	-		Grass & grasslike																		
Rytidosperma monticola	Mountain Wallaby Grass	Poaceae	N	-	-		Grass & grasslike																		
Rytidosperma pallidum	Redanther Wallaby Grass	Poaceae	N	-	-		Grass & grasslike	10	0					5	0									1	100
Rytidosperma spp.		Poaceae	N	-	-		Grass & grasslike																		
Salix fragilis	Crack Willow	Salicaceae	E	-	-																				
Schoenus apogon	Fluke Bogrush	Cyperaceae	N	-	-		Grass & grasslike																		
Scleranthus biflorus	Two-flowered Knawel	Caryophyllaceae	N	-	-		Forb																		
Scolymus hispanicus	Golden Thistle	Asteraceae	E	-	-					0.1	30											0.1	5		
Senecio diaschides		Asteraceae	N	-	-		Forb																		
Senecio gunnii		Asteraceae	N	-	-		Forb																		
Senecio prenanthoides		Asteraceae	N	-	-		Forb																		
Senecio quadridentatus	Cotton Fireweed	Asteraceae	N	-	-		Forb																		
Senecio spp.	Fireweed	Asteraceae	N	-	-		Forb							0.1	5										
Setaria gracilis		Poaceae	E	-	-																				
Setaria pumila	Pale Pigeon Grass	Poaceae	E	-	-																				
Solanum nigrum	Black-berry Nightshade	Solanaceae	E	-	-																				
Solenogyne spp.		Asteraceae	N	-	-		Forb																		
Sonchus asper	Prickly Sowthistle	Asteraceae	E	-	-																				
Sonchus spp.	Sowthistle	Asteraceae	N	-	-		Forb																		
Spergularia rubra	Sandspurry	Caryophyllaceae	E	-	-																				
Sporobolus caroli	Fairy Grass	Poaceae	N	-	-		Grass & grasslike																		
Sporobolus creber	Slender Rat's Tail Grass	Poaceae	N	-	-		Grass & grasslike																		
Stackhousia viminea	Slender Stackhousia	Stackhousiaceae	N	-	-		Forb																		
Stellaria media	Common Chickweed	Caryophyllaceae	E	-	-																				
Stellaria pungens	Prickly Starwort	Caryophyllaceae	N	-	-		Forb																		
Stylidium graminifolium	Grass Triggerplant	Stylidiaceae	N	-	-		Forb																		
Styphelia spp.		Ericaceae	N	-	-		Shrub																		

ScientificName	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	30011907		31011901		31011903		31011904		31011905		MAC01		MAC02		MAC03		MAC04	
								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Styphelia triflora	Pink Five-Corners	Ericaceae	N	-	-		Shrub									0.1	5								
Taraxacum officinale	Dandelion	Asteraceae	E	-	-																				
Taraxacum spp.	Dandelion	Asteraceae	N	-	-		Forb																		
Themeda australis		Poaceae	N	-	-		Grass & grasslike																		
Themeda triandra		Poaceae	N	-	-		Grass & grasslike							0.1	5	40	0								
Thinopyrum ponticum	Tall Wheat Grass	Poaceae	E	-	-																				
Tribulus terrestris	Cat-head	Zygophyllaceae	E	-	-																				
Tricoryne elatior	Yellow Autumn-lily	Anthericaceae	N	-	-		Forb																		
Trifolium angustifolium	Narrow-leaved Clover	Fabaceae (Faboideae)	E	-	-																				
Trifolium arvense	Haresfoot Clover	Fabaceae (Faboideae)	E	-	-																				
Trifolium repens	White Clover	Fabaceae (Faboideae)	E	-	-					5	0	1	500												
Trifolium spp.	A Clover	Fabaceae (Faboideae)	E	-	-																				
Urtica incisa	Stinging Nettle	Urticaceae	N	-	-		Forb																		
Verbascum spp.		Scrophulariaceae	E	-	-																				
Verbascum virgatum	Twiggy Mullein	Scrophulariaceae	E	-	-													0.1	1						
Veronica calycina	Hairy Speedwell	Plantaginaceae	N	-	-		Forb																		
Veronica plebeia	Trailing Speedwell	Plantaginaceae	N	-	-		Forb																		
Veronica spp.		Plantaginaceae	N	-	-		Forb																		
Vicia sativa	Common vetch	Fabaceae (Faboideae)	E	-	-																				
Vicia spp.	Vetch	Fabaceae (Faboideae)	E	-	-																				
Viola betonicifolia	Native Violet	Violaceae	N	-	-		Forb																		
Viola spp.		Violaceae	N	-	-		Forb																		
Vittadinia dissecta		Asteraceae	N	-	-		Forb																		
Vittadinia spp.	Fuzzweed	Asteraceae	N	-	-		Forb																		
Vulpia myuros	Rat's Tail Fescue	Poaceae	E	-	-																				
Wahlenbergia communis	Tufted Bluebell	Campanulaceae	N	-	-		Forb																		
Wahlenbergia gracilenta	Annual Bluebell	Campanulaceae	N	-	-		Forb																		
Wahlenbergia gracilis	Sprawling Bluebell	Campanulaceae	N	-	-		Forb																		
Wahlenbergia spp.	Bluebell	Campanulaceae	N	-	-		Forb																	0.1	10
Wahlenbergia stricta	Tall Bluebell	Campanulaceae	N	-	-		Forb																		
Wurmbea dioica	Early Nancy	Colchicaceae	N	-	-		Forb																		
Xerochrysum spp.		Asteraceae	N	-	-		Forb																		
Xerochrysum viscosum	Sticky Everlasting	Asteraceae	N	-	-		Forb																		
Zieria cytisoides	Downy Zieria	Rutaceae	N	-	-		Shrub																		

ScientificName	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	MAC05		MAC07		MAC08		MAC09		MAC10		MAC11		MAC12		MAC13		MAC65	
								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Acacia acinacea	Gold-dust Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia buxifolia	Box-leaved Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia dealbata	Silver Wattle	Fabaceae (Mimosoideae)	N	-	-		Tree																		
Acacia deanei	Green Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub	5	0	10	0														
Acacia falciformis	Broad-leaved Hickory	Fabaceae (Mimosoideae)	N	-	-		Shrub					5	0	1	0										
Acacia gunnii	Ploughshare Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub			0.1	1														
Acacia implexa	Hickory Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia melanoxylon	Blackwood	Fabaceae (Mimosoideae)	N	-	-		Tree																		
Acacia nana	Small Red-leaved Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia obliquinervia	Mountain Hickory	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia spp.	Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acaena agnipila	Hairy Sheep's Burr	Rosaceae	N	-	-		Forb																		
Acaena echinata	Sheep's Burr	Rosaceae	N	-	-		Forb																		
Acaena novae-zelandiae	Bidgee-widgee	Rosaceae	N	-	-		Forb					0.1	300	0.1	100										
Acaena ovina	Acaena	Rosaceae	N	-	-		Forb																		
Acaena spp.	Sheep's Burr	Rosaceae	N	-	-		Forb																		
Acetosella vulgaris	Sheep Sorrel	Polygonaceae	E	-	-	HTE														0.5	0				
Acrotriche serrulata	Honeypots	Ericaceae	N	-	-		Shrub	0.5	50	3	2	0.1	10	1	70					0.1	5				
Acrotriche spp.		Ericaceae	N	-	-		Shrub																		
Aira cupaniana	Silvery Hairgrass	Poaceae	E	-	-																				
Alternanthera angustifolia		Amaranthaceae	N	-	-		Forb																		
Amperea xiphoclada		Euphorbiaceae	N	-	-		Shrub																		
Amyema miquelii	Box Mistletoe	Loranthaceae	N	-	-		Other	5	0	5	0											0.5	1		
Amyema pendula		Loranthaceae	N	-	-		Other																		
Amyema spp.	Mistletoe	Loranthaceae	N	-	-		Other																	5	0
Anagallis arvensis	Scarlet Pimpernel	Primulaceae	E	-	-																				
Anthosachne scabra	Common Wheatgrass	Poaceae	N	-	-		Grass & grasslike																		
Anthoxanthum odoratum	Sweet Vernal Grass	Poaceae	E	-	-																				
Anthoxanthum spp.	Vernal Grass	Poaceae	E	-	-																				
Arctotheca calendula	Capeweed	Asteraceae	E	-	-																			25	0
Aristida ramosa	Purple Wiregrass	Poaceae	N	-	-		Grass & grasslike																		
Aristida spp.	A Wiregrass	Poaceae	N	-	-		Grass & grasslike																		
Aristida vagans	Threeawn Speargrass	Poaceae	N	-	-		Grass & grasslike																		
Asperula conferta	Common Woodruff	Rubiaceae	N	-	-		Forb																		
Asperula scoparia	Prickly Woodruff	Rubiaceae	N	-	-		Forb																		
Asperula spp.	Woodruff	Rubiaceae	N	-	-		Forb																		
Asphodelus fistulosus	Onion Weed	Asphodelaceae	E	-	-																				
Astroloma humifusum	Native Cranberry	Ericaceae	N	-	-		Shrub																		
Austrodanthonia spp.		Poaceae	N	-	-		Grass & grasslike																		
Austrostipa nodosa	A Speargrass	Poaceae	N	-	-		Grass & grasslike																		
Austrostipa scabra	Speargrass	Poaceae	N	-	-		Grass & grasslike															10	0		
Austrostipa spp.	A Speargrass	Poaceae	N	-	-		Grass & grasslike																		
Avena barbata	Bearded Oats	Poaceae	E	-	-																				

ScientificName	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	MAC05		MAC07		MAC08		MAC09		MAC10		MAC11		MAC12		MAC13		MAC65	
								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Avena fatua	Wild Oats	Poaceae	E	-	-																	1	30		
Avena sativa	Oats	Poaceae	E	-	-																				
Avena spp.	Oats	Poaceae	E	-	-																				
Bidens subalternans	Greater Beggar's Ticks	Asteraceae	E	-	-																				
Billardiera scandens	Hairy Apple Berry	Pittosporaceae	N	-	-		Other																		
Blechnum spp.		Blechnaceae	N	-	-		Fern											0.1	5						
Bossiaea buxifolia		Fabaceae (Faboideae)	N	-	-		Shrub																		
Bossiaea prostrata		Fabaceae (Faboideae)	N	-	-		Forb																		
Bothriochloa macra	Red Grass	Poaceae	N	-	-		Grass & grasslike															2	50		
Brachyloma daphnoides	Daphne Heath	Ericaceae	N	-	-		Shrub	0.5	5	5	0														
Brachyscome rigidula	Hairy Cutleaf Daisy	Asteraceae	N	-	-		Forb																		
Brachyscome spp.		Asteraceae	N	-	-		Forb																		
Brassica oleracea	Collards	Brassicaceae	E	-	-																				
Brassica spp.	Brassica	Brassicaceae	E	-	-																			5	0
Brassica tournefortii	Mediterranean Turnip	Brassicaceae	E	-	-	HTE																0.1	10		
Bromus catharticus	Praire Grass	Poaceae	E	-	-																				
Bromus diandrus	Great Brome	Poaceae	E	-	-	HTE																			
Bromus hordeaceus	Soft Brome	Poaceae	E	-	-																				
Bulbine bulbosa	Bulbine Lily	Asphodelaceae	N	-	-		Forb																		
Bursaria spinosa	Native Blackthorn	Pittosporaceae	N	-	-		Shrub																		
Caesia spp.		Anthericaceae	N	-	-		Forb															0.05	3		
Callistemon citrinus	Crimson Bottlebrush	Myrtaceae	N	-	-		Shrub																		
Calotis lappulacea	Yellow Burr-daisy	Asteraceae	N	-	-		Forb																		
Calotis spp.	A Burr-daisy	Asteraceae	N	-	-		Forb																		
Carex appressa	Tall Sedge	Cyperaceae	N	-	-		Grass & grasslike											30	0						
Carex bichenoviana		Cyperaceae	N	-	-		Grass & grasslike																		
Carex fascicularis	Tassel Sedge	Cyperaceae	N	-	-		Grass & grasslike											0.1	20						
Carex gaudichaudiana		Cyperaceae	N	-	-		Grass & grasslike																		
Carex spp.		Cyperaceae	N	-	-		Grass & grasslike																		
Cassinia aculeata	Dolly Bush	Asteraceae	N	-	-		Shrub					1	3							0.1	3				
Cassinia arcuata	Sifton Bush	Asteraceae	N	-	-		Shrub	10	0	35	0														
Cassinia laevis	Cough Bush	Asteraceae	N	-	-		Shrub																		
Cassinia longifolia		Asteraceae	N	-	-		Shrub																		
Cassinia quinquefaria		Asteraceae	N	-	-		Shrub																		
Cassinia spp.		Asteraceae	N	-	-		Shrub							0.1	1										
Casuarina cunninghamiana	River Oak	Casuarinaceae	N	-	-		Tree																		
Centaurium spp.		Gentianaceae	E	-	-																				
Centella asiatica	Indian Pennywort	Apiaceae	N	-	-		Forb																		
Cheilanthes austrotenuifolia	Rock Fern	Pteridaceae	N	-	-		Fern																		
Cheilanthes spp.	Rock Fern	Pteridaceae	N	-	-		Fern																		
Chenopodium album	Fat Hen	Chenopodiaceae	E	-	-																				
Chloris spp.		Poaceae	N	-	-		Grass & grasslike																		
Chloris truncata	Windmill Grass	Poaceae	N	-	-		Grass & grasslike																		

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								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Chloris ventricosa	Tall Chloris	Poaceae	N	-	-		Grass & grasslike																		
Chondrilla juncea	Skeleton Weed	Asteraceae	E	-	-																				
Chrysocephalum apiculatum	Common Everlasting	Asteraceae	N	-	-		Forb					0.5	50	1	10					0.1	5				
Chrysocephalum semicalvum		Asteraceae	N	-	-		Forb																		
Cirsium vulgare	Spear Thistle	Asteraceae	E	-	-																				
Clematis aristata	Old Man's Beard	Ranunculaceae	N	-	-		Other																		
Convolvulus angustissimus		Convolvulaceae	N	-	-		Other																		
Conyza bonariensis	Flaxleaf Fleabane	Asteraceae	E	-	-																				
Conyza spp.	A Fleabane	Asteraceae	E	-	-															0.1	50				
Coronidium elatum		Asteraceae	N	-	-		Shrub																		
Coronidium rutidolepis		Asteraceae	N	-	-																				
Coronidium scorpioides	Button Everlasting	Asteraceae	N	-	-		Forb																		
Coronidium spp.		Asteraceae	N	-	-		Forb																		
Cotoneaster spp.		Malaceae	E	-	-	HTE																1	1		
Crassula sieberiana	Australian Stonecrop	Crassulaceae	N	-	-		Forb																		
Crataegus monogyna	Hawthorn	Malaceae	E	-	-	HTE																			
Crepis capillaris	Smooth Hawksbeard	Asteraceae	E	-	-																				
Cullen tenax	Emu-foot	Fabaceae (Faboideae)	N	-	-		Forb																		
Cymbonotus lawsonianus	Bear's Ear	Asteraceae	N	-	-		Forb																		
Cymbonotus preissianus	Austral Bear's Ear	Asteraceae	N	-	-		Forb																		
Cynodon dactylon	Common Couch	Poaceae	N	-	-		Grass & grasslike															10	0		
Cynodon spp.		Poaceae	N	-	-		Grass & grasslike																		
Cynodon transvaalensis	South African Couch	Poaceae	E	-	-																				
Cyperus brevifolius		Cyperaceae	E	-	-																				
Cyperus eragrostis	Umbrella Sedge	Cyperaceae	E	-	-	HTE																			
Cyperus lhotskyanus		Cyperaceae	N	-	-		Grass & grasslike																		
Cyperus spp.		Cyperaceae	N	-	-		Grass & grasslike																		
Cytisus scoparius	English Broom	Fabaceae (Faboideae)	E	-	-	HTE						5	0							5	0				
Dactylis glomerata	Cocksfoot	Poaceae	E	-	-																				
Daucus glochidiatus	Native Carrot	Apiaceae	N	-	-		Forb																		
Daviesia corymbosa		Fabaceae (Faboideae)	N	-	-		Shrub																		
Daviesia latifolia	Bitter-pea	Fabaceae (Faboideae)	N	-	-		Shrub																		
Daviesia leptophylla		Fabaceae (Faboideae)	N	-	-		Shrub																		
Daviesia spp.		Fabaceae (Faboideae)	N	-	-		Shrub																		
Desmodium gunnii	Slender Tick-trefoil	Fabaceae (Faboideae)	N	-	-		Forb																		
Desmodium spp.	Tick-trefoil	Fabaceae (Faboideae)	N	-	-		Other																		
Dianella longifolia	Blueberry Lily	Phormiaceae	N	-	-		Forb																		
Dianella revoluta	Blueberry Lily	Phormiaceae	N	-	-		Forb	0.5	50	0.5	50														
Dianella spp.		Phormiaceae	N	-	-		Forb																		
Dichanthium spp.		Poaceae	N	-	-		Grass & grasslike																		
Dichondra repens	Kidney Weed	Convolvulaceae	N	-	-		Forb					0.1	200	5	0										
Dichopogon spp.	Chocolate Lily	Anthericaceae	N	-	-		Forb																		
Digitaria brownii	Cotton Panic Grass	Poaceae	N	-	-		Grass & grasslike																		

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								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Dillwynia cinerascens		Fabaceae (Faboideae)	N	-	-		Shrub																		
Dillwynia phylicoides	Parrot-pea	Fabaceae (Faboideae)	N	-	-		Shrub			0.1	2														
Dillwynia sericea	Egg and Bacon Pea	Fabaceae (Faboideae)	N	-	-		Shrub																		
Dillwynia spp.		Fabaceae (Faboideae)	N	-	-		Shrub																		
Dipodium hamiltonianum	Yellow Hyacinth-orchid	Orchidaceae	N	-	-		Forb																		
Dipsacus spp.		Dipsacaceae	E	-	-																				
Drosera spp.		Droseraceae	N	-	-		Forb																		
Dysphania pumilio	Small Crumbweed	Chenopodiaceae	N	-	-		Forb																		
Dysphania spp.		Chenopodiaceae	N	-	-		Forb																		
Echinopogon ovatus	Forest Hedgehog Grass	Poaceae	N	-	-		Grass & grasslike																		
Echium plantagineum	Patterson's Curse	Boraginaceae	E	-	-																	0.1	5		
Echium spp.		Boraginaceae	E	-	-																				
Echium vulgare	Viper's Bugloss	Boraginaceae	E	-	-																				
Einadia hastata	Berry Saltbush	Chenopodiaceae	N	-	-		Forb															2	15		
Einadia nutans	Climbing Saltbush	Chenopodiaceae	N	-	-		Forb															5	50		
Einadia polygonoides	Knotweed Goosefoot	Chenopodiaceae	N	-	-		Forb																		
Eleocharis acuta		Cyperaceae	N	-	-		Grass & grasslike											15	0						
Eleusine tristachya	Goose Grass	Poaceae	E	-	-																				
Elymus scaber	Common Wheatgrass	Poaceae	N	-	-		Grass & grasslike																		
Enneapogon nigricans	Niggerheads	Poaceae	N	-	-		Grass & grasslike																		
Enteropogon acicularis	Curly Windmill Grass	Poaceae	N	-	-		Grass & grasslike																		
Epacris spp.		Ericaceae	N	-	-		Shrub																		
Epilobium spp.		Onagraceae	N	-	-		Forb																		
Eragrostis cilianensis	Stinkgrass	Poaceae	E	-	-																				
Eragrostis curvula	African Lovegrass	Poaceae	E	-	-	HTE																			
Eragrostis leptostachya	Paddock Lovegrass	Poaceae	N	-	-		Grass & grasslike															0.1	1		
Eragrostis parviflora	Weeping Lovegrass	Poaceae	N	-	-		Grass & grasslike															0.5	10		
Eragrostis spp.	A Lovegrass	Poaceae	N	-	-		Grass & grasslike	10	0																
Erodium botrys	Long Storksbill	Geraniaceae	E	-	-																				
Erodium cicutarium	Common Crowfoot	Geraniaceae	E	-	-			5	0													10	0		
Erodium crinitum	Blue Crowfoot	Geraniaceae	N	-	-		Forb																		
Erodium malacoides		Geraniaceae	E	-	-																	0.5	25		
Erodium spp.	Crowfoot	Geraniaceae	N	-	-		Forb																		
Eucalyptus blakelyi	Blakely's Red Gum	Myrtaceae	N	-	-		Tree																		
Eucalyptus bridgesiana	Apple Box	Myrtaceae	N	-	-		Tree																	25	0
Eucalyptus cannonii	Capertee Stringybark	Myrtaceae	N	V	-		Tree																		
Eucalyptus dalrympleana	Mountain Gum	Myrtaceae	N	-	-		Tree																		
Eucalyptus dives	Broad-leaved Peppermint	Myrtaceae	N	-	-		Tree					25	0												
Eucalyptus fastigata	Brown Barrel	Myrtaceae	N	-	-		Tree																		
Eucalyptus goniocalyx	Bundy	Myrtaceae	N	-	-		Tree	50	0	55	0														
Eucalyptus macrorhyncha	Red Stringybark	Myrtaceae	N	-	-		Tree																		
Eucalyptus mannifera	Brittle Gum	Myrtaceae	N	-	-		Tree	5	0	40	0	50	0	5	0										
Eucalyptus melliodora	Yellow Box	Myrtaceae	N	-	-		Tree															15	0	25	0

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								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Eucalyptus pauciflora	White Sally	Myrtaceae	N	-	-		Tree																		
Eucalyptus rossii	Inland Scribbly Gum	Myrtaceae	N	-	-		Tree																		
Eucalyptus spp.		Myrtaceae	N	-	-		Tree	15	0																
Eucalyptus stellulata	Black Sally	Myrtaceae	N	-	-		Tree																		
Eucalyptus viminalis	Ribbon Gum	Myrtaceae	N	-	-		Tree																		
Euchiton japonicus		Asteraceae	N	-	-		Forb			0.1	30														
Euchiton sphaericus	Star Cudweed	Asteraceae	N	-	-		Forb																		
Euchiton spp.	A Cudweed	Asteraceae	N	-	-		Forb																		
Euphorbia dallachyana		Euphorbiaceae	N	-	-		Forb																		
Euphorbia drummondii	Caustic Weed	Euphorbiaceae	N	-	-		Forb																		
Euphorbia spp.		Euphorbiaceae	N	-	-		Forb																		
Exocarpos cupressiformis	Cherry Ballart	Santalaceae	N	-	-		Shrub																		
Exocarpos strictus	Dwarf Cherry	Santalaceae	N	-	-		Shrub																		
Foeniculum vulgare	Fennel	Apiaceae	E	-	-																				
Galium murale	Small Bedstraw	Rubiaceae	E	-	-																				
Gamochaeta calviceps	Cudweed	Asteraceae	E	-	-																				
Geranium graniticola		Geraniaceae	N	-	-		Forb	0.1	10	0.1	1	0.5	50	0.1	100										
Geranium molle	Cranesbill Geranium	Geraniaceae	E	-	-																				
Geranium solanderi	Native Geranium	Geraniaceae	N	-	-		Forb																		
Geranium spp.		Geraniaceae	N	-	-		Forb																		
Glycine clandestina	Twining glycine	Fabaceae (Faboideae)	N	-	-		Other																		
Glycine microphylla	Small-leaf Glycine	Fabaceae (Faboideae)	N	-	-		Other																		
Gonocarpus humilis		Haloragaceae	N	-	-		Forb																		
Gonocarpus spp.	Raspwort	Haloragaceae	N	-	-		Forb																		
Gonocarpus tetragynus	Poverty Raspwort	Haloragaceae	N	-	-		Forb																		
Gonocarpus teucrioides	Germander Raspwort	Haloragaceae	N	-	-		Forb																		
Goodenia hederacea	Ivy Goodenia	Goodeniaceae	N	-	-		Forb																		
Goodenia spp.		Goodeniaceae	N	-	-		Forb																		
Haloragis heterophylla	Variable Raspwort	Haloragaceae	N	-	-		Forb																		
Haloragis spp.	A Raspwort	Haloragaceae	N	-	-		Forb																		
Hardenbergia violacea	False Sarsaparilla	Fabaceae (Faboideae)	N	-	-		Other																		
Helichrysum leucopsideum	Satin Everlasting	Asteraceae	N	-	-		Forb																		
Helichrysum spp.		Asteraceae	N	-	-		Forb																		
Heliotropium amplexicaule	Blue Heliotrope	Boraginaceae	E	-	-	HTE																			
Hibbertia obtusifolia	Hoary Guinea Flower	Dilleniaceae	N	-	-		Shrub							0.1	1										
Holcus lanatus	Yorkshire Fog	Poaceae	E	-	-																				
Hordeum leporinum	Barley Grass	Poaceae	E	-	-																				
Hovea heterophylla		Fabaceae (Faboideae)	N	-	-		Forb																		
Hovea spp.		Fabaceae (Faboideae)	N	-	-		Forb																		
Hydrocotyle laxiflora	Stinking Pennywort	Apiaceae	N	-	-		Forb																		
Hydrocotyle sibthorpioides		Apiaceae	N	-	-		Forb											70	0						
Hydrocotyle spp.		Apiaceae	N	-	-		Forb																		
Hypericum gramineum	Small St John's Wort	Clusiaceae	N	-	-		Forb																		

ScientificName	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	MAC05		MAC07		MAC08		MAC09		MAC10		MAC11		MAC12		MAC13		MAC65	
								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Hypericum perforatum	St. Johns Wort	Clusiaceae	E	-	-	HTE														0.1	50				
Hypericum spp.		Clusiaceae	N	-	-		Forb																		
Hypochaeris glabra	Smooth Catsear	Asteraceae	E	-	-							0.1	100	0.1	50									0.1	100
Hypochaeris radicata	Catsear	Asteraceae	E	-	-																				
Hypochaeris spp.	A Catsear	Asteraceae	E	-	-																				
Hypochoeris radicata	Catsear	Asteraceae	E	-	-																				
Hypoxis spp.		Hypoxidaceae	N	-	-		Forb																		
Isolepis hookeriana		Cyperaceae	N	-	-		Grass & grasslike																		
Joycea pallida	Redanther Wallaby Grass	Poaceae	N	-	-		Grass & grasslike					20	0												
Juncus effusus		Juncaceae	E	-	-													5	0						
Juncus gregiflorus		Juncaceae	N	-	-		Grass & grasslike																		
Juncus homalocaulis		Juncaceae	N	-	-		Grass & grasslike																		
Juncus spp.	A Rush	Juncaceae	N	-	-		Grass & grasslike																		
Lactuca serriola	Prickly Lettuce	Asteraceae	E	-	-																				
Lagenifera spp.		Asteraceae	N	-	-		Forb																		
Lamarckia aurea	Goldentop	Poaceae	E	-	-																				
Lepidium africanum	Common Peppercress	Brassicaceae	E	-	-																				
Lepidium spp.	A Peppercress	Brassicaceae	N	-	-		Forb																		
Leptospermum myrtifolium		Myrtaceae	N	-	-		Shrub																		
Leptospermum spp.	Tea-tree	Myrtaceae	N	-	-		Shrub																		
Leucopogon appressus		Ericaceae	N	-	-		Shrub																		
Leucopogon fletcheri		Ericaceae	N	-	-		Shrub			1	1														
Leucopogon virgatus		Ericaceae	N	-	-		Shrub							1	70										
Linum marginale	Native Flax	Linaceae	N	-	-		Forb	0.1	50			0.5	50	0.5	100										
Lissanthe spp.		Ericaceae	N	-	-		Shrub																		
Lolium perenne	Perennial Ryegrass	Poaceae	E	-	-																				
Lomandra cylindrica		Lomandraceae	N	-	-		Grass & grasslike															0.05	4		
Lomandra filiformis	Wattle Matt-rush	Lomandraceae	N	-	-		Grass & grasslike													0.1	30				
Lomandra longifolia	Spiny-headed Mat-rush	Lomandraceae	N	-	-		Grass & grasslike	10	0			5	0	10	0	0.1	3								
Lomandra multiflora	Many-flowered Mat-rush	Lomandraceae	N	-	-		Grass & grasslike							0.1	50										
Lomandra spp.	Mat-rush	Lomandraceae	N	-	-		Grass & grasslike											1	10						
Lomatia ilicifolia	Holly Lomatia	Proteaceae	N	-	-		Shrub													0.1	1				
Lomatia myricoides	River Lomatia	Proteaceae	N	-	-		Shrub					1	2												
Luzula spp.		Juncaceae	N	-	-		Grass & grasslike																		
Lycium ferocissimum	African Boxthorn	Solanaceae	E	-	-	HTE																2	5		
Lysimachia arvensis	Scarlet Pimpernel	Primulaceae	E	-	-																				
Lythrum hyssopifolia	Hyssop Loosestrife	Lythraceae	N	-	-		Forb																		
Malus pumila	Apple	Malaceae	E	-	-																				
Malva neglecta	Dwarf Mallow	Malvaceae	E	-	-																				
Marrubium spp.		Lamiaceae	E	-	-																				
Marrubium vulgare	White Horehound	Lamiaceae	E	-	-																	1	10		
Medicago polymorpha	Burr Medic	Fabaceae (Faboideae)	E	-	-																				
Medicago spp.	A Medic	Fabaceae (Faboideae)	E	-	-																			0.1	200

ScientificName	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	MAC05		MAC07		MAC08		MAC09		MAC10		MAC11		MAC12		MAC13		MAC65	
								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Melichrus urceolatus	Urn Heath	Ericaceae	N	-	-		Shrub																		
Melicytus dentatus	Tree Violet	Violaceae	N	-	-		Shrub																		
Microlaena stipoides	Weeping Grass	Poaceae	N	-	-		Grass & grasslike																		
Modiola caroliniana	Red-flowered Mallow	Malvaceae	E	-	-																				
Modiola spp.		Malvaceae	E	-	-																				
Moenchia erecta	Erect Chickweed	Caryophyllaceae	E	-	-																				
Monoculus monstrosus		Asteraceae	E	-	-																				
Monotoca scoparia		Ericaceae	N	-	-		Shrub																		
Nassella trichotoma	Serrated Tussock	Poaceae	E	-	-																				
Notothixos spp.		Viscaceae	N	-	-		Other																		
Olearia spp.		Asteraceae	N	-	-		Shrub																		
Onopordum acanthium	Scotch Thistle	Asteraceae	E	-	-															0.1	3				
Ophioglossum lusitanicum	Adder's Tongue	Ophioglossaceae	N	-	-		Fern																		
Orobanche spp.		Scrophulariaceae	N	-	-		Forb																		
Oxalis perennans		Oxalidaceae	N	-	-		Forb															0	5		
Oxalis spp.		Oxalidaceae	N	-	-		Forb																		
Ozothamnus diosmifolius	White Dogwood	Asteraceae	N	-	-		Shrub																		
Panicum effusum	Hairy Panic	Poaceae	N	-	-		Grass & grasslike	0.1	2													0.1	5		
Paspalum dilatatum	Paspalum	Poaceae	E	-	-	HTE																			
Paspalum spp.		Poaceae	N	-	-		Grass & grasslike																		
Pennisetum clandestinum	Kikuyu Grass	Poaceae	E	-	-																				
Pentaschistis airoides	False Hairgrass	Poaceae	E	-	-																				
Persicaria prostrata	Creeping Knotweed	Polygonaceae	N	-	-		Forb																		
Petrorhagia spp.		Caryophyllaceae	E	-	-																				
Phalaris aquatica	Phalaris	Poaceae	E	-	-																	0.1	10		
Phalaris minor	Lesser Canary Grass	Poaceae	E	-	-																				
Phalaris spp.		Poaceae	E	-	-			15	0											0.5	300				
Phragmites australis	Common Reed	Poaceae	N	-	-		Grass & grasslike																		
Phragmites spp.		Poaceae	N	-	-		Grass & grasslike																		
Pinus radiata	Radiata Pine	Pinaceae	E	-	-					0.1	5	0.1	2			95	0	5	0	0.1	1				
Plantago gaudichaudii	Narrow Plantain	Plantaginaceae	N	-	-		Forb																		
Plantago lanceolata	Lamb's Tongues	Plantaginaceae	E	-	-			0.5	250							0.1	3			0.1	150	2	100		
Plantago spp.	Plantain	Plantaginaceae	N	-	-		Forb																		
Platylobium formosum		Fabaceae (Faboideae)	N	-	-		Shrub																		
Poa annua	Winter Grass	Poaceae	E	-	-																				
Poa induta		Poaceae	N	-	-		Grass & grasslike																		
Poa labillardierei	Tussock	Poaceae	N	-	-		Grass & grasslike																		
Poa meionectes		Poaceae	N	-	-		Grass & grasslike																		
Poa sieberiana	Snowgrass	Poaceae	N	-	-		Grass & grasslike	0.2	200	10	0	50	0	5	0					5	0				
Poa spp.		Poaceae	N	-	-		Grass & grasslike																		
Polycarpon tetraphyllum	Four-leaved Allseed	Caryophyllaceae	E	-	-																				
Polyscias sambucifolia	Elderberry Panax	Araliaceae	N	-	-		Shrub																		
Populus spp.		Salicaceae	N	-	-		Tree																		

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								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Poranthera microphylla	Small Poranthera	Phyllanthaceae	N	-	-		Forb																		
Portulaca oleracea	Pigweed	Portulacaceae	N	-	-		Forb															0.05	3		
Potentilla spp.		Rosaceae	E	-	-																				
Pseudognaphalium luteoalbum	Jersey Cudweed	Asteraceae	N	-	-		Forb																		
Pteridium esculentum	Bracken	Dennstaedtiaceae	N	-	-		Fern					15	0	2	120	0.5	50								
Pteridium spp.		Dennstaedtiaceae	N	-	-		Fern																		
Pultenaea microphylla	A Bush Pea	Fabaceae (Faboideae)	N	-	-		Shrub																		
Rosa rubiginosa	Sweet Briar	Rosaceae	E	-	-	HTE		0.5	10													1	2		
Rosa spp.		Rosaceae	E	-	-																				
Rubus fruticosus	Blackberry complex	Rosaceae	E	-	-			0.1	1			1	10	0.5	6	10	0	5	0	0.1	5	0.1	1		
Rubus parvifolius	Native Raspberry	Rosaceae	N	-	-		Shrub																		
Rumex acetosella	Sheep Sorrel	Polygonaceae	E	-	-																				
Rumex brownii	Swamp Dock	Polygonaceae	N	-	-		Forb																		
Rumex crispus	Curled Dock	Polygonaceae	E	-	-																				
Rumex spp.	Dock	Polygonaceae	N	-	-		Forb																	0.1	20
Rytidosperma caespitosum	Ringed Wallaby Grass	Poaceae	N	-	-		Grass & grasslike																		
Rytidosperma longifolium	Long-leaved Wallaby Grass	Poaceae	N	-	-		Grass & grasslike																		
Rytidosperma monticola	Mountain Wallaby Grass	Poaceae	N	-	-		Grass & grasslike																		
Rytidosperma pallidum	Redanther Wallaby Grass	Poaceae	N	-	-		Grass & grasslike							80	0										
Rytidosperma spp.		Poaceae	N	-	-		Grass & grasslike																		
Salix fragilis	Crack Willow	Salicaceae	E	-	-																				
Schoenus apogon	Fluke Bogrush	Cyperaceae	N	-	-		Grass & grasslike											5	0						
Scleranthus biflorus	Two-flowered Knawel	Caryophyllaceae	N	-	-		Forb																		
Scolymus hispanicus	Golden Thistle	Asteraceae	E	-	-																			0.1	5
Senecio diaschides		Asteraceae	N	-	-		Forb																		
Senecio gunnii		Asteraceae	N	-	-		Forb																		
Senecio prenanthoides		Asteraceae	N	-	-		Forb																		
Senecio quadridentatus	Cotton Fireweed	Asteraceae	N	-	-		Forb							0.1	25										
Senecio spp.	Fireweed	Asteraceae	N	-	-		Forb			0.1	5														
Setaria gracilis		Poaceae	E	-	-																				
Setaria pumila	Pale Pigeon Grass	Poaceae	E	-	-																				
Solanum nigrum	Black-berry Nightshade	Solanaceae	E	-	-																				
Solenogyne spp.		Asteraceae	N	-	-		Forb																		
Sonchus asper	Prickly Sowthistle	Asteraceae	E	-	-																				
Sonchus spp.	Sowthistle	Asteraceae	N	-	-		Forb																		
Spergularia rubra	Sandspurry	Caryophyllaceae	E	-	-																				
Sporobolus caroli	Fairy Grass	Poaceae	N	-	-		Grass & grasslike																		
Sporobolus creber	Slender Rat's Tail Grass	Poaceae	N	-	-		Grass & grasslike																		
Stackhousia viminea	Slender Stackhousia	Stackhousiaceae	N	-	-		Forb																		
Stellaria media	Common Chickweed	Caryophyllaceae	E	-	-																				
Stellaria pungens	Prickly Starwort	Caryophyllaceae	N	-	-		Forb																		
Stylidium graminifolium	Grass Triggerplant	Stylidiaceae	N	-	-		Forb																		
Styphelia spp.		Ericaceae	N	-	-		Shrub																		

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								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Styphelia triflora	Pink Five-Corners	Ericaceae	N	-	-		Shrub	0.1	2																
Taraxacum officinale	Dandelion	Asteraceae	E	-	-																				
Taraxacum spp.	Dandelion	Asteraceae	N	-	-		Forb																		
Themeda australis		Poaceae	N	-	-		Grass & grasslike																		
Themeda triandra		Poaceae	N	-	-		Grass & grasslike													1	25				
Thinopyrum ponticum	Tall Wheat Grass	Poaceae	E	-	-																				
Tribulus terrestris	Cat-head	Zygophyllaceae	E	-	-																	0.1	1		
Tricoryne elatior	Yellow Autumn-lily	Anthericaceae	N	-	-		Forb																		
Trifolium angustifolium	Narrow-leaved Clover	Fabaceae (Faboideae)	E	-	-																				
Trifolium arvense	Haresfoot Clover	Fabaceae (Faboideae)	E	-	-																				
Trifolium repens	White Clover	Fabaceae (Faboideae)	E	-	-																			40	0
Trifolium spp.	A Clover	Fabaceae (Faboideae)	E	-	-																				
Urtica incisa	Stinging Nettle	Urticaceae	N	-	-		Forb																	0.1	50
Verbascum spp.		Scrophulariaceae	E	-	-																				
Verbascum virgatum	Twiggy Mullein	Scrophulariaceae	E	-	-																				
Veronica calycina	Hairy Speedwell	Plantaginaceae	N	-	-		Forb					0.1	50	1	200										
Veronica plebeia	Trailing Speedwell	Plantaginaceae	N	-	-		Forb																		
Veronica spp.		Plantaginaceae	N	-	-		Forb																		
Vicia sativa	Common vetch	Fabaceae (Faboideae)	E	-	-																				
Vicia spp.	Vetch	Fabaceae (Faboideae)	E	-	-																				
Viola betonicifolia	Native Violet	Violaceae	N	-	-		Forb			0.1	1	0.1	2	1	200										
Viola spp.		Violaceae	N	-	-		Forb																		
Vittadinia dissecta		Asteraceae	N	-	-		Forb																		
Vittadinia spp.	Fuzzweed	Asteraceae	N	-	-		Forb																		
Vulpia myuros	Rat's Tail Fescue	Poaceae	E	-	-																				
Wahlenbergia communis	Tufted Bluebell	Campanulaceae	N	-	-		Forb																		
Wahlenbergia gracilenta	Annual Bluebell	Campanulaceae	N	-	-		Forb																		
Wahlenbergia gracilis	Sprawling Bluebell	Campanulaceae	N	-	-		Forb																		
Wahlenbergia spp.	Bluebell	Campanulaceae	N	-	-		Forb							0.1	50										
Wahlenbergia stricta	Tall Bluebell	Campanulaceae	N	-	-		Forb													0.1	20				
Wurmbea dioica	Early Nancy	Colchicaceae	N	-	-		Forb																		
Xerochrysum spp.		Asteraceae	N	-	-		Forb																		
Xerochrysum viscosum	Sticky Everlasting	Asteraceae	N	-	-		Forb																		
Zieria cytisoides	Downy Zieria	Rutaceae	N	-	-		Shrub																		

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								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Acacia acinacea	Gold-dust Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia buxifolia	Box-leaved Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia dealbata	Silver Wattle	Fabaceae (Mimosoideae)	N	-	-		Tree					0.1	1	0.1	0	1	5								
Acacia deanei	Green Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia falciformis	Broad-leaved Hickory	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia gunnii	Ploughshare Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia implexa	Hickory Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia melanoxylon	Blackwood	Fabaceae (Mimosoideae)	N	-	-		Tree																		
Acacia nana	Small Red-leaved Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia obliquinervia	Mountain Hickory	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia spp.	Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acaena agnipila	Hairy Sheep's Burr	Rosaceae	N	-	-		Forb																		
Acaena echinata	Sheep's Burr	Rosaceae	N	-	-		Forb									0.1	100					0.1	50		
Acaena novae-zelandiae	Bidgee-widgee	Rosaceae	N	-	-		Forb																		
Acaena ovina	Acaena	Rosaceae	N	-	-		Forb																		
Acaena spp.	Sheep's Burr	Rosaceae	N	-	-		Forb																		
Acetosella vulgaris	Sheep Sorrel	Polygonaceae	E	-	-	HTE				0.5	300	1	200			0.1	50	0.1	100					0.1	50
Acrotriche serrulata	Honeypots	Ericaceae	N	-	-		Shrub									0.5	5								
Acrotriche spp.		Ericaceae	N	-	-		Shrub																		
Aira cupaniana	Silvery Hairgrass	Poaceae	E	-	-																				
Alternanthera angustifolia		Amaranthaceae	N	-	-		Forb																		
Amperea xiphoclada		Euphorbiaceae	N	-	-		Shrub																		
Amyema miquelii	Box Mistletoe	Loranthaceae	N	-	-		Other																		
Amyema pendula		Loranthaceae	N	-	-		Other																		
Amyema spp.	Mistletoe	Loranthaceae	N	-	-		Other																		
Anagallis arvensis	Scarlet Pimpernel	Primulaceae	E	-	-																				
Anthosachne scabra	Common Wheatgrass	Poaceae	N	-	-		Grass & grasslike																		
Anthoxanthum odoratum	Sweet Vernal Grass	Poaceae	E	-	-																				
Anthoxanthum spp.	Vernal Grass	Poaceae	E	-	-																				
Arctotheca calendula	Capeweed	Asteraceae	E	-	-					0	0														
Aristida ramosa	Purple Wiregrass	Poaceae	N	-	-		Grass & grasslike																		
Aristida spp.	A Wiregrass	Poaceae	N	-	-		Grass & grasslike																		
Aristida vagans	Threeawn Speargrass	Poaceae	N	-	-		Grass & grasslike																		
Asperula conferta	Common Woodruff	Rubiaceae	N	-	-		Forb			0.5	60														
Asperula scoparia	Prickly Woodruff	Rubiaceae	N	-	-		Forb																		
Asperula spp.	Woodruff	Rubiaceae	N	-	-		Forb																		
Asphodelus fistulosus	Onion Weed	Asphodelaceae	E	-	-																				
Astroloma humifusum	Native Cranberry	Ericaceae	N	-	-		Shrub																		
Austrodanthonia spp.		Poaceae	N	-	-		Grass & grasslike							5	0										
Austrostipa nodosa	A Speargrass	Poaceae	N	-	-		Grass & grasslike																		
Austrostipa scabra	Speargrass	Poaceae	N	-	-		Grass & grasslike																		
Austrostipa spp.	A Speargrass	Poaceae	N	-	-		Grass & grasslike																		
Avena barbata	Bearded Oats	Poaceae	E	-	-																				

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								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Avena fatua	Wild Oats	Poaceae	E	-	-																				
Avena sativa	Oats	Poaceae	E	-	-																				
Avena spp.	Oats	Poaceae	E	-	-																				
Bidens subalternans	Greater Beggar's Ticks	Asteraceae	E	-	-																				
Billardiera scandens	Hairy Apple Berry	Pittosporaceae	N	-	-		Other																		
Blechnum spp.		Blechnaceae	N	-	-		Fern																		
Bossiaea buxifolia		Fabaceae (Faboideae)	N	-	-		Shrub																		
Bossiaea prostrata		Fabaceae (Faboideae)	N	-	-		Forb																		
Bothriochloa macra	Red Grass	Poaceae	N	-	-		Grass & grasslike							10	0							1	100		
Brachyloma daphnoides	Daphne Heath	Ericaceae	N	-	-		Shrub																		
Brachyscome rigidula	Hairy Cutleaf Daisy	Asteraceae	N	-	-		Forb																		
Brachyscome spp.		Asteraceae	N	-	-		Forb																		
Brassica oleracea	Collards	Brassicaceae	E	-	-																				
Brassica spp.	Brassica	Brassicaceae	E	-	-					1	30														
Brassica tournefortii	Mediterranean Turnip	Brassicaceae	E	-	-	HTE																			
Bromus catharticus	Praire Grass	Poaceae	E	-	-																				
Bromus diandrus	Great Brome	Poaceae	E	-	-	HTE																			
Bromus hordeaceus	Soft Brome	Poaceae	E	-	-																				
Bulbine bulbosa	Bulbine Lily	Asphodelaceae	N	-	-		Forb																		
Bursaria spinosa	Native Blackthorn	Pittosporaceae	N	-	-		Shrub																		
Caesia spp.		Anthericaceae	N	-	-		Forb																		
Callistemon citrinus	Crimson Bottlebrush	Myrtaceae	N	-	-		Shrub																		
Calotis lappulacea	Yellow Burr-daisy	Asteraceae	N	-	-		Forb																		
Calotis spp.	A Burr-daisy	Asteraceae	N	-	-		Forb																		
Carex appressa	Tall Sedge	Cyperaceae	N	-	-		Grass & grasslike																		
Carex bichenoviana		Cyperaceae	N	-	-		Grass & grasslike					0.1	20												
Carex fascicularis	Tassel Sedge	Cyperaceae	N	-	-		Grass & grasslike																		
Carex gaudichaudiana		Cyperaceae	N	-	-		Grass & grasslike																		
Carex spp.		Cyperaceae	N	-	-		Grass & grasslike																		
Cassinia aculeata	Dolly Bush	Asteraceae	N	-	-		Shrub							0.1	2							0.1	1		
Cassinia arcuata	Sifton Bush	Asteraceae	N	-	-		Shrub																		
Cassinia laevis	Cough Bush	Asteraceae	N	-	-		Shrub	0.1	2			0.1	0	0.1	1	1	5								
Cassinia longifolia		Asteraceae	N	-	-		Shrub																		
Cassinia quinquefaria		Asteraceae	N	-	-		Shrub																		
Cassinia spp.		Asteraceae	N	-	-		Shrub											0.1	1						
Casuarina cunninghamiana	River Oak	Casuarinaceae	N	-	-		Tree																		
Centaurium spp.		Gentianaceae	E	-	-																				
Centella asiatica	Indian Pennywort	Apiaceae	N	-	-		Forb																		
Cheilanthes austrotenuifolia	Rock Fern	Pteridaceae	N	-	-		Fern																		
Cheilanthes spp.	Rock Fern	Pteridaceae	N	-	-		Fern																		
Chenopodium album	Fat Hen	Chenopodiaceae	E	-	-																				
Chloris spp.		Poaceae	N	-	-		Grass & grasslike																		
Chloris truncata	Windmill Grass	Poaceae	N	-	-		Grass & grasslike																		

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								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Chloris ventricosa	Tall Chloris	Poaceae	N	-	-		Grass & grasslike																		
Chondrilla juncea	Skeleton Weed	Asteraceae	E	-	-																				
Chrysocephalum apiculatum	Common Everlasting	Asteraceae	N	-	-		Forb															0.1	40		
Chrysocephalum semicalvum		Asteraceae	N	-	-		Forb																		
Cirsium vulgare	Spear Thistle	Asteraceae	E	-	-																				
Clematis aristata	Old Man's Beard	Ranunculaceae	N	-	-		Other																		
Convolvulus angustissimus		Convolvulaceae	N	-	-		Other																		
Conyza bonariensis	Flaxleaf Fleabane	Asteraceae	E	-	-																				
Conyza spp.	A Fleabane	Asteraceae	E	-	-																				
Coronidium elatum		Asteraceae	N	-	-		Shrub																		
Coronidium rutidolepis		Asteraceae	N	-	-																				
Coronidium scorpioides	Button Everlasting	Asteraceae	N	-	-		Forb																		
Coronidium spp.		Asteraceae	N	-	-		Forb																		
Cotoneaster spp.		Malaceae	E	-	-	HTE																			
Crassula sieberiana	Australian Stonecrop	Crassulaceae	N	-	-		Forb																		
Crataegus monogyna	Hawthorn	Malaceae	E	-	-	HTE																1	2		
Crepis capillaris	Smooth Hawksbeard	Asteraceae	E	-	-																				
Cullen tenax	Emu-foot	Fabaceae (Faboideae)	N	-	-		Forb																		
Cymbonotus lawsonianus	Bear's Ear	Asteraceae	N	-	-		Forb																		
Cymbonotus preissianus	Austral Bear's Ear	Asteraceae	N	-	-		Forb							0.1	5							0.1	20		
Cynodon dactylon	Common Couch	Poaceae	N	-	-		Grass & grasslike	0.1	0																
Cynodon spp.		Poaceae	N	-	-		Grass & grasslike																		
Cynodon transvaalensis	South African Couch	Poaceae	E	-	-																				
Cyperus brevifolius		Cyperaceae	E	-	-															0.1	40	0.5	0	0.1	0
Cyperus eragrostis	Umbrella Sedge	Cyperaceae	E	-	-	HTE																			
Cyperus lhotskyanus		Cyperaceae	N	-	-		Grass & grasslike																		
Cyperus spp.		Cyperaceae	N	-	-		Grass & grasslike					0.1	50												
Cytisus scoparius	English Broom	Fabaceae (Faboideae)	E	-	-	HTE																			
Dactylis glomerata	Cocksfoot	Poaceae	E	-	-																				
Daucus glochidiatus	Native Carrot	Apiaceae	N	-	-		Forb																		
Daviesia corymbosa		Fabaceae (Faboideae)	N	-	-		Shrub																		
Daviesia latifolia	Bitter-pea	Fabaceae (Faboideae)	N	-	-		Shrub																		
Daviesia leptophylla		Fabaceae (Faboideae)	N	-	-		Shrub																		
Daviesia spp.		Fabaceae (Faboideae)	N	-	-		Shrub																		
Desmodium gunnii	Slender Tick-trefoil	Fabaceae (Faboideae)	N	-	-		Forb																		
Desmodium spp.	Tick-trefoil	Fabaceae (Faboideae)	N	-	-		Other																		
Dianella longifolia	Blueberry Lily	Phormiaceae	N	-	-		Forb																		
Dianella revoluta	Blueberry Lily	Phormiaceae	N	-	-		Forb																		
Dianella spp.		Phormiaceae	N	-	-		Forb																		
Dichanthium spp.		Poaceae	N	-	-		Grass & grasslike																		
Dichondra repens	Kidney Weed	Convolvulaceae	N	-	-		Forb																		
Dichopogon spp.	Chocolate Lily	Anthericaceae	N	-	-		Forb																		
Digitaria brownii	Cotton Panic Grass	Poaceae	N	-	-		Grass & grasslike																		

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								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Dillwynia cinerascens		Fabaceae (Faboideae)	N	-	-		Shrub																		
Dillwynia phylicoides	Parrot-pea	Fabaceae (Faboideae)	N	-	-		Shrub																		
Dillwynia sericea	Egg and Bacon Pea	Fabaceae (Faboideae)	N	-	-		Shrub																		
Dillwynia spp.		Fabaceae (Faboideae)	N	-	-		Shrub																		
Dipodium hamiltonianum	Yellow Hyacinth-orchid	Orchidaceae	N	-	-		Forb																		
Dipsacus spp.		Dipsacaceae	E	-	-																				
Drosera spp.		Droseraceae	N	-	-		Forb															0.1	10		
Dysphania pumilio	Small Crumbweed	Chenopodiaceae	N	-	-		Forb																		
Dysphania spp.		Chenopodiaceae	N	-	-		Forb																		
Echinopogon ovatus	Forest Hedgehog Grass	Poaceae	N	-	-		Grass & grasslike							0.5	50										
Echium plantagineum	Patterson's Curse	Boraginaceae	E	-	-													0.1	30	0.1	5			0.5	200
Echium spp.		Boraginaceae	E	-	-																				
Echium vulgare	Viper's Bugloss	Boraginaceae	E	-	-																				
Einadia hastata	Berry Saltbush	Chenopodiaceae	N	-	-		Forb																		
Einadia nutans	Climbing Saltbush	Chenopodiaceae	N	-	-		Forb									0.1	50								
Einadia polygonoides	Knotweed Goosefoot	Chenopodiaceae	N	-	-		Forb																		
Eleocharis acuta		Cyperaceae	N	-	-		Grass & grasslike																		
Eleusine tristachya	Goose Grass	Poaceae	E	-	-							20	0											10	0
Elymus scaber	Common Wheatgrass	Poaceae	N	-	-		Grass & grasslike																		
Enneapogon nigricans	Niggerheads	Poaceae	N	-	-		Grass & grasslike													0.1	50				
Enteropogon acicularis	Curly Windmill Grass	Poaceae	N	-	-		Grass & grasslike																		
Epacris spp.		Ericaceae	N	-	-		Shrub																		
Epilobium spp.		Onagraceae	N	-	-		Forb																		
Eragrostis cilianensis	Stinkgrass	Poaceae	E	-	-																				
Eragrostis curvula	African Lovegrass	Poaceae	E	-	-	HTE																			
Eragrostis leptostachya	Paddock Lovegrass	Poaceae	N	-	-		Grass & grasslike																		
Eragrostis parviflora	Weeping Lovegrass	Poaceae	N	-	-		Grass & grasslike																		
Eragrostis spp.	A Lovegrass	Poaceae	N	-	-		Grass & grasslike																		
Erodium botrys	Long Storksbill	Geraniaceae	E	-	-																				
Erodium cicutarium	Common Crowfoot	Geraniaceae	E	-	-																				
Erodium crinitum	Blue Crowfoot	Geraniaceae	N	-	-		Forb																		
Erodium malacoides		Geraniaceae	E	-	-																				
Erodium spp.	Crowfoot	Geraniaceae	N	-	-		Forb			1	100													0.1	10
Eucalyptus blakelyi	Blakely's Red Gum	Myrtaceae	N	-	-		Tree																		
Eucalyptus bridgesiana	Apple Box	Myrtaceae	N	-	-		Tree			50	0	0.1	1	10	1	60	0								
Eucalyptus cannonii	Capertee Stringybark	Myrtaceae	N	V	-		Tree																		
Eucalyptus dalrympleana	Mountain Gum	Myrtaceae	N	-	-		Tree																		
Eucalyptus dives	Broad-leaved Peppermint	Myrtaceae	N	-	-		Tree									5	0								
Eucalyptus fastigata	Brown Barrel	Myrtaceae	N	-	-		Tree																		
Eucalyptus goniocalyx	Bundy	Myrtaceae	N	-	-		Tree							25	1			0.1	2			50	0		
Eucalyptus macrorhyncha	Red Stringybark	Myrtaceae	N	-	-		Tree							25	1	5	0					30	0		
Eucalyptus mannifera	Brittle Gum	Myrtaceae	N	-	-		Tree																		
Eucalyptus melliodora	Yellow Box	Myrtaceae	N	-	-		Tree													5	0				

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								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Eucalyptus pauciflora	White Sally	Myrtaceae	N	-	-		Tree																		
Eucalyptus rossii	Inland Scribbly Gum	Myrtaceae	N	-	-		Tree																		
Eucalyptus spp.		Myrtaceae	N	-	-		Tree																		
Eucalyptus stellulata	Black Sally	Myrtaceae	N	-	-		Tree																		
Eucalyptus viminalis	Ribbon Gum	Myrtaceae	N	-	-		Tree																		
Euchiton japonicus		Asteraceae	N	-	-		Forb																		
Euchiton sphaericus	Star Cudweed	Asteraceae	N	-	-		Forb																		
Euchiton spp.	A Cudweed	Asteraceae	N	-	-		Forb																		
Euphorbia dallachyana		Euphorbiaceae	N	-	-		Forb																		
Euphorbia drummondii	Caustic Weed	Euphorbiaceae	N	-	-		Forb																		
Euphorbia spp.		Euphorbiaceae	N	-	-		Forb																		
Exocarpos cupressiformis	Cherry Ballart	Santalaceae	N	-	-		Shrub																		
Exocarpos strictus	Dwarf Cherry	Santalaceae	N	-	-		Shrub																		
Foeniculum vulgare	Fennel	Apiaceae	E	-	-																				
Galium murale	Small Bedstraw	Rubiaceae	E	-	-																				
Gamochaeta calviceps	Cudweed	Asteraceae	E	-	-															0.1	20				
Geranium graniticola		Geraniaceae	N	-	-		Forb																		
Geranium molle	Cranesbill Geranium	Geraniaceae	E	-	-																				
Geranium solanderi	Native Geranium	Geraniaceae	N	-	-		Forb							0.1	10	0.5	200			0.1	5				
Geranium spp.		Geraniaceae	N	-	-		Forb															0.1	10		
Glycine clandestina	Twining glycine	Fabaceae (Faboideae)	N	-	-		Other																		
Glycine microphylla	Small-leaf Glycine	Fabaceae (Faboideae)	N	-	-		Other																		
Gonocarpus humilis		Haloragaceae	N	-	-		Forb																		
Gonocarpus spp.	Raspwort	Haloragaceae	N	-	-		Forb																		
Gonocarpus tetragynus	Poverty Raspwort	Haloragaceae	N	-	-		Forb															0.1	20		
Gonocarpus teucrioides	Germander Raspwort	Haloragaceae	N	-	-		Forb																		
Goodenia hederacea	Ivy Goodenia	Goodeniaceae	N	-	-		Forb																		
Goodenia spp.		Goodeniaceae	N	-	-		Forb																		
Haloragis heterophylla	Variable Raspwort	Haloragaceae	N	-	-		Forb																		
Haloragis spp.	A Raspwort	Haloragaceae	N	-	-		Forb									0.1	100								
Hardenbergia violacea	False Sarsaparilla	Fabaceae (Faboideae)	N	-	-		Other																		
Helichrysum leucopsideum	Satin Everlasting	Asteraceae	N	-	-		Forb																		
Helichrysum spp.		Asteraceae	N	-	-		Forb																		
Heliotropium amplexicaule	Blue Heliotrope	Boraginaceae	E	-	-	HTE																			
Hibbertia obtusifolia	Hoary Guinea Flower	Dilleniaceae	N	-	-		Shrub															0.1	20		
Holcus lanatus	Yorkshire Fog	Poaceae	E	-	-																				
Hordeum leporinum	Barley Grass	Poaceae	E	-	-																				
Hovea heterophylla		Fabaceae (Faboideae)	N	-	-		Forb																		
Hovea spp.		Fabaceae (Faboideae)	N	-	-		Forb																		
Hydrocotyle laxiflora	Stinking Pennywort	Apiaceae	N	-	-		Forb																		
Hydrocotyle sibthorpioides		Apiaceae	N	-	-		Forb																		
Hydrocotyle spp.		Apiaceae	N	-	-		Forb																		
Hypericum gramineum	Small St John's Wort	Clusiaceae	N	-	-		Forb																		

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								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Hypericum perforatum	St. Johns Wort	Clusiaceae	E	-	-	HTE						0.1	5												
Hypericum spp.		Clusiaceae	N	-	-		Forb																		
Hypochaeris glabra	Smooth Catsear	Asteraceae	E	-	-			0.1	0	0.1	100	5	0	0.1	150	0.1	100	0.1	50	1	200			0.1	50
Hypochaeris radicata	Catsear	Asteraceae	E	-	-																				
Hypochaeris spp.	A Catsear	Asteraceae	E	-	-																				
Hypochoeris radicata	Catsear	Asteraceae	E	-	-																				
Hypoxis spp.		Hypoxidaceae	N	-	-		Forb																		
Isolepis hookeriana		Cyperaceae	N	-	-		Grass & grasslike													0.1	100	0.5	0	0.1	100
Joycea pallida	Redanther Wallaby Grass	Poaceae	N	-	-		Grass & grasslike																		
Juncus effusus		Juncaceae	E	-	-																				
Juncus gregiflorus		Juncaceae	N	-	-		Grass & grasslike																		
Juncus homalocaulis		Juncaceae	N	-	-		Grass & grasslike													0.1	20	0.1	10		
Juncus spp.	A Rush	Juncaceae	N	-	-		Grass & grasslike					0.5	10												
Lactuca serriola	Prickly Lettuce	Asteraceae	E	-	-																				
Lagenifera spp.		Asteraceae	N	-	-		Forb																		
Lamarckia aurea	Goldentop	Poaceae	E	-	-							0.5	0												
Lepidium africanum	Common Peppercress	Brassicaceae	E	-	-																				
Lepidium spp.	A Peppercress	Brassicaceae	N	-	-		Forb																		
Leptospermum myrtifolium		Myrtaceae	N	-	-		Shrub																		
Leptospermum spp.	Tea-tree	Myrtaceae	N	-	-		Shrub																		
Leucopogon appressus		Ericaceae	N	-	-		Shrub																		
Leucopogon fletcheri		Ericaceae	N	-	-		Shrub																		
Leucopogon virgatus		Ericaceae	N	-	-		Shrub																		
Linum marginale	Native Flax	Linaceae	N	-	-		Forb																		
Lissanthe spp.		Ericaceae	N	-	-		Shrub																		
Lolium perenne	Perennial Ryegrass	Poaceae	E	-	-																				
Lomandra cylindrica		Lomandraceae	N	-	-		Grass & grasslike																		
Lomandra filiformis	Wattle Matt-rush	Lomandraceae	N	-	-		Grass & grasslike							0.1	50	0.1	20					0.1	5		
Lomandra longifolia	Spiny-headed Mat-rush	Lomandraceae	N	-	-		Grass & grasslike																		
Lomandra multiflora	Many-flowered Mat-rush	Lomandraceae	N	-	-		Grass & grasslike																		
Lomandra spp.	Mat-rush	Lomandraceae	N	-	-		Grass & grasslike																		
Lomatia ilicifolia	Holly Lomatia	Proteaceae	N	-	-		Shrub																		
Lomatia myricoides	River Lomatia	Proteaceae	N	-	-		Shrub																		
Luzula spp.		Juncaceae	N	-	-		Grass & grasslike																		
Lycium ferocissimum	African Boxthorn	Solanaceae	E	-	-	HTE																			
Lysimachia arvensis	Scarlet Pimpernel	Primulaceae	E	-	-																				
Lythrum hyssopifolia	Hyssop Loosestrife	Lythraceae	N	-	-		Forb																		
Malus pumila	Apple	Malaceae	E	-	-																				
Malva neglecta	Dwarf Mallow	Malvaceae	E	-	-																				
Marrubium spp.		Lamiaceae	E	-	-																				
Marrubium vulgare	White Horehound	Lamiaceae	E	-	-																				
Medicago polymorpha	Burr Medic	Fabaceae (Faboideae)	E	-	-					0.1	100														
Medicago spp.	A Medic	Fabaceae (Faboideae)	E	-	-																			10	0

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								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Melichrus urceolatus	Urn Heath	Ericaceae	N	-	-		Shrub																		
Melicytus dentatus	Tree Violet	Violaceae	N	-	-		Shrub															0.1	1		
Microlaena stipoides	Weeping Grass	Poaceae	N	-	-		Grass & grasslike													5	0	1	50		
Modiola caroliniana	Red-flowered Mallow	Malvaceae	E	-	-																				
Modiola spp.		Malvaceae	E	-	-																				
Moenchia erecta	Erect Chickweed	Caryophyllaceae	E	-	-																	0.5	100		
Monoculus monstrosus		Asteraceae	E	-	-																				
Monotoca scoparia		Ericaceae	N	-	-		Shrub																		
Nassella trichotoma	Serrated Tussock	Poaceae	E	-	-																				
Notothixos spp.		Viscaceae	N	-	-		Other																		
Olearia spp.		Asteraceae	N	-	-		Shrub																		
Onopordum acanthium	Scotch Thistle	Asteraceae	E	-	-																				
Ophioglossum lusitanicum	Adder's Tongue	Ophioglossaceae	N	-	-		Fern																		
Orobanche spp.		Scrophulariaceae	N	-	-		Forb																		
Oxalis perennans		Oxalidaceae	N	-	-		Forb	0.1	50	0.1	0	0.1	0	0.1	100	0.1	100	0.1	50	0.5	200	0.5	200	0.1	50
Oxalis spp.		Oxalidaceae	N	-	-		Forb																		
Ozothamnus diosmifolius	White Dogwood	Asteraceae	N	-	-		Shrub																		
Panicum effusum	Hairy Panic	Poaceae	N	-	-		Grass & grasslike																		
Paspalum dilatatum	Paspalum	Poaceae	E	-	-	HTE																			
Paspalum spp.		Poaceae	N	-	-		Grass & grasslike																		
Pennisetum clandestinum	Kikuyu Grass	Poaceae	E	-	-					10	0														
Pentaschistis airoides	False Hairgrass	Poaceae	E	-	-															20	0				
Persicaria prostrata	Creeping Knotweed	Polygonaceae	N	-	-		Forb																		
Petrorhagia spp.		Caryophyllaceae	E	-	-																				
Phalaris aquatica	Phalaris	Poaceae	E	-	-																				
Phalaris minor	Lesser Canary Grass	Poaceae	E	-	-															30	0	5	0		
Phalaris spp.		Poaceae	E	-	-			1	100	10	0	5	0			5	0	5	0						
Phragmites australis	Common Reed	Poaceae	N	-	-		Grass & grasslike																		
Phragmites spp.		Poaceae	N	-	-		Grass & grasslike																		
Pinus radiata	Radiata Pine	Pinaceae	E	-	-			80	0			5	0					80	0						
Plantago gaudichaudii	Narrow Plantain	Plantaginaceae	N	-	-		Forb																		
Plantago lanceolata	Lamb's Tongues	Plantaginaceae	E	-	-																				
Plantago spp.	Plantain	Plantaginaceae	N	-	-		Forb	0.1	50	0.5	30			0.5	50	0.1	50			0.1	40				
Platylobium formosum		Fabaceae (Faboideae)	N	-	-		Shrub																		
Poa annua	Winter Grass	Poaceae	E	-	-																				
Poa induta		Poaceae	N	-	-		Grass & grasslike																		
Poa labillardierei	Tussock	Poaceae	N	-	-		Grass & grasslike																		
Poa meionectes		Poaceae	N	-	-		Grass & grasslike									10	0								
Poa sieberiana	Snowgrass	Poaceae	N	-	-		Grass & grasslike							1	10							10	0		
Poa spp.		Poaceae	N	-	-		Grass & grasslike																		
Polycarpon tetraphyllum	Four-leaved Allseed	Caryophyllaceae	E	-	-																				
Polyscias sambucifolia	Elderberry Panax	Araliaceae	N	-	-		Shrub																		
Populus spp.		Salicaceae	N	-	-		Tree																		

ScientificName	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	MAC66		MAC67		MAC68		MAC70		MAC71		MAC72		MAC73		MAC74		MAC75	
								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Poranthera microphylla	Small Poranthera	Phyllanthaceae	N	-	-		Forb																		
Portulaca oleracea	Pigweed	Portulacaceae	N	-	-		Forb																		
Potentilla spp.		Rosaceae	E	-	-																				
Pseudognaphalium luteoalbum	Jersey Cudweed	Asteraceae	N	-	-		Forb																		
Pteridium esculentum	Bracken	Dennstaedtiaceae	N	-	-		Fern																		
Pteridium spp.		Dennstaedtiaceae	N	-	-		Fern																		
Pultenaea microphylla	A Bush Pea	Fabaceae (Faboideae)	N	-	-		Shrub															0.1	100		
Rosa rubiginosa	Sweet Briar	Rosaceae	E	-	-	HTE																			
Rosa spp.		Rosaceae	E	-	-																				
Rubus fruticosus	Blackberry complex	Rosaceae	E	-	-			5	0			25	0	5	0	5	0			0.1	2	1	5		
Rubus parvifolius	Native Raspberry	Rosaceae	N	-	-		Shrub																		
Rumex acetosella	Sheep Sorrel	Polygonaceae	E	-	-																				
Rumex brownii	Swamp Dock	Polygonaceae	N	-	-		Forb																		
Rumex crispus	Curled Dock	Polygonaceae	E	-	-																				
Rumex spp.	Dock	Polygonaceae	N	-	-		Forb			0.1	0					0.1	10	0.1	1						
Rytidosperma caespitosum	Ringed Wallaby Grass	Poaceae	N	-	-		Grass & grasslike																		
Rytidosperma longifolium	Long-leaved Wallaby Grass	Poaceae	N	-	-		Grass & grasslike																		
Rytidosperma monticola	Mountain Wallaby Grass	Poaceae	N	-	-		Grass & grasslike																		
Rytidosperma pallidum	Redanther Wallaby Grass	Poaceae	N	-	-		Grass & grasslike																		
Rytidosperma spp.		Poaceae	N	-	-		Grass & grasslike																		
Salix fragilis	Crack Willow	Salicaceae	E	-	-																				
Schoenus apogon	Fluke Bogrush	Cyperaceae	N	-	-		Grass & grasslike																		
Scleranthus biflorus	Two-flowered Knawel	Caryophyllaceae	N	-	-		Forb																		
Scolymus hispanicus	Golden Thistle	Asteraceae	E	-	-							1	10			0.1	5			0.1	1			0.1	1
Senecio diaschides		Asteraceae	N	-	-		Forb																		
Senecio gunnii		Asteraceae	N	-	-		Forb																		
Senecio prenanthoides		Asteraceae	N	-	-		Forb							0.1	10										
Senecio quadridentatus	Cotton Fireweed	Asteraceae	N	-	-		Forb																		
Senecio spp.	Fireweed	Asteraceae	N	-	-		Forb									0	20								
Setaria gracilis		Poaceae	E	-	-																				
Setaria pumila	Pale Pigeon Grass	Poaceae	E	-	-																				
Solanum nigrum	Black-berry Nightshade	Solanaceae	E	-	-																				
Solenogyne spp.		Asteraceae	N	-	-		Forb																		
Sonchus asper	Prickly Sowthistle	Asteraceae	E	-	-																				
Sonchus spp.	Sowthistle	Asteraceae	N	-	-		Forb																		
Spergularia rubra	Sandspurry	Caryophyllaceae	E	-	-																				
Sporobolus caroli	Fairy Grass	Poaceae	N	-	-		Grass & grasslike																		
Sporobolus creber	Slender Rat's Tail Grass	Poaceae	N	-	-		Grass & grasslike																		
Stackhousia viminea	Slender Stackhousia	Stackhousiaceae	N	-	-		Forb																		
Stellaria media	Common Chickweed	Caryophyllaceae	E	-	-											1	200								
Stellaria pungens	Prickly Starwort	Caryophyllaceae	N	-	-		Forb																		
Stylidium graminifolium	Grass Triggerplant	Stylidiaceae	N	-	-		Forb																		
Styphelia spp.		Ericaceae	N	-	-		Shrub																		

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								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Styphelia triflora	Pink Five-Corners	Ericaceae	N	-	-		Shrub																		
Taraxacum officinale	Dandelion	Asteraceae	E	-	-																				
Taraxacum spp.	Dandelion	Asteraceae	N	-	-		Forb																		
Themeda australis		Poaceae	N	-	-		Grass & grasslike																		
Themeda triandra		Poaceae	N	-	-		Grass & grasslike																		
Thinopyrum ponticum	Tall Wheat Grass	Poaceae	E	-	-																				
Tribulus terrestris	Cat-head	Zygophyllaceae	E	-	-																				
Tricoryne elatior	Yellow Autumn-lily	Anthericaceae	N	-	-		Forb																		
Trifolium angustifolium	Narrow-leaved Clover	Fabaceae (Faboideae)	E	-	-																				
Trifolium arvense	Haresfoot Clover	Fabaceae (Faboideae)	E	-	-																				
Trifolium repens	White Clover	Fabaceae (Faboideae)	E	-	-							0.1	50							1	300				
Trifolium spp.	A Clover	Fabaceae (Faboideae)	E	-	-					10	0			0	50			0.1	50					25	0
Urtica incisa	Stinging Nettle	Urticaceae	N	-	-		Forb																		
Verbascum spp.		Scrophulariaceae	E	-	-																				
Verbascum virgatum	Twiggy Mullein	Scrophulariaceae	E	-	-																				
Veronica calycina	Hairy Speedwell	Plantaginaceae	N	-	-		Forb																		
Veronica plebeia	Trailing Speedwell	Plantaginaceae	N	-	-		Forb																		
Veronica spp.		Plantaginaceae	N	-	-		Forb																		
Vicia sativa	Common vetch	Fabaceae (Faboideae)	E	-	-																				
Vicia spp.	Vetch	Fabaceae (Faboideae)	E	-	-																				
Viola betonicifolia	Native Violet	Violaceae	N	-	-		Forb									0.1	50					0.1	10		
Viola spp.		Violaceae	N	-	-		Forb																		
Vittadinia dissecta		Asteraceae	N	-	-		Forb																		
Vittadinia spp.	Fuzzweed	Asteraceae	N	-	-		Forb																		
Vulpia myuros	Rat's Tail Fescue	Poaceae	E	-	-															5	0			20	0
Wahlenbergia communis	Tufted Bluebell	Campanulaceae	N	-	-		Forb																		
Wahlenbergia gracilenta	Annual Bluebell	Campanulaceae	N	-	-		Forb																		
Wahlenbergia gracilis	Sprawling Bluebell	Campanulaceae	N	-	-		Forb																		
Wahlenbergia spp.	Bluebell	Campanulaceae	N	-	-		Forb																		
Wahlenbergia stricta	Tall Bluebell	Campanulaceae	N	-	-		Forb																		
Wurmbea dioica	Early Nancy	Colchicaceae	N	-	-		Forb															0.1	3		
Xerochrysum spp.		Asteraceae	N	-	-		Forb																		
Xerochrysum viscosum	Sticky Everlasting	Asteraceae	N	-	-		Forb																		
Zieria cytisoides	Downy Zieria	Rutaceae	N	-	-		Shrub																		

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								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Acacia acinacea	Gold-dust Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia buxifolia	Box-leaved Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia dealbata	Silver Wattle	Fabaceae (Mimosoideae)	N	-	-		Tree																		
Acacia deanei	Green Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia falciformis	Broad-leaved Hickory	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia gunnii	Ploughshare Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia implexa	Hickory Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia melanoxylon	Blackwood	Fabaceae (Mimosoideae)	N	-	-		Tree																		
Acacia nana	Small Red-leaved Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia obliquinervia	Mountain Hickory	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia spp.	Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acaena agnipila	Hairy Sheep's Burr	Rosaceae	N	-	-		Forb																		
Acaena echinata	Sheep's Burr	Rosaceae	N	-	-		Forb	0.1	100																
Acaena novae-zelandiae	Bidgee-widgee	Rosaceae	N	-	-		Forb																		
Acaena ovina	Acaena	Rosaceae	N	-	-		Forb											0.1	10						
Acaena spp.	Sheep's Burr	Rosaceae	N	-	-		Forb																		
Acetosella vulgaris	Sheep Sorrel	Polygonaceae	E	-	-	HTE						10	0	1	500									0.5	50
Acrotriche serrulata	Honeypots	Ericaceae	N	-	-		Shrub																		
Acrotriche spp.		Ericaceae	N	-	-		Shrub																		
Aira cupaniana	Silvery Hairgrass	Poaceae	E	-	-							1	100												
Alternanthera angustifolia		Amaranthaceae	N	-	-		Forb											0.1	10	0.1	50	0.1	50		
Amperea xiphoclada		Euphorbiaceae	N	-	-		Shrub																		
Amyema miquelii	Box Mistletoe	Loranthaceae	N	-	-		Other																		
Amyema pendula		Loranthaceae	N	-	-		Other																		
Amyema spp.	Mistletoe	Loranthaceae	N	-	-		Other																		
Anagallis arvensis	Scarlet Pimpernel	Primulaceae	E	-	-																				
Anthosachne scabra	Common Wheatgrass	Poaceae	N	-	-		Grass & grasslike											0.5	50	0.1	30				
Anthoxanthum odoratum	Sweet Vernal Grass	Poaceae	E	-	-																				
Anthoxanthum spp.	Vernal Grass	Poaceae	E	-	-																				
Arctotheca calendula	Capeweed	Asteraceae	E	-	-																	0.1	10		
Aristida ramosa	Purple Wiregrass	Poaceae	N	-	-		Grass & grasslike																		
Aristida spp.	A Wiregrass	Poaceae	N	-	-		Grass & grasslike																		
Aristida vagans	Threeawn Speargrass	Poaceae	N	-	-		Grass & grasslike																		
Asperula conferta	Common Woodruff	Rubiaceae	N	-	-		Forb	0.1	20																
Asperula scoparia	Prickly Woodruff	Rubiaceae	N	-	-		Forb																		
Asperula spp.	Woodruff	Rubiaceae	N	-	-		Forb																		
Asphodelus fistulosus	Onion Weed	Asphodelaceae	E	-	-																				
Astroloma humifusum	Native Cranberry	Ericaceae	N	-	-		Shrub																		
Austrodanthonia spp.		Poaceae	N	-	-		Grass & grasslike																		
Austrostipa nodosa	A Speargrass	Poaceae	N	-	-		Grass & grasslike											10	0	0.5	50	10	0	0.1	20
Austrostipa scabra	Speargrass	Poaceae	N	-	-		Grass & grasslike																		
Austrostipa spp.	A Speargrass	Poaceae	N	-	-		Grass & grasslike																		
Avena barbata	Bearded Oats	Poaceae	E	-	-									0.5	100										

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								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Avena fatua	Wild Oats	Poaceae	E	-	-																				
Avena sativa	Oats	Poaceae	E	-	-																				
Avena spp.	Oats	Poaceae	E	-	-																				
Bidens subalternans	Greater Beggar's Ticks	Asteraceae	E	-	-																				
Billardiera scandens	Hairy Apple Berry	Pittosporaceae	N	-	-		Other																		
Blechnum spp.		Blechnaceae	N	-	-		Fern																		
Bossiaea buxifolia		Fabaceae (Faboideae)	N	-	-		Shrub																		
Bossiaea prostrata		Fabaceae (Faboideae)	N	-	-		Forb																		
Bothriochloa macra	Red Grass	Poaceae	N	-	-		Grass & grasslike	5	0																
Brachyloma daphnoides	Daphne Heath	Ericaceae	N	-	-		Shrub																		
Brachyscome rigidula	Hairy Cutleaf Daisy	Asteraceae	N	-	-		Forb																		
Brachyscome spp.		Asteraceae	N	-	-		Forb																		
Brassica oleracea	Collards	Brassicaceae	E	-	-							1	50												
Brassica spp.	Brassica	Brassicaceae	E	-	-					0.1	10							0.1	20	0.1	20			0.1	5
Brassica tournefortii	Mediterranean Turnip	Brassicaceae	E	-	-	HTE						1	100	0.5	0										
Bromus catharticus	Praire Grass	Poaceae	E	-	-																				
Bromus diandrus	Great Brome	Poaceae	E	-	-	HTE												0.1	20						
Bromus hordeaceus	Soft Brome	Poaceae	E	-	-							5	0	5	0	10	0	5	0	5	0	0.1	20	30	0
Bulbine bulbosa	Bulbine Lily	Asphodelaceae	N	-	-		Forb																		
Bursaria spinosa	Native Blackthorn	Pittosporaceae	N	-	-		Shrub																		
Caesia spp.		Anthericaceae	N	-	-		Forb																		
Callistemon citrinus	Crimson Bottlebrush	Myrtaceae	N	-	-		Shrub																		
Calotis lappulacea	Yellow Burr-daisy	Asteraceae	N	-	-		Forb																		
Calotis spp.	A Burr-daisy	Asteraceae	N	-	-		Forb																		
Carex appressa	Tall Sedge	Cyperaceae	N	-	-		Grass & grasslike																		
Carex bichenoviana		Cyperaceae	N	-	-		Grass & grasslike																		
Carex fascicularis	Tassel Sedge	Cyperaceae	N	-	-		Grass & grasslike																		
Carex gaudichaudiana		Cyperaceae	N	-	-		Grass & grasslike																		
Carex spp.		Cyperaceae	N	-	-		Grass & grasslike									0.5	10								
Cassinia aculeata	Dolly Bush	Asteraceae	N	-	-		Shrub																		
Cassinia arcuata	Sifton Bush	Asteraceae	N	-	-		Shrub																		
Cassinia laevis	Cough Bush	Asteraceae	N	-	-		Shrub																		
Cassinia longifolia		Asteraceae	N	-	-		Shrub																		
Cassinia quinquefaria		Asteraceae	N	-	-		Shrub																		
Cassinia spp.		Asteraceae	N	-	-		Shrub																		
Casuarina cunninghamiana	River Oak	Casuarinaceae	N	-	-		Tree																		
Centaurium spp.		Gentianaceae	E	-	-																				
Centella asiatica	Indian Pennywort	Apiaceae	N	-	-		Forb																		
Cheilanthes austrotenuifolia	Rock Fern	Pteridaceae	N	-	-		Fern																		
Cheilanthes spp.	Rock Fern	Pteridaceae	N	-	-		Fern																		
Chenopodium album	Fat Hen	Chenopodiaceae	E	-	-																				
Chloris spp.		Poaceae	N	-	-		Grass & grasslike																		
Chloris truncata	Windmill Grass	Poaceae	N	-	-		Grass & grasslike													0.1	5				

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								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Chloris ventricosa	Tall Chloris	Poaceae	N	-	-		Grass & grasslike																		
Chondrilla juncea	Skeleton Weed	Asteraceae	E	-	-																				
Chrysocephalum apiculatum	Common Everlasting	Asteraceae	N	-	-		Forb																		
Chrysocephalum semicalvum		Asteraceae	N	-	-		Forb																		
Cirsium vulgare	Spear Thistle	Asteraceae	E	-	-																				
Clematis aristata	Old Man's Beard	Ranunculaceae	N	-	-		Other																		
Convolvulus angustissimus		Convolvulaceae	N	-	-		Other	0.1	1																
Conyza bonariensis	Flaxleaf Fleabane	Asteraceae	E	-	-																				
Conyza spp.	A Fleabane	Asteraceae	E	-	-																				
Coronidium elatum		Asteraceae	N	-	-		Shrub																		
Coronidium rutidolepis		Asteraceae	N	-	-																				
Coronidium scorpioides	Button Everlasting	Asteraceae	N	-	-		Forb																		
Coronidium spp.		Asteraceae	N	-	-		Forb																		
Cotoneaster spp.		Malaceae	E	-	-	HTE																			
Crassula sieberiana	Australian Stonecrop	Crassulaceae	N	-	-		Forb																		
Crataegus monogyna	Hawthorn	Malaceae	E	-	-	HTE																			
Crepis capillaris	Smooth Hawksbeard	Asteraceae	E	-	-																				
Cullen tenax	Emu-foot	Fabaceae (Faboideae)	N	-	-		Forb																		
Cymbonotus lawsonianus	Bear's Ear	Asteraceae	N	-	-		Forb																	0.1	5
Cymbonotus preissianus	Austral Bear's Ear	Asteraceae	N	-	-		Forb	0.1	50																
Cynodon dactylon	Common Couch	Poaceae	N	-	-		Grass & grasslike																		
Cynodon spp.		Poaceae	N	-	-		Grass & grasslike																		
Cynodon transvaalensis	South African Couch	Poaceae	E	-	-																				
Cyperus brevifolius		Cyperaceae	E	-	-																				
Cyperus eragrostis	Umbrella Sedge	Cyperaceae	E	-	-	HTE																			
Cyperus lhotskyanus		Cyperaceae	N	-	-		Grass & grasslike																		
Cyperus spp.		Cyperaceae	N	-	-		Grass & grasslike																		
Cytisus scoparius	English Broom	Fabaceae (Faboideae)	E	-	-	HTE																			
Dactylis glomerata	Cocksfoot	Poaceae	E	-	-																				
Daucus glochidiatus	Native Carrot	Apiaceae	N	-	-		Forb																		
Daviesia corymbosa		Fabaceae (Faboideae)	N	-	-		Shrub																		
Daviesia latifolia	Bitter-pea	Fabaceae (Faboideae)	N	-	-		Shrub																		
Daviesia leptophylla		Fabaceae (Faboideae)	N	-	-		Shrub																		
Daviesia spp.		Fabaceae (Faboideae)	N	-	-		Shrub																		
Desmodium gunnii	Slender Tick-trefoil	Fabaceae (Faboideae)	N	-	-		Forb																		
Desmodium spp.	Tick-trefoil	Fabaceae (Faboideae)	N	-	-		Other																		
Dianella longifolia	Blueberry Lily	Phormiaceae	N	-	-		Forb																		
Dianella revoluta	Blueberry Lily	Phormiaceae	N	-	-		Forb																		
Dianella spp.		Phormiaceae	N	-	-		Forb																		
Dichanthium spp.		Poaceae	N	-	-		Grass & grasslike																		
Dichondra repens	Kidney Weed	Convolvulaceae	N	-	-		Forb	0.5	200																
Dichopogon spp.	Chocolate Lily	Anthericaceae	N	-	-		Forb																		
Digitaria brownii	Cotton Panic Grass	Poaceae	N	-	-		Grass & grasslike																		

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								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Dillwynia cinerascens		Fabaceae (Faboideae)	N	-	-		Shrub																		
Dillwynia phylicoides	Parrot-pea	Fabaceae (Faboideae)	N	-	-		Shrub																		
Dillwynia sericea	Egg and Bacon Pea	Fabaceae (Faboideae)	N	-	-		Shrub																		
Dillwynia spp.		Fabaceae (Faboideae)	N	-	-		Shrub																		
Dipodium hamiltonianum	Yellow Hyacinth-orchid	Orchidaceae	N	-	-		Forb																		
Dipsacus spp.		Dipsacaceae	E	-	-																				
Drosera spp.		Droseraceae	N	-	-		Forb																		
Dysphania pumilio	Small Crumbweed	Chenopodiaceae	N	-	-		Forb																		
Dysphania spp.		Chenopodiaceae	N	-	-		Forb																		
Echinopogon ovatus	Forest Hedgehog Grass	Poaceae	N	-	-		Grass & grasslike																		
Echium plantagineum	Patterson's Curse	Boraginaceae	E	-	-					0.1	50	10	0	0.5	100	0.1	10	0.5	10			0.1	10		
Echium spp.		Boraginaceae	E	-	-																				
Echium vulgare	Viper's Bugloss	Boraginaceae	E	-	-																				
Einadia hastata	Berry Saltbush	Chenopodiaceae	N	-	-		Forb																		
Einadia nutans	Climbing Saltbush	Chenopodiaceae	N	-	-		Forb															0.1	5		
Einadia polygonoides	Knotweed Goosefoot	Chenopodiaceae	N	-	-		Forb																		
Eleocharis acuta		Cyperaceae	N	-	-		Grass & grasslike																		
Eleusine tristachya	Goose Grass	Poaceae	E	-	-			1	50			0.5	50											0.1	10
Elymus scaber	Common Wheatgrass	Poaceae	N	-	-		Grass & grasslike																		
Enneapogon nigricans	Niggerheads	Poaceae	N	-	-		Grass & grasslike																		
Enteropogon acicularis	Curly Windmill Grass	Poaceae	N	-	-		Grass & grasslike																		
Epacris spp.		Ericaceae	N	-	-		Shrub																		
Epilobium spp.		Onagraceae	N	-	-		Forb																		
Eragrostis cilianensis	Stinkgrass	Poaceae	E	-	-																				
Eragrostis curvula	African Lovegrass	Poaceae	E	-	-	HTE																			
Eragrostis leptostachya	Paddock Lovegrass	Poaceae	N	-	-		Grass & grasslike					0.1	20			1	100	0.5	50			0.1	10	1	0
Eragrostis parviflora	Weeping Lovegrass	Poaceae	N	-	-		Grass & grasslike																		
Eragrostis spp.	A Lovegrass	Poaceae	N	-	-		Grass & grasslike																		
Erodium botrys	Long Storksbill	Geraniaceae	E	-	-																				
Erodium cicutarium	Common Crowfoot	Geraniaceae	E	-	-																				
Erodium crinitum	Blue Crowfoot	Geraniaceae	N	-	-		Forb																		
Erodium malacoides		Geraniaceae	E	-	-																				
Erodium spp.	Crowfoot	Geraniaceae	N	-	-		Forb			0.1	20														
Eucalyptus blakelyi	Blakely's Red Gum	Myrtaceae	N	-	-		Tree											25	1			50	0		
Eucalyptus bridgesiana	Apple Box	Myrtaceae	N	-	-		Tree																		
Eucalyptus cannonii	Capertee Stringybark	Myrtaceae	N	V	-		Tree																		
Eucalyptus dalrympleana	Mountain Gum	Myrtaceae	N	-	-		Tree																		
Eucalyptus dives	Broad-leaved Peppermint	Myrtaceae	N	-	-		Tree																		
Eucalyptus fastigata	Brown Barrel	Myrtaceae	N	-	-		Tree																		
Eucalyptus goniocalyx	Bundy	Myrtaceae	N	-	-		Tree	4	0																
Eucalyptus macrorhyncha	Red Stringybark	Myrtaceae	N	-	-		Tree																		
Eucalyptus mannifera	Brittle Gum	Myrtaceae	N	-	-		Tree																		
Eucalyptus melliodora	Yellow Box	Myrtaceae	N	-	-		Tree			25	0														

ScientificName	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	MAC76		MAC77		MAC41201		MAC41202		MAC41203		MAC41204		MAC41205		MAC41206		MAC41207	
								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Eucalyptus pauciflora	White Sally	Myrtaceae	N	-	-		Tree																		
Eucalyptus rossii	Inland Scribbly Gum	Myrtaceae	N	-	-		Tree																		
Eucalyptus spp.		Myrtaceae	N	-	-		Tree																		
Eucalyptus stellulata	Black Sally	Myrtaceae	N	-	-		Tree																		
Eucalyptus viminalis	Ribbon Gum	Myrtaceae	N	-	-		Tree																		
Euchiton japonicus		Asteraceae	N	-	-		Forb																		
Euchiton sphaericus	Star Cudweed	Asteraceae	N	-	-		Forb																	0.1	50
Euchiton spp.	A Cudweed	Asteraceae	N	-	-		Forb																		
Euphorbia dallachyana		Euphorbiaceae	N	-	-		Forb													0.1	100				
Euphorbia drummondii	Caustic Weed	Euphorbiaceae	N	-	-		Forb																		
Euphorbia spp.		Euphorbiaceae	N	-	-		Forb																		
Exocarpos cupressiformis	Cherry Ballart	Santalaceae	N	-	-		Shrub																		
Exocarpos strictus	Dwarf Cherry	Santalaceae	N	-	-		Shrub																		
Foeniculum vulgare	Fennel	Apiaceae	E	-	-																				
Galium murale	Small Bedstraw	Rubiaceae	E	-	-																				
Gamochaeta calviceps	Cudweed	Asteraceae	E	-	-																				
Geranium graniticola		Geraniaceae	N	-	-		Forb																		
Geranium molle	Cranesbill Geranium	Geraniaceae	E	-	-											0.1	50								
Geranium solanderi	Native Geranium	Geraniaceae	N	-	-		Forb																		
Geranium spp.		Geraniaceae	N	-	-		Forb																		
Glycine clandestina	Twining glycine	Fabaceae (Faboideae)	N	-	-		Other																		
Glycine microphylla	Small-leaf Glycine	Fabaceae (Faboideae)	N	-	-		Other																		
Gonocarpus humilis		Haloragaceae	N	-	-		Forb																		
Gonocarpus spp.	Raspwort	Haloragaceae	N	-	-		Forb																		
Gonocarpus tetragynus	Poverty Raspwort	Haloragaceae	N	-	-		Forb																		
Gonocarpus teucrioides	Germander Raspwort	Haloragaceae	N	-	-		Forb																		
Goodenia hederacea	Ivy Goodenia	Goodeniaceae	N	-	-		Forb	0.1	20																
Goodenia spp.		Goodeniaceae	N	-	-		Forb																		
Haloragis heterophylla	Variable Raspwort	Haloragaceae	N	-	-		Forb																		
Haloragis spp.	A Raspwort	Haloragaceae	N	-	-		Forb																		
Hardenbergia violacea	False Sarsaparilla	Fabaceae (Faboideae)	N	-	-		Other																		
Helichrysum leucopsideum	Satin Everlasting	Asteraceae	N	-	-		Forb																		
Helichrysum spp.		Asteraceae	N	-	-		Forb																		
Heliotropium amplexicaule	Blue Heliotrope	Boraginaceae	E	-	-	HTE												0.1	5					0.1	10
Hibbertia obtusifolia	Hoary Guinea Flower	Dilleniaceae	N	-	-		Shrub																		
Holcus lanatus	Yorkshire Fog	Poaceae	E	-	-											0.1	10								
Hordeum leporinum	Barley Grass	Poaceae	E	-	-							5	0	1	500							0.1	50		
Hovea heterophylla		Fabaceae (Faboideae)	N	-	-		Forb																		
Hovea spp.		Fabaceae (Faboideae)	N	-	-		Forb																		
Hydrocotyle laxiflora	Stinking Pennywort	Apiaceae	N	-	-		Forb																		
Hydrocotyle sibthorpioides		Apiaceae	N	-	-		Forb																		
Hydrocotyle spp.		Apiaceae	N	-	-		Forb																		
Hypericum gramineum	Small St John's Wort	Clusiaceae	N	-	-		Forb																		

ScientificName	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	MAC76		MAC77		MAC41201		MAC41202		MAC41203		MAC41204		MAC41205		MAC41206		MAC41207	
								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Hypericum perforatum	St. Johns Wort	Clusiaceae	E	-	-	HTE												0.5	30						
Hypericum spp.		Clusiaceae	N	-	-		Forb																		
Hypochaeris glabra	Smooth Catsear	Asteraceae	E	-	-			0.1	50	0.1	50	0.5	200	0.1	50	0.5	200	0.1	50	5	0	0.1	50	1	500
Hypochaeris radicata	Catsear	Asteraceae	E	-	-																				
Hypochaeris spp.	A Catsear	Asteraceae	E	-	-			0.1	1																
Hypochoeris radicata	Catsear	Asteraceae	E	-	-																				
Hypoxis spp.		Hypoxidaceae	N	-	-		Forb																		
Isolepis hookeriana		Cyperaceae	N	-	-		Grass & grasslike																		
Joycea pallida	Redanther Wallaby Grass	Poaceae	N	-	-		Grass & grasslike																		
Juncus effusus		Juncaceae	E	-	-																				
Juncus gregiflorus		Juncaceae	N	-	-		Grass & grasslike																		
Juncus homalocaulis		Juncaceae	N	-	-		Grass & grasslike																		
Juncus spp.	A Rush	Juncaceae	N	-	-		Grass & grasslike																		
Lactuca serriola	Prickly Lettuce	Asteraceae	E	-	-																				
Lagenifera spp.		Asteraceae	N	-	-		Forb																		
Lamarckia aurea	Goldentop	Poaceae	E	-	-																				
Lepidium africanum	Common Peppercress	Brassicaceae	E	-	-																				
Lepidium spp.	A Peppercress	Brassicaceae	N	-	-		Forb																		
Leptospermum myrtifolium		Myrtaceae	N	-	-		Shrub																		
Leptospermum spp.	Tea-tree	Myrtaceae	N	-	-		Shrub																		
Leucopogon appressus		Ericaceae	N	-	-		Shrub																		
Leucopogon fletcheri		Ericaceae	N	-	-		Shrub																		
Leucopogon virgatus		Ericaceae	N	-	-		Shrub																		
Linum marginale	Native Flax	Linaceae	N	-	-		Forb																		
Lissanthe spp.		Ericaceae	N	-	-		Shrub																		
Lolium perenne	Perennial Ryegrass	Poaceae	E	-	-									1	500									25	0
Lomandra cylindrica		Lomandraceae	N	-	-		Grass & grasslike																		
Lomandra filiformis	Wattle Matt-rush	Lomandraceae	N	-	-		Grass & grasslike	0.1	5																
Lomandra longifolia	Spiny-headed Mat-rush	Lomandraceae	N	-	-		Grass & grasslike											1	10						
Lomandra multiflora	Many-flowered Mat-rush	Lomandraceae	N	-	-		Grass & grasslike																		
Lomandra spp.	Mat-rush	Lomandraceae	N	-	-		Grass & grasslike																		
Lomatia ilicifolia	Holly Lomatia	Proteaceae	N	-	-		Shrub																		
Lomatia myricoides	River Lomatia	Proteaceae	N	-	-		Shrub																		
Luzula spp.		Juncaceae	N	-	-		Grass & grasslike																		
Lycium ferocissimum	African Boxthorn	Solanaceae	E	-	-	HTE																			
Lysimachia arvensis	Scarlet Pimpernel	Primulaceae	E	-	-													0.1	5						
Lythrum hyssopifolia	Hyssop Loosestrife	Lythraceae	N	-	-		Forb																		
Malus pumila	Apple	Malaceae	E	-	-																				
Malva neglecta	Dwarf Mallow	Malvaceae	E	-	-																				
Marrubium spp.		Lamiaceae	E	-	-					0.1	10														
Marrubium vulgare	White Horehound	Lamiaceae	E	-	-																				
Medicago polymorpha	Burr Medic	Fabaceae (Faboideae)	E	-	-																				
Medicago spp.	A Medic	Fabaceae (Faboideae)	E	-	-			1	100	5	0														

ScientificName	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	MAC76		MAC77		MAC41201		MAC41202		MAC41203		MAC41204		MAC41205		MAC41206		MAC41207	
								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Melichrus urceolatus	Urn Heath	Ericaceae	N	-	-		Shrub																		
Melicytus dentatus	Tree Violet	Violaceae	N	-	-		Shrub	5	0																
Microlaena stipoides	Weeping Grass	Poaceae	N	-	-		Grass & grasslike																		
Modiola caroliniana	Red-flowered Mallow	Malvaceae	E	-	-															0.1	100				
Modiola spp.		Malvaceae	E	-	-																	0.1	20	0.1	0
Moenchia erecta	Erect Chickweed	Caryophyllaceae	E	-	-																				
Monoculus monstrosus		Asteraceae	E	-	-							0.1	20												
Monotoca scoparia		Ericaceae	N	-	-		Shrub																		
Nassella trichotoma	Serrated Tussock	Poaceae	E	-	-																				
Notothixos spp.		Viscaceae	N	-	-		Other			1	2														
Olearia spp.		Asteraceae	N	-	-		Shrub																		
Onopordum acanthium	Scotch Thistle	Asteraceae	E	-	-													0.1	10						
Ophioglossum lusitanicum	Adder's Tongue	Ophioglossaceae	N	-	-		Fern																		
Orobanche spp.		Scrophulariaceae	N	-	-		Forb																		
Oxalis perennans		Oxalidaceae	N	-	-		Forb	0.1	50							0.1	10	0.1	20					0.5	200
Oxalis spp.		Oxalidaceae	N	-	-		Forb																		
Ozothamnus diosmifolius	White Dogwood	Asteraceae	N	-	-		Shrub																		
Panicum effusum	Hairy Panic	Poaceae	N	-	-		Grass & grasslike			0.1	1														
Paspalum dilatatum	Paspalum	Poaceae	E	-	-	HTE																			
Paspalum spp.		Poaceae	N	-	-		Grass & grasslike																		
Pennisetum clandestinum	Kikuyu Grass	Poaceae	E	-	-																				
Pentaschistis airoides	False Hairgrass	Poaceae	E	-	-							10	0							0.1	50				
Persicaria prostrata	Creeping Knotweed	Polygonaceae	N	-	-		Forb							0.1	5	0.1	5	0.1	5					0.5	10
Petrorhagia spp.		Caryophyllaceae	E	-	-																			0.1	20
Phalaris aquatica	Phalaris	Poaceae	E	-	-							1	100	40	0	80	0	25	0	1	200			0.1	30
Phalaris minor	Lesser Canary Grass	Poaceae	E	-	-																				
Phalaris spp.		Poaceae	E	-	-																				
Phragmites australis	Common Reed	Poaceae	N	-	-		Grass & grasslike																		
Phragmites spp.		Poaceae	N	-	-		Grass & grasslike																		
Pinus radiata	Radiata Pine	Pinaceae	E	-	-																				
Plantago gaudichaudii	Narrow Plantain	Plantaginaceae	N	-	-		Forb																		
Plantago lanceolata	Lamb's Tongues	Plantaginaceae	E	-	-																				
Plantago spp.	Plantain	Plantaginaceae	N	-	-		Forb	0.1	0																
Platylobium formosum		Fabaceae (Faboideae)	N	-	-		Shrub																		
Poa annua	Winter Grass	Poaceae	E	-	-																			0.1	50
Poa induta		Poaceae	N	-	-		Grass & grasslike																		
Poa labillardierei	Tussock	Poaceae	N	-	-		Grass & grasslike			0.1	1														
Poa meionectes		Poaceae	N	-	-		Grass & grasslike																		
Poa sieberiana	Snowgrass	Poaceae	N	-	-		Grass & grasslike	1	50																
Poa spp.		Poaceae	N	-	-		Grass & grasslike																		
Polycarpon tetraphyllum	Four-leaved Allseed	Caryophyllaceae	E	-	-															0.5	100				
Polyscias sambucifolia	Elderberry Panax	Araliaceae	N	-	-		Shrub																		
Populus spp.		Salicaceae	N	-	-		Tree																		

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								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Poranthera microphylla	Small Poranthera	Phyllanthaceae	N	-	-		Forb																		
Portulaca oleracea	Pigweed	Portulacaceae	N	-	-		Forb																		
Potentilla spp.		Rosaceae	E	-	-																				
Pseudognaphalium luteoalbum	Jersey Cudweed	Asteraceae	N	-	-		Forb																	0.1	100
Pteridium esculentum	Bracken	Dennstaedtiaceae	N	-	-		Fern																		
Pteridium spp.		Dennstaedtiaceae	N	-	-		Fern																		
Pultenaea microphylla	A Bush Pea	Fabaceae (Faboideae)	N	-	-		Shrub																		
Rosa rubiginosa	Sweet Briar	Rosaceae	E	-	-	HTE												0.5	5						
Rosa spp.		Rosaceae	E	-	-																				
Rubus fruticosus	Blackberry complex	Rosaceae	E	-	-			0.1	5	0.1	1							0.1	1						
Rubus parvifolius	Native Raspberry	Rosaceae	N	-	-		Shrub																		
Rumex acetosella	Sheep Sorrel	Polygonaceae	E	-	-																				
Rumex brownii	Swamp Dock	Polygonaceae	N	-	-		Forb																		
Rumex crispus	Curled Dock	Polygonaceae	E	-	-																				
Rumex spp.	Dock	Polygonaceae	N	-	-		Forb	0.1	1	10	0			0.1	20	0.1	20								
Rytidosperma caespitosum	Ringed Wallaby Grass	Poaceae	N	-	-		Grass & grasslike																		
Rytidosperma longifolium	Long-leaved Wallaby Grass	Poaceae	N	-	-		Grass & grasslike																		
Rytidosperma monticola	Mountain Wallaby Grass	Poaceae	N	-	-		Grass & grasslike					0.5	100											0.5	0
Rytidosperma pallidum	Redanther Wallaby Grass	Poaceae	N	-	-		Grass & grasslike																		
Rytidosperma spp.		Poaceae	N	-	-		Grass & grasslike																		
Salix fragilis	Crack Willow	Salicaceae	E	-	-											1	0							5	0
Schoenus apogon	Fluke Bogrush	Cyperaceae	N	-	-		Grass & grasslike																		
Scleranthus biflorus	Two-flowered Knawel	Caryophyllaceae	N	-	-		Forb																		
Scolymus hispanicus	Golden Thistle	Asteraceae	E	-	-															0.1	30			0.1	10
Senecio diaschides		Asteraceae	N	-	-		Forb																		
Senecio gunnii		Asteraceae	N	-	-		Forb																		
Senecio prenanthoides		Asteraceae	N	-	-		Forb	0.1	5																
Senecio quadridentatus	Cotton Fireweed	Asteraceae	N	-	-		Forb																		
Senecio spp.	Fireweed	Asteraceae	N	-	-		Forb																		
Setaria gracilis		Poaceae	E	-	-																				
Setaria pumila	Pale Pigeon Grass	Poaceae	E	-	-																				
Solanum nigrum	Black-berry Nightshade	Solanaceae	E	-	-																				
Solenogyne spp.		Asteraceae	N	-	-		Forb																		
Sonchus asper	Prickly Sowthistle	Asteraceae	E	-	-																				
Sonchus spp.	Sowthistle	Asteraceae	N	-	-		Forb																		
Spergularia rubra	Sandspurry	Caryophyllaceae	E	-	-																	0.1	10		
Sporobolus caroli	Fairy Grass	Poaceae	N	-	-		Grass & grasslike							5	0										
Sporobolus creber	Slender Rat's Tail Grass	Poaceae	N	-	-		Grass & grasslike																		
Stackhousia viminea	Slender Stackhousia	Stackhousiaceae	N	-	-		Forb																		
Stellaria media	Common Chickweed	Caryophyllaceae	E	-	-																				
Stellaria pungens	Prickly Starwort	Caryophyllaceae	N	-	-		Forb																		
Stylidium graminifolium	Grass Triggerplant	Stylidiaceae	N	-	-		Forb																		
Styphelia spp.		Ericaceae	N	-	-		Shrub																		

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								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Styphelia triflora	Pink Five-Corners	Ericaceae	N	-	-		Shrub																		
Taraxacum officinale	Dandelion	Asteraceae	E	-	-																				
Taraxacum spp.	Dandelion	Asteraceae	N	-	-		Forb																		
Themeda australis		Poaceae	N	-	-		Grass & grasslike																		
Themeda triandra		Poaceae	N	-	-		Grass & grasslike																		
Thinopyrum ponticum	Tall Wheat Grass	Poaceae	E	-	-																			0.1	100
Tribulus terrestris	Cat-head	Zygophyllaceae	E	-	-																				
Tricoryne elatior	Yellow Autumn-lily	Anthericaceae	N	-	-		Forb																		
Trifolium angustifolium	Narrow-leaved Clover	Fabaceae (Faboideae)	E	-	-													0.1	20						
Trifolium arvense	Haresfoot Clover	Fabaceae (Faboideae)	E	-	-							1	300							0.1	50			0.5	100
Trifolium repens	White Clover	Fabaceae (Faboideae)	E	-	-																				
Trifolium spp.	A Clover	Fabaceae (Faboideae)	E	-	-					0.1	100														
Urtica incisa	Stinging Nettle	Urticaceae	N	-	-		Forb																		
Verbascum spp.		Scrophulariaceae	E	-	-																				
Verbascum virgatum	Twiggy Mullein	Scrophulariaceae	E	-	-																				
Veronica calycina	Hairy Speedwell	Plantaginaceae	N	-	-		Forb																		
Veronica plebeia	Trailing Speedwell	Plantaginaceae	N	-	-		Forb																		
Veronica spp.		Plantaginaceae	N	-	-		Forb																		
Vicia sativa	Common vetch	Fabaceae (Faboideae)	E	-	-																				
Vicia spp.	Vetch	Fabaceae (Faboideae)	E	-	-																				
Viola betonicifolia	Native Violet	Violaceae	N	-	-		Forb																		
Viola spp.		Violaceae	N	-	-		Forb																		
Vittadinia dissecta		Asteraceae	N	-	-		Forb																		
Vittadinia spp.	Fuzzweed	Asteraceae	N	-	-		Forb																		
Vulpia myuros	Rat's Tail Fescue	Poaceae	E	-	-					10	0	25	0			5	0	1	100					1	2000
Wahlenbergia communis	Tufted Bluebell	Campanulaceae	N	-	-		Forb																		
Wahlenbergia gracilenta	Annual Bluebell	Campanulaceae	N	-	-		Forb																		
Wahlenbergia gracilis	Sprawling Bluebell	Campanulaceae	N	-	-		Forb																		
Wahlenbergia spp.	Bluebell	Campanulaceae	N	-	-		Forb																	0.1	50
Wahlenbergia stricta	Tall Bluebell	Campanulaceae	N	-	-		Forb																		
Wurmbea dioica	Early Nancy	Colchicaceae	N	-	-		Forb																		
Xerochrysum spp.		Asteraceae	N	-	-		Forb																		
Xerochrysum viscosum	Sticky Everlasting	Asteraceae	N	-	-		Forb																		
Zieria cytisoides	Downy Zieria	Rutaceae	N	-	-		Shrub																		

ScientificName	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	MAC51201		MAC51202		MAC51203		MAC61201		MAC61202		MAC61203		MAC71201		MAC240901		MAC240902	
								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Acacia acinacea	Gold-dust Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub											5	0						
Acacia buxifolia	Box-leaved Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia dealbata	Silver Wattle	Fabaceae (Mimosoideae)	N	-	-		Tree													5	0				
Acacia deanei	Green Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia falciformis	Broad-leaved Hickory	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia gunnii	Ploughshare Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia implexa	Hickory Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub															0.1	3		
Acacia melanoxylon	Blackwood	Fabaceae (Mimosoideae)	N	-	-		Tree															1	4	10	0
Acacia nana	Small Red-leaved Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia obliquinervia	Mountain Hickory	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia spp.	Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub											5	0	0.5	0				
Acaena agnipila	Hairy Sheep's Burr	Rosaceae	N	-	-		Forb																		
Acaena echinata	Sheep's Burr	Rosaceae	N	-	-		Forb																		
Acaena novae-zelandiae	Bidgee-widgee	Rosaceae	N	-	-		Forb																		
Acaena ovina	Acaena	Rosaceae	N	-	-		Forb																	0.1	100
Acaena spp.	Sheep's Burr	Rosaceae	N	-	-		Forb																		
Acetosella vulgaris	Sheep Sorrel	Polygonaceae	E	-	-	HTE		0.5	100	5	0					0.1	20								
Acrotriche serrulata	Honeypots	Ericaceae	N	-	-		Shrub																		
Acrotriche spp.		Ericaceae	N	-	-		Shrub															0.1	3		
Aira cupaniana	Silvery Hairgrass	Poaceae	E	-	-																				
Alternanthera angustifolia		Amaranthaceae	N	-	-		Forb																		
Amperea xiphoclada		Euphorbiaceae	N	-	-		Shrub																		
Amyema miquelii	Box Mistletoe	Loranthaceae	N	-	-		Other																		
Amyema pendula		Loranthaceae	N	-	-		Other					1	2												
Amyema spp.	Mistletoe	Loranthaceae	N	-	-		Other													5	0				
Anagallis arvensis	Scarlet Pimpernel	Primulaceae	E	-	-																				
Anthosachne scabra	Common Wheatgrass	Poaceae	N	-	-		Grass & grasslike																		
Anthoxanthum odoratum	Sweet Vernal Grass	Poaceae	E	-	-																				
Anthoxanthum spp.	Vernal Grass	Poaceae	E	-	-																				
Arctotheca calendula	Capeweed	Asteraceae	E	-	-					0.1	10														
Aristida ramosa	Purple Wiregrass	Poaceae	N	-	-		Grass & grasslike	10	0																
Aristida spp.	A Wiregrass	Poaceae	N	-	-		Grass & grasslike																		
Aristida vagans	Threeawn Speargrass	Poaceae	N	-	-		Grass & grasslike																		
Asperula conferta	Common Woodruff	Rubiaceae	N	-	-		Forb																		
Asperula scoparia	Prickly Woodruff	Rubiaceae	N	-	-		Forb																		
Asperula spp.	Woodruff	Rubiaceae	N	-	-		Forb																		
Asphodelus fistulosus	Onion Weed	Asphodelaceae	E	-	-																				
Astroloma humifusum	Native Cranberry	Ericaceae	N	-	-		Shrub																		
Austrodanthonia spp.		Poaceae	N	-	-		Grass & grasslike																		
Austrostipa nodosa	A Speargrass	Poaceae	N	-	-		Grass & grasslike	5	0			20	0												
Austrostipa scabra	Speargrass	Poaceae	N	-	-		Grass & grasslike																		
Austrostipa spp.	A Speargrass	Poaceae	N	-	-		Grass & grasslike																		
Avena barbata	Bearded Oats	Poaceae	E	-	-							0.1	20												

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								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Avena fatua	Wild Oats	Poaceae	E	-	-																				
Avena sativa	Oats	Poaceae	E	-	-									50	0										
Avena spp.	Oats	Poaceae	E	-	-																				
Bidens subalternans	Greater Beggar's Ticks	Asteraceae	E	-	-																				
Billardiera scandens	Hairy Apple Berry	Pittosporaceae	N	-	-		Other																	0.1	1
Blechnum spp.		Blechnaceae	N	-	-		Fern																		
Bossiaea buxifolia		Fabaceae (Faboideae)	N	-	-		Shrub													0.1	1				
Bossiaea prostrata		Fabaceae (Faboideae)	N	-	-		Forb																		
Bothriochloa macra	Red Grass	Poaceae	N	-	-		Grass & grasslike					0.1	5												
Brachyloma daphnoides	Daphne Heath	Ericaceae	N	-	-		Shrub																		
Brachyscome rigidula	Hairy Cutleaf Daisy	Asteraceae	N	-	-		Forb																		
Brachyscome spp.		Asteraceae	N	-	-		Forb																		
Brassica oleracea	Collards	Brassicaceae	E	-	-																				
Brassica spp.	Brassica	Brassicaceae	E	-	-			1	100																
Brassica tournefortii	Mediterranean Turnip	Brassicaceae	E	-	-	HTE				30	0	10	0	0.5	100	0.1	20	0.5	100						
Bromus catharticus	Praire Grass	Poaceae	E	-	-			5	0			0.5	300												
Bromus diandrus	Great Brome	Poaceae	E	-	-	HTE		25	0			0.1	20			25	0								
Bromus hordeaceus	Soft Brome	Poaceae	E	-	-			5	0	0.1	50			0.1	50			5	0						
Bulbine bulbosa	Bulbine Lily	Asphodelaceae	N	-	-		Forb																		
Bursaria spinosa	Native Blackthorn	Pittosporaceae	N	-	-		Shrub															0.5	2		
Caesia spp.		Anthericaceae	N	-	-		Forb																		
Callistemon citrinus	Crimson Bottlebrush	Myrtaceae	N	-	-		Shrub											1	1						
Calotis lappulacea	Yellow Burr-daisy	Asteraceae	N	-	-		Forb																		
Calotis spp.	A Burr-daisy	Asteraceae	N	-	-		Forb															0.1	200	0.1	100
Carex appressa	Tall Sedge	Cyperaceae	N	-	-		Grass & grasslike																		
Carex bichenoviana		Cyperaceae	N	-	-		Grass & grasslike																		
Carex fascicularis	Tassel Sedge	Cyperaceae	N	-	-		Grass & grasslike																		
Carex gaudichaudiana		Cyperaceae	N	-	-		Grass & grasslike																		
Carex spp.		Cyperaceae	N	-	-		Grass & grasslike																		
Cassinia aculeata	Dolly Bush	Asteraceae	N	-	-		Shrub																		
Cassinia arcuata	Sifton Bush	Asteraceae	N	-	-		Shrub																		
Cassinia laevis	Cough Bush	Asteraceae	N	-	-		Shrub																		
Cassinia longifolia		Asteraceae	N	-	-		Shrub																		
Cassinia quinquefaria		Asteraceae	N	-	-		Shrub													1	10				
Cassinia spp.		Asteraceae	N	-	-		Shrub																		
Casuarina cunninghamiana	River Oak	Casuarinaceae	N	-	-		Tree											1	1						
Centaurium spp.		Gentianaceae	E	-	-																				
Centella asiatica	Indian Pennywort	Apiaceae	N	-	-		Forb																		
Cheilanthes austrotenuifolia	Rock Fern	Pteridaceae	N	-	-		Fern																		
Cheilanthes spp.	Rock Fern	Pteridaceae	N	-	-		Fern																		
Chenopodium album	Fat Hen	Chenopodiaceae	E	-	-											0.1	5								
Chloris spp.		Poaceae	N	-	-		Grass & grasslike																		
Chloris truncata	Windmill Grass	Poaceae	N	-	-		Grass & grasslike																		

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								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Chloris ventricosa	Tall Chloris	Poaceae	N	-	-		Grass & grasslike																		
Chondrilla juncea	Skeleton Weed	Asteraceae	E	-	-																				
Chrysocephalum apiculatum	Common Everlasting	Asteraceae	N	-	-		Forb											1	50	0.1	5	0.1	10		
Chrysocephalum semicalvum		Asteraceae	N	-	-		Forb																		
Cirsium vulgare	Spear Thistle	Asteraceae	E	-	-																				
Clematis aristata	Old Man's Beard	Ranunculaceae	N	-	-		Other																		
Convolvulus angustissimus		Convolvulaceae	N	-	-		Other																		
Conyza bonariensis	Flaxleaf Fleabane	Asteraceae	E	-	-																				
Conyza spp.	A Fleabane	Asteraceae	E	-	-																				
Coronidium elatum		Asteraceae	N	-	-		Shrub																		
Coronidium rutidolepis		Asteraceae	N	-	-																				
Coronidium scorpioides	Button Everlasting	Asteraceae	N	-	-		Forb																		
Coronidium spp.		Asteraceae	N	-	-		Forb																		
Cotoneaster spp.		Malaceae	E	-	-	HTE																			
Crassula sieberiana	Australian Stonecrop	Crassulaceae	N	-	-		Forb																		
Crataegus monogyna	Hawthorn	Malaceae	E	-	-	HTE																			
Crepis capillaris	Smooth Hawksbeard	Asteraceae	E	-	-																				
Cullen tenax	Emu-foot	Fabaceae (Faboideae)	N	-	-		Forb																		
Cymbonotus lawsonianus	Bear's Ear	Asteraceae	N	-	-		Forb																		
Cymbonotus preissianus	Austral Bear's Ear	Asteraceae	N	-	-		Forb																		
Cynodon dactylon	Common Couch	Poaceae	N	-	-		Grass & grasslike			1	0	0.5	0	25	0	5	0								
Cynodon spp.		Poaceae	N	-	-		Grass & grasslike																		
Cynodon transvaalensis	South African Couch	Poaceae	E	-	-																				
Cyperus brevifolius		Cyperaceae	E	-	-																				
Cyperus eragrostis	Umbrella Sedge	Cyperaceae	E	-	-	HTE																			
Cyperus lhotskyanus		Cyperaceae	N	-	-		Grass & grasslike											0.5	50						
Cyperus spp.		Cyperaceae	N	-	-		Grass & grasslike																		
Cytisus scoparius	English Broom	Fabaceae (Faboideae)	E	-	-	HTE																		0.1	3
Dactylis glomerata	Cocksfoot	Poaceae	E	-	-			0.5	50			0.1	20			0.1	20	80	0						
Daucus glochidiatus	Native Carrot	Apiaceae	N	-	-		Forb																		
Daviesia corymbosa		Fabaceae (Faboideae)	N	-	-		Shrub																		
Daviesia latifolia	Bitter-pea	Fabaceae (Faboideae)	N	-	-		Shrub																		
Daviesia leptophylla		Fabaceae (Faboideae)	N	-	-		Shrub													1	20				
Daviesia spp.		Fabaceae (Faboideae)	N	-	-		Shrub																		
Desmodium gunnii	Slender Tick-trefoil	Fabaceae (Faboideae)	N	-	-		Forb																		
Desmodium spp.	Tick-trefoil	Fabaceae (Faboideae)	N	-	-		Other																		
Dianella longifolia	Blueberry Lily	Phormiaceae	N	-	-		Forb																		
Dianella revoluta	Blueberry Lily	Phormiaceae	N	-	-		Forb																		
Dianella spp.		Phormiaceae	N	-	-		Forb													1	50				
Dichanthium spp.		Poaceae	N	-	-		Grass & grasslike																		
Dichondra repens	Kidney Weed	Convolvulaceae	N	-	-		Forb															0.1	200	1	1000
Dichopogon spp.	Chocolate Lily	Anthericaceae	N	-	-		Forb																		
Digitaria brownii	Cotton Panic Grass	Poaceae	N	-	-		Grass & grasslike																		

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								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Dillwynia cinerascens		Fabaceae (Faboideae)	N	-	-		Shrub																		
Dillwynia phylicoides	Parrot-pea	Fabaceae (Faboideae)	N	-	-		Shrub													1	20				
Dillwynia sericea	Egg and Bacon Pea	Fabaceae (Faboideae)	N	-	-		Shrub																		
Dillwynia spp.		Fabaceae (Faboideae)	N	-	-		Shrub																		
Dipodium hamiltonianum	Yellow Hyacinth-orchid	Orchidaceae	N	-	-		Forb																		
Dipsacus spp.		Dipsacaceae	E	-	-																				
Drosera spp.		Droseraceae	N	-	-		Forb																		
Dysphania pumilio	Small Crumbweed	Chenopodiaceae	N	-	-		Forb			0.1	100					0.1	10								
Dysphania spp.		Chenopodiaceae	N	-	-		Forb																		
Echinopogon ovatus	Forest Hedgehog Grass	Poaceae	N	-	-		Grass & grasslike																		
Echium plantagineum	Patterson's Curse	Boraginaceae	E	-	-			1	50	5	0	0.1	20	0.1	5	1	50								
Echium spp.		Boraginaceae	E	-	-																				
Echium vulgare	Viper's Bugloss	Boraginaceae	E	-	-																				
Einadia hastata	Berry Saltbush	Chenopodiaceae	N	-	-		Forb																		
Einadia nutans	Climbing Saltbush	Chenopodiaceae	N	-	-		Forb	5	0			0.5	50			0.1	5								
Einadia polygonoides	Knotweed Goosefoot	Chenopodiaceae	N	-	-		Forb																		
Eleocharis acuta		Cyperaceae	N	-	-		Grass & grasslike																		
Eleusine tristachya	Goose Grass	Poaceae	E	-	-																				
Elymus scaber	Common Wheatgrass	Poaceae	N	-	-		Grass & grasslike																		
Enneapogon nigricans	Niggerheads	Poaceae	N	-	-		Grass & grasslike																		
Enteropogon acicularis	Curly Windmill Grass	Poaceae	N	-	-		Grass & grasslike																		
Epacris spp.		Ericaceae	N	-	-		Shrub																		
Epilobium spp.		Onagraceae	N	-	-		Forb																		
Eragrostis cilianensis	Stinkgrass	Poaceae	E	-	-																				
Eragrostis curvula	African Lovegrass	Poaceae	E	-	-	HTE																			
Eragrostis leptostachya	Paddock Lovegrass	Poaceae	N	-	-		Grass & grasslike	0.1	10			0.1	5												
Eragrostis parviflora	Weeping Lovegrass	Poaceae	N	-	-		Grass & grasslike																		
Eragrostis spp.	A Lovegrass	Poaceae	N	-	-		Grass & grasslike																		
Erodium botrys	Long Storksbill	Geraniaceae	E	-	-																				
Erodium cicutarium	Common Crowfoot	Geraniaceae	E	-	-							0.1	50												
Erodium crinitum	Blue Crowfoot	Geraniaceae	N	-	-		Forb																		
Erodium malacoides		Geraniaceae	E	-	-																				
Erodium spp.	Crowfoot	Geraniaceae	N	-	-		Forb																		
Eucalyptus blakelyi	Blakely's Red Gum	Myrtaceae	N	-	-		Tree	25	2									1	0						
Eucalyptus bridgesiana	Apple Box	Myrtaceae	N	-	-		Tree	1	1																
Eucalyptus cannonii	Capertee Stringybark	Myrtaceae	N	V	-		Tree																		
Eucalyptus dalrympleana	Mountain Gum	Myrtaceae	N	-	-		Tree																	60	0
Eucalyptus dives	Broad-leaved Peppermint	Myrtaceae	N	-	-		Tree													40	0				
Eucalyptus fastigata	Brown Barrel	Myrtaceae	N	-	-		Tree																		
Eucalyptus goniocalyx	Bundy	Myrtaceae	N	-	-		Tree																		
Eucalyptus macrorhyncha	Red Stringybark	Myrtaceae	N	-	-		Tree																		
Eucalyptus mannifera	Brittle Gum	Myrtaceae	N	-	-		Tree													5	0				
Eucalyptus melliodora	Yellow Box	Myrtaceae	N	-	-		Tree	20	2			25	0			25	0								

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								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Eucalyptus pauciflora	White Sally	Myrtaceae	N	-	-		Tree															50	0	35	0
Eucalyptus rossii	Inland Scribbly Gum	Myrtaceae	N	-	-		Tree													30	0	25	0		
Eucalyptus spp.		Myrtaceae	N	-	-		Tree																		
Eucalyptus stellulata	Black Sally	Myrtaceae	N	-	-		Tree																		
Eucalyptus viminalis	Ribbon Gum	Myrtaceae	N	-	-		Tree																		
Euchiton japonicus		Asteraceae	N	-	-		Forb																		
Euchiton sphaericus	Star Cudweed	Asteraceae	N	-	-		Forb					0.1	5												
Euchiton spp.	A Cudweed	Asteraceae	N	-	-		Forb																		
Euphorbia dallachyana		Euphorbiaceae	N	-	-		Forb																		
Euphorbia drummondii	Caustic Weed	Euphorbiaceae	N	-	-		Forb																		
Euphorbia spp.		Euphorbiaceae	N	-	-		Forb					0.1	25												
Exocarpos cupressiformis	Cherry Ballart	Santalaceae	N	-	-		Shrub																		
Exocarpos strictus	Dwarf Cherry	Santalaceae	N	-	-		Shrub																	0.1	1
Foeniculum vulgare	Fennel	Apiaceae	E	-	-									1	10										
Galium murale	Small Bedstraw	Rubiaceae	E	-	-																				
Gamochaeta calviceps	Cudweed	Asteraceae	E	-	-																				
Geranium graniticola		Geraniaceae	N	-	-		Forb																		
Geranium molle	Cranesbill Geranium	Geraniaceae	E	-	-									0.1	10	0.1	5								
Geranium solanderi	Native Geranium	Geraniaceae	N	-	-		Forb																	0.1	200
Geranium spp.		Geraniaceae	N	-	-		Forb																		
Glycine clandestina	Twining glycine	Fabaceae (Faboideae)	N	-	-		Other																		
Glycine microphylla	Small-leaf Glycine	Fabaceae (Faboideae)	N	-	-		Other																		
Gonocarpus humilis		Haloragaceae	N	-	-		Forb																		
Gonocarpus spp.	Raspwort	Haloragaceae	N	-	-		Forb																	0.1	50
Gonocarpus tetragynus	Poverty Raspwort	Haloragaceae	N	-	-		Forb															0.1	300	0.1	50
Gonocarpus teucrioides	Germander Raspwort	Haloragaceae	N	-	-		Forb																		
Goodenia hederacea	Ivy Goodenia	Goodeniaceae	N	-	-		Forb																		
Goodenia spp.		Goodeniaceae	N	-	-		Forb															0.1	50		
Haloragis heterophylla	Variable Raspwort	Haloragaceae	N	-	-		Forb																		
Haloragis spp.	A Raspwort	Haloragaceae	N	-	-		Forb													0.1	20				
Hardenbergia violacea	False Sarsaparilla	Fabaceae (Faboideae)	N	-	-		Other													0.5	10	0.1	10	0.5	30
Helichrysum leucopsideum	Satin Everlasting	Asteraceae	N	-	-		Forb																		
Helichrysum spp.		Asteraceae	N	-	-		Forb																		
Heliotropium amplexicaule	Blue Heliotrope	Boraginaceae	E	-	-	HTE																			
Hibbertia obtusifolia	Hoary Guinea Flower	Dilleniaceae	N	-	-		Shrub															0.1	3	0.1	3
Holcus lanatus	Yorkshire Fog	Poaceae	E	-	-																				
Hordeum leporinum	Barley Grass	Poaceae	E	-	-			1	200	0.5	100					25	0	0.1	20						
Hovea heterophylla		Fabaceae (Faboideae)	N	-	-		Forb													0.1	1			0.1	3
Hovea spp.		Fabaceae (Faboideae)	N	-	-		Forb																		
Hydrocotyle laxiflora	Stinking Pennywort	Apiaceae	N	-	-		Forb																		
Hydrocotyle sibthorpioides		Apiaceae	N	-	-		Forb																		
Hydrocotyle spp.		Apiaceae	N	-	-		Forb																		
Hypericum gramineum	Small St John's Wort	Clusiaceae	N	-	-		Forb																		

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								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Hypericum perforatum	St. Johns Wort	Clusiaceae	E	-	-	HTE														0.1	50				
Hypericum spp.		Clusiaceae	N	-	-		Forb																		
Hypochaeris glabra	Smooth Catsear	Asteraceae	E	-	-			0.1	100			0.1	50			0.1	50	0.1	30	0.1	20			0.1	20
Hypochaeris radicata	Catsear	Asteraceae	E	-	-																				
Hypochaeris spp.	A Catsear	Asteraceae	E	-	-																	0.1	50		
Hypochoeris radicata	Catsear	Asteraceae	E	-	-																				
Hypoxis spp.		Hypoxidaceae	N	-	-		Forb																		
Isolepis hookeriana		Cyperaceae	N	-	-		Grass & grasslike																		
Joycea pallida	Redanther Wallaby Grass	Poaceae	N	-	-		Grass & grasslike																		
Juncus effusus		Juncaceae	E	-	-																				
Juncus gregiflorus		Juncaceae	N	-	-		Grass & grasslike																		
Juncus homalocaulis		Juncaceae	N	-	-		Grass & grasslike																		
Juncus spp.	A Rush	Juncaceae	N	-	-		Grass & grasslike																		
Lactuca serriola	Prickly Lettuce	Asteraceae	E	-	-													0.1	50						
Lagenifera spp.		Asteraceae	N	-	-		Forb																		
Lamarckia aurea	Goldentop	Poaceae	E	-	-																				
Lepidium africanum	Common Peppercress	Brassicaceae	E	-	-					10	0														
Lepidium spp.	A Peppercress	Brassicaceae	N	-	-		Forb																		
Leptospermum myrtifolium		Myrtaceae	N	-	-		Shrub																		
Leptospermum spp.	Tea-tree	Myrtaceae	N	-	-		Shrub																		
Leucopogon appressus		Ericaceae	N	-	-		Shrub													0.5	20				
Leucopogon fletcheri		Ericaceae	N	-	-		Shrub																		
Leucopogon virgatus		Ericaceae	N	-	-		Shrub																		
Linum marginale	Native Flax	Linaceae	N	-	-		Forb																		
Lissanthe spp.		Ericaceae	N	-	-		Shrub																		
Lolium perenne	Perennial Ryegrass	Poaceae	E	-	-					25	50	0.5	200			1	200	0.1	100						
Lomandra cylindrica		Lomandraceae	N	-	-		Grass & grasslike																		
Lomandra filiformis	Wattle Matt-rush	Lomandraceae	N	-	-		Grass & grasslike													5	0	0.1	20	0.1	50
Lomandra longifolia	Spiny-headed Mat-rush	Lomandraceae	N	-	-		Grass & grasslike													0.1	10	5	0	5	0
Lomandra multiflora	Many-flowered Mat-rush	Lomandraceae	N	-	-		Grass & grasslike																		
Lomandra spp.	Mat-rush	Lomandraceae	N	-	-		Grass & grasslike																		
Lomatia ilicifolia	Holly Lomatia	Proteaceae	N	-	-		Shrub																		
Lomatia myricoides	River Lomatia	Proteaceae	N	-	-		Shrub																		
Luzula spp.		Juncaceae	N	-	-		Grass & grasslike																		
Lycium ferocissimum	African Boxthorn	Solanaceae	E	-	-	HTE																			
Lysimachia arvensis	Scarlet Pimpernel	Primulaceae	E	-	-																				
Lythrum hyssopifolia	Hyssop Loosestrife	Lythraceae	N	-	-		Forb																		
Malus pumila	Apple	Malaceae	E	-	-																				
Malva neglecta	Dwarf Mallow	Malvaceae	E	-	-					0.1	20					1	100								
Marrubium spp.		Lamiaceae	E	-	-																				
Marrubium vulgare	White Horehound	Lamiaceae	E	-	-			5	0			0.5	10			0.1	5								
Medicago polymorpha	Burr Medic	Fabaceae (Faboideae)	E	-	-																				
Medicago spp.	A Medic	Fabaceae (Faboideae)	E	-	-																				

ScientificName	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	MAC51201		MAC51202		MAC51203		MAC61201		MAC61202		MAC61203		MAC71201		MAC240901		MAC240902	
								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Melichrus urceolatus	Urn Heath	Ericaceae	N	-	-		Shrub																		
Melicytus dentatus	Tree Violet	Violaceae	N	-	-		Shrub																		
Microlaena stipoides	Weeping Grass	Poaceae	N	-	-		Grass & grasslike															0.1	5	0.1	5
Modiola caroliniana	Red-flowered Mallow	Malvaceae	E	-	-																				
Modiola spp.		Malvaceae	E	-	-																				
Moenchia erecta	Erect Chickweed	Caryophyllaceae	E	-	-																				
Monoculus monstrosus		Asteraceae	E	-	-																				
Monotoca scoparia		Ericaceae	N	-	-		Shrub																	0.1	1
Nassella trichotoma	Serrated Tussock	Poaceae	E	-	-									1	200										
Notothixos spp.		Viscaceae	N	-	-		Other																		
Olearia spp.		Asteraceae	N	-	-		Shrub																		
Onopordum acanthium	Scotch Thistle	Asteraceae	E	-	-					5	0			25	0										
Ophioglossum lusitanicum	Adder's Tongue	Ophioglossaceae	N	-	-		Fern																		
Orobanche spp.		Scrophulariaceae	N	-	-		Forb																		
Oxalis perennans		Oxalidaceae	N	-	-		Forb	0.5	100			0.1	5					0.1	100	0.1	10				
Oxalis spp.		Oxalidaceae	N	-	-		Forb																		
Ozothamnus diosmifolius	White Dogwood	Asteraceae	N	-	-		Shrub																		
Panicum effusum	Hairy Panic	Poaceae	N	-	-		Grass & grasslike																		
Paspalum dilatatum	Paspalum	Poaceae	E	-	-	HTE																			
Paspalum spp.		Poaceae	N	-	-		Grass & grasslike																		
Pennisetum clandestinum	Kikuyu Grass	Poaceae	E	-	-																				
Pentaschistis airoides	False Hairgrass	Poaceae	E	-	-																				
Persicaria prostrata	Creeping Knotweed	Polygonaceae	N	-	-		Forb							0.1	5										
Petrorhagia spp.		Caryophyllaceae	E	-	-																				
Phalaris aquatica	Phalaris	Poaceae	E	-	-									5	0										
Phalaris minor	Lesser Canary Grass	Poaceae	E	-	-																				
Phalaris spp.		Poaceae	E	-	-																				
Phragmites australis	Common Reed	Poaceae	N	-	-		Grass & grasslike							1	200										
Phragmites spp.		Poaceae	N	-	-		Grass & grasslike																		
Pinus radiata	Radiata Pine	Pinaceae	E	-	-																				
Plantago gaudichaudii	Narrow Plantain	Plantaginaceae	N	-	-		Forb																		
Plantago lanceolata	Lamb's Tongues	Plantaginaceae	E	-	-																				
Plantago spp.	Plantain	Plantaginaceae	N	-	-		Forb											0.1	20	0.1	50				
Platylobium formosum		Fabaceae (Faboideae)	N	-	-		Shrub																		
Poa annua	Winter Grass	Poaceae	E	-	-																				
Poa induta		Poaceae	N	-	-		Grass & grasslike													5	0				
Poa labillardierei	Tussock	Poaceae	N	-	-		Grass & grasslike																	30	0
Poa meionectes		Poaceae	N	-	-		Grass & grasslike																		
Poa sieberiana	Snowgrass	Poaceae	N	-	-		Grass & grasslike	0.1	5											60	0	40	0	3	0
Poa spp.		Poaceae	N	-	-		Grass & grasslike																		
Polycarpon tetraphyllum	Four-leaved Allseed	Caryophyllaceae	E	-	-																				
Polyscias sambucifolia	Elderberry Panax	Araliaceae	N	-	-		Shrub																		
Populus spp.		Salicaceae	N	-	-		Tree																		

ScientificName	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	MAC51201		MAC51202		MAC51203		MAC61201		MAC61202		MAC61203		MAC71201		MAC240901		MAC240902	
								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Poranthera microphylla	Small Poranthera	Phyllanthaceae	N	-	-		Forb																		
Portulaca oleracea	Pigweed	Portulacaceae	N	-	-		Forb			0.1	20														
Potentilla spp.		Rosaceae	E	-	-																				
Pseudognaphalium luteoalbum	Jersey Cudweed	Asteraceae	N	-	-		Forb																		
Pteridium esculentum	Bracken	Dennstaedtiaceae	N	-	-		Fern															20	0		
Pteridium spp.		Dennstaedtiaceae	N	-	-		Fern																		
Pultenaea microphylla	A Bush Pea	Fabaceae (Faboideae)	N	-	-		Shrub																		
Rosa rubiginosa	Sweet Briar	Rosaceae	E	-	-	HTE																			
Rosa spp.		Rosaceae	E	-	-																				
Rubus fruticosus	Blackberry complex	Rosaceae	E	-	-											0.1	1			0.5	2			0.1	2
Rubus parvifolius	Native Raspberry	Rosaceae	N	-	-		Shrub																		
Rumex acetosella	Sheep Sorrel	Polygonaceae	E	-	-																				
Rumex brownii	Swamp Dock	Polygonaceae	N	-	-		Forb					0.1	5					0.1	10						
Rumex crispus	Curled Dock	Polygonaceae	E	-	-																				
Rumex spp.	Dock	Polygonaceae	N	-	-		Forb	0.1	20					0.1	100										
Rytidosperma caespitosum	Ringed Wallaby Grass	Poaceae	N	-	-		Grass & grasslike	0.1	10			0.1	200					0.1	20						
Rytidosperma longifolium	Long-leaved Wallaby Grass	Poaceae	N	-	-		Grass & grasslike																		
Rytidosperma monticola	Mountain Wallaby Grass	Poaceae	N	-	-		Grass & grasslike	0.1	20																
Rytidosperma pallidum	Redanther Wallaby Grass	Poaceae	N	-	-		Grass & grasslike																		
Rytidosperma spp.		Poaceae	N	-	-		Grass & grasslike																		
Salix fragilis	Crack Willow	Salicaceae	E	-	-													1	0						
Schoenus apogon	Fluke Bogrush	Cyperaceae	N	-	-		Grass & grasslike																		
Scleranthus biflorus	Two-flowered Knawel	Caryophyllaceae	N	-	-		Forb																		
Scolymus hispanicus	Golden Thistle	Asteraceae	E	-	-													0.1	10						
Senecio diaschides		Asteraceae	N	-	-		Forb															0.1	1		
Senecio gunnii		Asteraceae	N	-	-		Forb																		
Senecio prenanthoides		Asteraceae	N	-	-		Forb																		
Senecio quadridentatus	Cotton Fireweed	Asteraceae	N	-	-		Forb																		
Senecio spp.	Fireweed	Asteraceae	N	-	-		Forb																		
Setaria gracilis		Poaceae	E	-	-																				
Setaria pumila	Pale Pigeon Grass	Poaceae	E	-	-																				
Solanum nigrum	Black-berry Nightshade	Solanaceae	E	-	-																				
Solenogyne spp.		Asteraceae	N	-	-		Forb																		
Sonchus asper	Prickly Sowthistle	Asteraceae	E	-	-																				
Sonchus spp.	Sowthistle	Asteraceae	N	-	-		Forb																		
Spergularia rubra	Sandspurry	Caryophyllaceae	E	-	-							0.1	1												
Sporobolus caroli	Fairy Grass	Poaceae	N	-	-		Grass & grasslike																		
Sporobolus creber	Slender Rat's Tail Grass	Poaceae	N	-	-		Grass & grasslike																		
Stackhousia viminea	Slender Stackhousia	Stackhousiaceae	N	-	-		Forb																		
Stellaria media	Common Chickweed	Caryophyllaceae	E	-	-																				
Stellaria pungens	Prickly Starwort	Caryophyllaceae	N	-	-		Forb																		
Stylidium graminifolium	Grass Triggerplant	Stylidiaceae	N	-	-		Forb													0.1	5				
Styphelia spp.		Ericaceae	N	-	-		Shrub																		

ScientificName	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	MAC51201		MAC51202		MAC51203		MAC61201		MAC61202		MAC61203		MAC71201		MAC240901		MAC240902	
								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Styphelia triflora	Pink Five-Corners	Ericaceae	N	-	-		Shrub																		
Taraxacum officinale	Dandelion	Asteraceae	E	-	-																				
Taraxacum spp.	Dandelion	Asteraceae	N	-	-		Forb																		
Themeda australis		Poaceae	N	-	-		Grass & grasslike																		
Themeda triandra		Poaceae	N	-	-		Grass & grasslike													15	0				
Thinopyrum ponticum	Tall Wheat Grass	Poaceae	E	-	-																				
Tribulus terrestris	Cat-head	Zygophyllaceae	E	-	-					0.5	50	0.1	20												
Tricoryne elatior	Yellow Autumn-lily	Anthericaceae	N	-	-		Forb																		
Trifolium angustifolium	Narrow-leaved Clover	Fabaceae (Faboideae)	E	-	-																				
Trifolium arvense	Haresfoot Clover	Fabaceae (Faboideae)	E	-	-							0.1	50			0.1	20	0.1	100						
Trifolium repens	White Clover	Fabaceae (Faboideae)	E	-	-							0.1	50												
Trifolium spp.	A Clover	Fabaceae (Faboideae)	E	-	-																				
Urtica incisa	Stinging Nettle	Urticaceae	N	-	-		Forb									5	50								
Verbascum spp.		Scrophulariaceae	E	-	-																				
Verbascum virgatum	Twiggy Mullein	Scrophulariaceae	E	-	-																				
Veronica calycina	Hairy Speedwell	Plantaginaceae	N	-	-		Forb																	0.1	0
Veronica plebeia	Trailing Speedwell	Plantaginaceae	N	-	-		Forb																		
Veronica spp.		Plantaginaceae	N	-	-		Forb																		
Vicia sativa	Common vetch	Fabaceae (Faboideae)	E	-	-																				
Vicia spp.	Vetch	Fabaceae (Faboideae)	E	-	-																				
Viola betonicifolia	Native Violet	Violaceae	N	-	-		Forb															0.1	1	0.1	200
Viola spp.		Violaceae	N	-	-		Forb																		
Vittadinia dissecta		Asteraceae	N	-	-		Forb					0.1	5												
Vittadinia spp.	Fuzzweed	Asteraceae	N	-	-		Forb																		
Vulpia myuros	Rat's Tail Fescue	Poaceae	E	-	-							0.1	50												
Wahlenbergia communis	Tufted Bluebell	Campanulaceae	N	-	-		Forb					0.1	20					0.1	20						
Wahlenbergia gracilenta	Annual Bluebell	Campanulaceae	N	-	-		Forb																		
Wahlenbergia gracilis	Sprawling Bluebell	Campanulaceae	N	-	-		Forb					0.1	5							0.1	50				
Wahlenbergia spp.	Bluebell	Campanulaceae	N	-	-		Forb	0.1	50																
Wahlenbergia stricta	Tall Bluebell	Campanulaceae	N	-	-		Forb																		
Wurmbea dioica	Early Nancy	Colchicaceae	N	-	-		Forb																		
Xerochrysum spp.		Asteraceae	N	-	-		Forb																		
Xerochrysum viscosum	Sticky Everlasting	Asteraceae	N	-	-		Forb																		
Zieria cytisoides	Downy Zieria	Rutaceae	N	-	-		Shrub															0	0		

ScientificName	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	MAC250901		MAC250902		MAC250903		MAC250904		MAC250906		MAC250909		MAC250907		MAC250910		R01DNG	
								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Acacia acinacea	Gold-dust Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia buxifolia	Box-leaved Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia dealbata	Silver Wattle	Fabaceae (Mimosoideae)	N	-	-		Tree	5	6					5	0	1	2	5	0			5	3		
Acacia deanei	Green Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia falciformis	Broad-leaved Hickory	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia gunnii	Ploughshare Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia implexa	Hickory Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia melanoxylon	Blackwood	Fabaceae (Mimosoideae)	N	-	-		Tree	5	0	5	2			25	0	10	0								
Acacia nana	Small Red-leaved Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia obliquinervia	Mountain Hickory	Fabaceae (Mimosoideae)	N	-	-		Shrub					5	0												
Acacia spp.	Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acaena agnipila	Hairy Sheep's Burr	Rosaceae	N	-	-		Forb																		
Acaena echinata	Sheep's Burr	Rosaceae	N	-	-		Forb			0.1	200														
Acaena novae-zelandiae	Bidgee-widgee	Rosaceae	N	-	-		Forb																		
Acaena ovina	Acaena	Rosaceae	N	-	-		Forb											0.1	1						
Acaena spp.	Sheep's Burr	Rosaceae	N	-	-		Forb																		
Acetosella vulgaris	Sheep Sorrel	Polygonaceae	E	-	-	HTE		0.1	10					0.1	10										
Acrotriche serrulata	Honeypots	Ericaceae	N	-	-		Shrub											0.5	10						
Acrotriche spp.		Ericaceae	N	-	-		Shrub																		
Aira cupaniana	Silvery Hairgrass	Poaceae	E	-	-																				
Alternanthera angustifolia		Amaranthaceae	N	-	-		Forb																		
Amperea xiphoclada		Euphorbiaceae	N	-	-		Shrub									0.1	1								
Amyema miquelii	Box Mistletoe	Loranthaceae	N	-	-		Other							0.5	0										
Amyema pendula		Loranthaceae	N	-	-		Other																		
Amyema spp.	Mistletoe	Loranthaceae	N	-	-		Other							1	0	0.1	1								
Anagallis arvensis	Scarlet Pimpernel	Primulaceae	E	-	-																				
Anthosachne scabra	Common Wheatgrass	Poaceae	N	-	-		Grass & grasslike																		
Anthoxanthum odoratum	Sweet Vernal Grass	Poaceae	E	-	-																				
Anthoxanthum spp.	Vernal Grass	Poaceae	E	-	-																				
Arctotheca calendula	Capeweed	Asteraceae	E	-	-			0.1	20									0.1	50						
Aristida ramosa	Purple Wiregrass	Poaceae	N	-	-		Grass & grasslike																		
Aristida spp.	A Wiregrass	Poaceae	N	-	-		Grass & grasslike																		
Aristida vagans	Threeawn Speargrass	Poaceae	N	-	-		Grass & grasslike																		
Asperula conferta	Common Woodruff	Rubiaceae	N	-	-		Forb																		
Asperula scoparia	Prickly Woodruff	Rubiaceae	N	-	-		Forb																		
Asperula spp.	Woodruff	Rubiaceae	N	-	-		Forb																		
Asphodelus fistulosus	Onion Weed	Asphodelaceae	E	-	-																				
Astroloma humifusum	Native Cranberry	Ericaceae	N	-	-		Shrub																		
Austrodanthonia spp.		Poaceae	N	-	-		Grass & grasslike																		
Austrostipa nodosa	A Speargrass	Poaceae	N	-	-		Grass & grasslike																		
Austrostipa scabra	Speargrass	Poaceae	N	-	-		Grass & grasslike																		
Austrostipa spp.	A Speargrass	Poaceae	N	-	-		Grass & grasslike							0.5	50										
Avena barbata	Bearded Oats	Poaceae	E	-	-																				

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								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Avena fatua	Wild Oats	Poaceae	E	-	-																				
Avena sativa	Oats	Poaceae	E	-	-																				
Avena spp.	Oats	Poaceae	E	-	-																				
Bidens subalternans	Greater Beggar's Ticks	Asteraceae	E	-	-																				
Billardiera scandens	Hairy Apple Berry	Pittosporaceae	N	-	-		Other																		
Blechnum spp.		Blechnaceae	N	-	-		Fern																		
Bossiaea buxifolia		Fabaceae (Faboideae)	N	-	-		Shrub																		
Bossiaea prostrata		Fabaceae (Faboideae)	N	-	-		Forb																		
Bothriochloa macra	Red Grass	Poaceae	N	-	-		Grass & grasslike																	8	500
Brachyloma daphnoides	Daphne Heath	Ericaceae	N	-	-		Shrub																		
Brachyscome rigidula	Hairy Cutleaf Daisy	Asteraceae	N	-	-		Forb																		
Brachyscome spp.		Asteraceae	N	-	-		Forb																		
Brassica oleracea	Collards	Brassicaceae	E	-	-																				
Brassica spp.	Brassica	Brassicaceae	E	-	-																				
Brassica tournefortii	Mediterranean Turnip	Brassicaceae	E	-	-	HTE																			
Bromus catharticus	Praire Grass	Poaceae	E	-	-																				
Bromus diandrus	Great Brome	Poaceae	E	-	-	HTE																			
Bromus hordeaceus	Soft Brome	Poaceae	E	-	-																				
Bulbine bulbosa	Bulbine Lily	Asphodelaceae	N	-	-		Forb																		
Bursaria spinosa	Native Blackthorn	Pittosporaceae	N	-	-		Shrub																		
Caesia spp.		Anthericaceae	N	-	-		Forb																		
Callistemon citrinus	Crimson Bottlebrush	Myrtaceae	N	-	-		Shrub																		
Calotis lappulacea	Yellow Burr-daisy	Asteraceae	N	-	-		Forb																		
Calotis spp.	A Burr-daisy	Asteraceae	N	-	-		Forb	0.1	1000			0.1	500	0.1	50										
Carex appressa	Tall Sedge	Cyperaceae	N	-	-		Grass & grasslike																		
Carex bichenoviana		Cyperaceae	N	-	-		Grass & grasslike																		
Carex fascicularis	Tassel Sedge	Cyperaceae	N	-	-		Grass & grasslike																		
Carex gaudichaudiana		Cyperaceae	N	-	-		Grass & grasslike																		
Carex spp.		Cyperaceae	N	-	-		Grass & grasslike																		
Cassinia aculeata	Dolly Bush	Asteraceae	N	-	-		Shrub																		
Cassinia arcuata	Sifton Bush	Asteraceae	N	-	-		Shrub									0.1	1								
Cassinia laevis	Cough Bush	Asteraceae	N	-	-		Shrub			0.1	1														
Cassinia longifolia		Asteraceae	N	-	-		Shrub									10	0								
Cassinia quinquefaria		Asteraceae	N	-	-		Shrub																		
Cassinia spp.		Asteraceae	N	-	-		Shrub																		
Casuarina cunninghamiana	River Oak	Casuarinaceae	N	-	-		Tree																		
Centaurium spp.		Gentianaceae	E	-	-																				
Centella asiatica	Indian Pennywort	Apiaceae	N	-	-		Forb																		
Cheilanthes austrotenuifolia	Rock Fern	Pteridaceae	N	-	-		Fern																		
Cheilanthes spp.	Rock Fern	Pteridaceae	N	-	-		Fern																		
Chenopodium album	Fat Hen	Chenopodiaceae	E	-	-																				
Chloris spp.		Poaceae	N	-	-		Grass & grasslike																		
Chloris truncata	Windmill Grass	Poaceae	N	-	-		Grass & grasslike																		

ScientificName	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	MAC250901		MAC250902		MAC250903		MAC250904		MAC250906		MAC250909		MAC250907		MAC250910		R01DNG	
								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Chloris ventricosa	Tall Chloris	Poaceae	N	-	-		Grass & grasslike																		
Chondrilla juncea	Skeleton Weed	Asteraceae	E	-	-																				
Chrysocephalum apiculatum	Common Everlasting	Asteraceae	N	-	-		Forb																		
Chrysocephalum semicalvum		Asteraceae	N	-	-		Forb																		
Cirsium vulgare	Spear Thistle	Asteraceae	E	-	-																				
Clematis aristata	Old Man's Beard	Ranunculaceae	N	-	-		Other																		
Convolvulus angustissimus		Convolvulaceae	N	-	-		Other																		
Conyza bonariensis	Flaxleaf Fleabane	Asteraceae	E	-	-																				
Conyza spp.	A Fleabane	Asteraceae	E	-	-																				
Coronidium elatum		Asteraceae	N	-	-		Shrub																		
Coronidium rutidolepis		Asteraceae	N	-	-																				
Coronidium scorpioides	Button Everlasting	Asteraceae	N	-	-		Forb																		
Coronidium spp.		Asteraceae	N	-	-		Forb																		
Cotoneaster spp.		Malaceae	E	-	-	HTE																			
Crassula sieberiana	Australian Stonecrop	Crassulaceae	N	-	-		Forb																		
Crataegus monogyna	Hawthorn	Malaceae	E	-	-	HTE																			
Crepis capillaris	Smooth Hawksbeard	Asteraceae	E	-	-																				
Cullen tenax	Emu-foot	Fabaceae (Faboideae)	N	-	-		Forb																		
Cymbonotus lawsonianus	Bear's Ear	Asteraceae	N	-	-		Forb							0.1	100										
Cymbonotus preissianus	Austral Bear's Ear	Asteraceae	N	-	-		Forb																		
Cynodon dactylon	Common Couch	Poaceae	N	-	-		Grass & grasslike																	0.1	50
Cynodon spp.		Poaceae	N	-	-		Grass & grasslike																		
Cynodon transvaalensis	South African Couch	Poaceae	E	-	-																				
Cyperus brevifolius		Cyperaceae	E	-	-																				
Cyperus eragrostis	Umbrella Sedge	Cyperaceae	E	-	-	HTE																			
Cyperus lhotskyanus		Cyperaceae	N	-	-		Grass & grasslike																		
Cyperus spp.		Cyperaceae	N	-	-		Grass & grasslike																		
Cytisus scoparius	English Broom	Fabaceae (Faboideae)	E	-	-	HTE		25	0													0.1	1		
Dactylis glomerata	Cocksfoot	Poaceae	E	-	-																			0.4	500
Daucus glochidiatus	Native Carrot	Apiaceae	N	-	-		Forb																		
Daviesia corymbosa		Fabaceae (Faboideae)	N	-	-		Shrub																		
Daviesia latifolia	Bitter-pea	Fabaceae (Faboideae)	N	-	-		Shrub																		
Daviesia leptophylla		Fabaceae (Faboideae)	N	-	-		Shrub																		
Daviesia spp.		Fabaceae (Faboideae)	N	-	-		Shrub																		
Desmodium gunnii	Slender Tick-trefoil	Fabaceae (Faboideae)	N	-	-		Forb			0.1	5														
Desmodium spp.	Tick-trefoil	Fabaceae (Faboideae)	N	-	-		Other																		
Dianella longifolia	Blueberry Lily	Phormiaceae	N	-	-		Forb							0.1	10										
Dianella revoluta	Blueberry Lily	Phormiaceae	N	-	-		Forb																		
Dianella spp.		Phormiaceae	N	-	-		Forb															0.1	10		
Dichanthium spp.		Poaceae	N	-	-		Grass & grasslike																		
Dichondra repens	Kidney Weed	Convolvulaceae	N	-	-		Forb			0.1	1000	0.5	2000	1	500			0.1	300			0.1	1000		
Dichopogon spp.	Chocolate Lily	Anthericaceae	N	-	-		Forb																		
Digitaria brownii	Cotton Panic Grass	Poaceae	N	-	-		Grass & grasslike																	0.3	400

ScientificName	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	MAC250901		MAC250902		MAC250903		MAC250904		MAC250906		MAC250909		MAC250907		MAC250910		R01DNG	
								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Dillwynia cinerascens		Fabaceae (Faboideae)	N	-	-		Shrub																		
Dillwynia phylicoides	Parrot-pea	Fabaceae (Faboideae)	N	-	-		Shrub																		
Dillwynia sericea	Egg and Bacon Pea	Fabaceae (Faboideae)	N	-	-		Shrub									0.2	5								
Dillwynia spp.		Fabaceae (Faboideae)	N	-	-		Shrub																		
Dipodium hamiltonianum	Yellow Hyacinth-orchid	Orchidaceae	N	-	-		Forb																		
Dipsacus spp.		Dipsacaceae	E	-	-																				
Drosera spp.		Droseraceae	N	-	-		Forb																		
Dysphania pumilio	Small Crumbweed	Chenopodiaceae	N	-	-		Forb																	0.2	300
Dysphania spp.		Chenopodiaceae	N	-	-		Forb																		
Echinopogon ovatus	Forest Hedgehog Grass	Poaceae	N	-	-		Grass & grasslike																		
Echium plantagineum	Patterson's Curse	Boraginaceae	E	-	-																				
Echium spp.		Boraginaceae	E	-	-																				
Echium vulgare	Viper's Bugloss	Boraginaceae	E	-	-																			0.1	10
Einadia hastata	Berry Saltbush	Chenopodiaceae	N	-	-		Forb																		
Einadia nutans	Climbing Saltbush	Chenopodiaceae	N	-	-		Forb																		
Einadia polygonoides	Knotweed Goosefoot	Chenopodiaceae	N	-	-		Forb																		
Eleocharis acuta		Cyperaceae	N	-	-		Grass & grasslike																		
Eleusine tristachya	Goose Grass	Poaceae	E	-	-																				
Elymus scaber	Common Wheatgrass	Poaceae	N	-	-		Grass & grasslike																		
Enneapogon nigricans	Niggerheads	Poaceae	N	-	-		Grass & grasslike																		
Enteropogon acicularis	Curly Windmill Grass	Poaceae	N	-	-		Grass & grasslike																	0.2	400
Epacris spp.		Ericaceae	N	-	-		Shrub	0.1	5			0.1	5	0.5	50	0.1	10								
Epilobium spp.		Onagraceae	N	-	-		Forb																		
Eragrostis cilianensis	Stinkgrass	Poaceae	E	-	-																			3	800
Eragrostis curvula	African Lovegrass	Poaceae	E	-	-	HTE																			
Eragrostis leptostachya	Paddock Lovegrass	Poaceae	N	-	-		Grass & grasslike																		
Eragrostis parviflora	Weeping Lovegrass	Poaceae	N	-	-		Grass & grasslike																	0.1	100
Eragrostis spp.	A Lovegrass	Poaceae	N	-	-		Grass & grasslike															0.5	30	10	500
Erodium botrys	Long Storksbill	Geraniaceae	E	-	-																				
Erodium cicutarium	Common Crowfoot	Geraniaceae	E	-	-																			0.1	30
Erodium crinitum	Blue Crowfoot	Geraniaceae	N	-	-		Forb																		
Erodium malacoides		Geraniaceae	E	-	-																				
Erodium spp.	Crowfoot	Geraniaceae	N	-	-		Forb																		
Eucalyptus blakelyi	Blakely's Red Gum	Myrtaceae	N	-	-		Tree																		
Eucalyptus bridgesiana	Apple Box	Myrtaceae	N	-	-		Tree																		
Eucalyptus cannonii	Capertee Stringybark	Myrtaceae	N	V	-		Tree																		
Eucalyptus dalrympleana	Mountain Gum	Myrtaceae	N	-	-		Tree																		
Eucalyptus dives	Broad-leaved Peppermint	Myrtaceae	N	-	-		Tree							10	0			15	0			25	0		
Eucalyptus fastigata	Brown Barrel	Myrtaceae	N	-	-		Tree					5	0												
Eucalyptus goniocalyx	Bundy	Myrtaceae	N	-	-		Tree																		
Eucalyptus macrorhyncha	Red Stringybark	Myrtaceae	N	-	-		Tree																		
Eucalyptus mannifera	Brittle Gum	Myrtaceae	N	-	-		Tree															5	0		
Eucalyptus melliodora	Yellow Box	Myrtaceae	N	-	-		Tree																		

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								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Eucalyptus pauciflora	White Sally	Myrtaceae	N	-	-		Tree	5	0					50	0										
Eucalyptus rossii	Inland Scribbly Gum	Myrtaceae	N	-	-		Tree																		
Eucalyptus spp.		Myrtaceae	N	-	-		Tree											50	0			10	0		
Eucalyptus stellulata	Black Sally	Myrtaceae	N	-	-		Tree																		
Eucalyptus viminalis	Ribbon Gum	Myrtaceae	N	-	-		Tree					0	0							80	0				
Euchiton japonicus		Asteraceae	N	-	-		Forb																		
Euchiton sphaericus	Star Cudweed	Asteraceae	N	-	-		Forb																		
Euchiton spp.	A Cudweed	Asteraceae	N	-	-		Forb																		
Euphorbia dallachyana		Euphorbiaceae	N	-	-		Forb																		
Euphorbia drummondii	Caustic Weed	Euphorbiaceae	N	-	-		Forb																		
Euphorbia spp.		Euphorbiaceae	N	-	-		Forb																		
Exocarpos cupressiformis	Cherry Ballart	Santalaceae	N	-	-		Shrub																		
Exocarpos strictus	Dwarf Cherry	Santalaceae	N	-	-		Shrub																		
Foeniculum vulgare	Fennel	Apiaceae	E	-	-																				
Galium murale	Small Bedstraw	Rubiaceae	E	-	-																	0.1	300		
Gamochaeta calviceps	Cudweed	Asteraceae	E	-	-																				
Geranium graniticola		Geraniaceae	N	-	-		Forb																		
Geranium molle	Cranesbill Geranium	Geraniaceae	E	-	-																				
Geranium solanderi	Native Geranium	Geraniaceae	N	-	-		Forb	0.1	20	0.1	200			0.5	1000			0.1	300	0.5	500				
Geranium spp.		Geraniaceae	N	-	-		Forb															0.5	1000		
Glycine clandestina	Twining glycine	Fabaceae (Faboideae)	N	-	-		Other																		
Glycine microphylla	Small-leaf Glycine	Fabaceae (Faboideae)	N	-	-		Other																		
Gonocarpus humilis		Haloragaceae	N	-	-		Forb			0.1	200														
Gonocarpus spp.	Raspwort	Haloragaceae	N	-	-		Forb											0.1	500			0.1	300		
Gonocarpus tetragynus	Poverty Raspwort	Haloragaceae	N	-	-		Forb																		
Gonocarpus teucrioides	Germander Raspwort	Haloragaceae	N	-	-		Forb							0.1	50										
Goodenia hederacea	Ivy Goodenia	Goodeniaceae	N	-	-		Forb																		
Goodenia spp.		Goodeniaceae	N	-	-		Forb																		
Haloragis heterophylla	Variable Raspwort	Haloragaceae	N	-	-		Forb																	0.1	50
Haloragis spp.	A Raspwort	Haloragaceae	N	-	-		Forb																		
Hardenbergia violacea	False Sarsaparilla	Fabaceae (Faboideae)	N	-	-		Other									0.5	20								
Helichrysum leucopsideum	Satin Everlasting	Asteraceae	N	-	-		Forb									0.1	50								
Helichrysum spp.		Asteraceae	N	-	-		Forb			0.1	100														
Heliotropium amplexicaule	Blue Heliotrope	Boraginaceae	E	-	-	HTE																			
Hibbertia obtusifolia	Hoary Guinea Flower	Dilleniaceae	N	-	-		Shrub																		
Holcus lanatus	Yorkshire Fog	Poaceae	E	-	-																				
Hordeum leporinum	Barley Grass	Poaceae	E	-	-																				
Hovea heterophylla		Fabaceae (Faboideae)	N	-	-		Forb																		
Hovea spp.		Fabaceae (Faboideae)	N	-	-		Forb																		
Hydrocotyle laxiflora	Stinking Pennywort	Apiaceae	N	-	-		Forb																		
Hydrocotyle sibthorpioides		Apiaceae	N	-	-		Forb																		
Hydrocotyle spp.		Apiaceae	N	-	-		Forb																		
Hypericum gramineum	Small St John's Wort	Clusiaceae	N	-	-		Forb											0.1	5						

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								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Hypericum perforatum	St. Johns Wort	Clusiaceae	E	-	-	HTE				0.1	10					0.1	500	0.1	50	0.5	200	0.1	150		
Hypericum spp.		Clusiaceae	N	-	-		Forb																		
Hypochaeris glabra	Smooth Catsear	Asteraceae	E	-	-			0.1	1000	0.1	500	0.1	500					0.1	100						
Hypochaeris radicata	Catsear	Asteraceae	E	-	-																				
Hypochaeris spp.	A Catsear	Asteraceae	E	-	-									0.1	50	0.1	500			0	0	0.1	0		
Hypochoeris radicata	Catsear	Asteraceae	E	-	-																			0.3	300
Hypoxis spp.		Hypoxidaceae	N	-	-		Forb																		
Isolepis hookeriana		Cyperaceae	N	-	-		Grass & grasslike																		
Joycea pallida	Redanther Wallaby Grass	Poaceae	N	-	-		Grass & grasslike																		
Juncus effusus		Juncaceae	E	-	-																				
Juncus gregiflorus		Juncaceae	N	-	-		Grass & grasslike									0.1	10								
Juncus homalocaulis		Juncaceae	N	-	-		Grass & grasslike																		
Juncus spp.	A Rush	Juncaceae	N	-	-		Grass & grasslike																	0.1	2
Lactuca serriola	Prickly Lettuce	Asteraceae	E	-	-																				
Lagenifera spp.		Asteraceae	N	-	-		Forb																		
Lamarckia aurea	Goldentop	Poaceae	E	-	-																				
Lepidium africanum	Common Peppercress	Brassicaceae	E	-	-																				
Lepidium spp.	A Peppercress	Brassicaceae	N	-	-		Forb																		
Leptospermum myrtifolium		Myrtaceae	N	-	-		Shrub																		
Leptospermum spp.	Tea-tree	Myrtaceae	N	-	-		Shrub																		
Leucopogon appressus		Ericaceae	N	-	-		Shrub																		
Leucopogon fletcheri		Ericaceae	N	-	-		Shrub																		
Leucopogon virgatus		Ericaceae	N	-	-		Shrub																		
Linum marginale	Native Flax	Linaceae	N	-	-		Forb																		
Lissanthe spp.		Ericaceae	N	-	-		Shrub																		
Lolium perenne	Perennial Ryegrass	Poaceae	E	-	-																				
Lomandra cylindrica		Lomandraceae	N	-	-		Grass & grasslike																		
Lomandra filiformis	Wattle Matt-rush	Lomandraceae	N	-	-		Grass & grasslike					0.1	5	0.1	50	0.5	500	0.1	300			25	0		
Lomandra longifolia	Spiny-headed Mat-rush	Lomandraceae	N	-	-		Grass & grasslike					0.1	2	5	0	0.1	5								
Lomandra multiflora	Many-flowered Mat-rush	Lomandraceae	N	-	-		Grass & grasslike																		
Lomandra spp.	Mat-rush	Lomandraceae	N	-	-		Grass & grasslike																		
Lomatia ilicifolia	Holly Lomatia	Proteaceae	N	-	-		Shrub																		
Lomatia myricoides	River Lomatia	Proteaceae	N	-	-		Shrub																		
Luzula spp.		Juncaceae	N	-	-		Grass & grasslike																		
Lycium ferocissimum	African Boxthorn	Solanaceae	E	-	-	HTE																			
Lysimachia arvensis	Scarlet Pimpernel	Primulaceae	E	-	-																				
Lythrum hyssopifolia	Hyssop Loosestrife	Lythraceae	N	-	-		Forb																		
Malus pumila	Apple	Malaceae	E	-	-																				
Malva neglecta	Dwarf Mallow	Malvaceae	E	-	-																				
Marrubium spp.		Lamiaceae	E	-	-																				
Marrubium vulgare	White Horehound	Lamiaceae	E	-	-																				
Medicago polymorpha	Burr Medic	Fabaceae (Faboideae)	E	-	-			0.1	20											0.5	500				
Medicago spp.	A Medic	Fabaceae (Faboideae)	E	-	-																				

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								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Melichrus urceolatus	Urn Heath	Ericaceae	N	-	-		Shrub																		
Melicytus dentatus	Tree Violet	Violaceae	N	-	-		Shrub																		
Microlaena stipoides	Weeping Grass	Poaceae	N	-	-		Grass & grasslike	0.5	100			0.5	100	5	0										
Modiola caroliniana	Red-flowered Mallow	Malvaceae	E	-	-																				
Modiola spp.		Malvaceae	E	-	-																				
Moenchia erecta	Erect Chickweed	Caryophyllaceae	E	-	-																				
Monoculus monstrosus		Asteraceae	E	-	-																				
Monotoca scoparia		Ericaceae	N	-	-		Shrub																		
Nassella trichotoma	Serrated Tussock	Poaceae	E	-	-											5	0								
Notothixos spp.		Viscaceae	N	-	-		Other																		
Olearia spp.		Asteraceae	N	-	-		Shrub																		
Onopordum acanthium	Scotch Thistle	Asteraceae	E	-	-																				
Ophioglossum lusitanicum	Adder's Tongue	Ophioglossaceae	N	-	-		Fern							0.1	200										
Orobanche spp.		Scrophulariaceae	N	-	-		Forb																		
Oxalis perennans		Oxalidaceae	N	-	-		Forb																	0.1	100
Oxalis spp.		Oxalidaceae	N	-	-		Forb									0.1	50								
Ozothamnus diosmifolius	White Dogwood	Asteraceae	N	-	-		Shrub																		
Panicum effusum	Hairy Panic	Poaceae	N	-	-		Grass & grasslike																	5	2000
Paspalum dilatatum	Paspalum	Poaceae	E	-	-	HTE																			
Paspalum spp.		Poaceae	N	-	-		Grass & grasslike																		
Pennisetum clandestinum	Kikuyu Grass	Poaceae	E	-	-																				
Pentaschistis airoides	False Hairgrass	Poaceae	E	-	-																				
Persicaria prostrata	Creeping Knotweed	Polygonaceae	N	-	-		Forb																		
Petrorhagia spp.		Caryophyllaceae	E	-	-																				
Phalaris aquatica	Phalaris	Poaceae	E	-	-																				
Phalaris minor	Lesser Canary Grass	Poaceae	E	-	-																				
Phalaris spp.		Poaceae	E	-	-			30	0	0.5	100			0.1	50	0.5	20			25	0	10	50		
Phragmites australis	Common Reed	Poaceae	N	-	-		Grass & grasslike																		
Phragmites spp.		Poaceae	N	-	-		Grass & grasslike																		
Pinus radiata	Radiata Pine	Pinaceae	E	-	-					90	0	70	0			50	0					0.1	1		
Plantago gaudichaudii	Narrow Plantain	Plantaginaceae	N	-	-		Forb																		
Plantago lanceolata	Lamb's Tongues	Plantaginaceae	E	-	-																				
Plantago spp.	Plantain	Plantaginaceae	N	-	-		Forb	0.1	1000	0.1	500	0	0	0.1	100			0.1	300	0.1	200	0.1	100		
Platylobium formosum		Fabaceae (Faboideae)	N	-	-		Shrub																		
Poa annua	Winter Grass	Poaceae	E	-	-																				
Poa induta		Poaceae	N	-	-		Grass & grasslike																		
Poa labillardierei	Tussock	Poaceae	N	-	-		Grass & grasslike	0.5	50	5	50	5	0	10	0	45	0			25	0				
Poa meionectes		Poaceae	N	-	-		Grass & grasslike																		
Poa sieberiana	Snowgrass	Poaceae	N	-	-		Grass & grasslike	20	0	1	100	5	0			5	0	5	0			5	0		
Poa spp.		Poaceae	N	-	-		Grass & grasslike					0.5	0									15	0		
Polycarpon tetraphyllum	Four-leaved Allseed	Caryophyllaceae	E	-	-																				
Polyscias sambucifolia	Elderberry Panax	Araliaceae	N	-	-		Shrub																		
Populus spp.		Salicaceae	N	-	-		Tree																		

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								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Poranthera microphylla	Small Poranthera	Phyllanthaceae	N	-	-		Forb																		
Portulaca oleracea	Pigweed	Portulacaceae	N	-	-		Forb																	0.1	1
Potentilla spp.		Rosaceae	E	-	-																				
Pseudognaphalium luteoalbum	Jersey Cudweed	Asteraceae	N	-	-		Forb																		
Pteridium esculentum	Bracken	Dennstaedtiaceae	N	-	-		Fern			5	0	5	0	25	0										
Pteridium spp.		Dennstaedtiaceae	N	-	-		Fern	35	0																
Pultenaea microphylla	A Bush Pea	Fabaceae (Faboideae)	N	-	-		Shrub									0.1	3								
Rosa rubiginosa	Sweet Briar	Rosaceae	E	-	-	HTE												0.1	5						
Rosa spp.		Rosaceae	E	-	-															0.5	10				
Rubus fruticosus	Blackberry complex	Rosaceae	E	-	-			25	0	10	0	50	0	20	0	1	15	0.5	10	20	0				
Rubus parvifolius	Native Raspberry	Rosaceae	N	-	-		Shrub																		
Rumex acetosella	Sheep Sorrel	Polygonaceae	E	-	-																				
Rumex brownii	Swamp Dock	Polygonaceae	N	-	-		Forb																		
Rumex crispus	Curled Dock	Polygonaceae	E	-	-																				
Rumex spp.	Dock	Polygonaceae	N	-	-		Forb													0.1	50				
Rytidosperma caespitosum	Ringed Wallaby Grass	Poaceae	N	-	-		Grass & grasslike																		
Rytidosperma longifolium	Long-leaved Wallaby Grass	Poaceae	N	-	-		Grass & grasslike																		
Rytidosperma monticola	Mountain Wallaby Grass	Poaceae	N	-	-		Grass & grasslike																		
Rytidosperma pallidum	Redanther Wallaby Grass	Poaceae	N	-	-		Grass & grasslike																		
Rytidosperma spp.		Poaceae	N	-	-		Grass & grasslike																	0.1	50
Salix fragilis	Crack Willow	Salicaceae	E	-	-																				
Schoenus apogon	Fluke Bogrush	Cyperaceae	N	-	-		Grass & grasslike																		
Scleranthus biflorus	Two-flowered Knawel	Caryophyllaceae	N	-	-		Forb																		
Scolymus hispanicus	Golden Thistle	Asteraceae	E	-	-			1	50	0.1	20			0.1	2					0.1	10	0.1	2		
Senecio diaschides		Asteraceae	N	-	-		Forb																		
Senecio gunnii		Asteraceae	N	-	-		Forb																		
Senecio prenanthoides		Asteraceae	N	-	-		Forb																		
Senecio quadridentatus	Cotton Fireweed	Asteraceae	N	-	-		Forb																		
Senecio spp.	Fireweed	Asteraceae	N	-	-		Forb							0.1	10	0.1	5								
Setaria gracilis		Poaceae	E	-	-																				
Setaria pumila	Pale Pigeon Grass	Poaceae	E	-	-																			0.1	100
Solanum nigrum	Black-berry Nightshade	Solanaceae	E	-	-																				
Solenogyne spp.		Asteraceae	N	-	-		Forb																		
Sonchus asper	Prickly Sowthistle	Asteraceae	E	-	-																				
Sonchus spp.	Sowthistle	Asteraceae	N	-	-		Forb																		
Spergularia rubra	Sandspurry	Caryophyllaceae	E	-	-																				
Sporobolus caroli	Fairy Grass	Poaceae	N	-	-		Grass & grasslike																		
Sporobolus creber	Slender Rat's Tail Grass	Poaceae	N	-	-		Grass & grasslike																	2	250
Stackhousia viminea	Slender Stackhousia	Stackhousiaceae	N	-	-		Forb																		
Stellaria media	Common Chickweed	Caryophyllaceae	E	-	-																				
Stellaria pungens	Prickly Starwort	Caryophyllaceae	N	-	-		Forb																		
Stylidium graminifolium	Grass Triggerplant	Stylidiaceae	N	-	-		Forb																		
Styphelia spp.		Ericaceae	N	-	-		Shrub																		

ScientificName	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	MAC250901		MAC250902		MAC250903		MAC250904		MAC250906		MAC250909		MAC250907		MAC250910		R01DNG	
								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Styphelia triflora	Pink Five-Corners	Ericaceae	N	-	-		Shrub																		
Taraxacum officinale	Dandelion	Asteraceae	E	-	-																			0.2	250
Taraxacum spp.	Dandelion	Asteraceae	N	-	-		Forb			0.1	10	0.1	20							0.1	200				
Themeda australis		Poaceae	N	-	-		Grass & grasslike																		
Themeda triandra		Poaceae	N	-	-		Grass & grasslike	0.1	5													0.1	5		
Thinopyrum ponticum	Tall Wheat Grass	Poaceae	E	-	-																				
Tribulus terrestris	Cat-head	Zygophyllaceae	E	-	-																				
Tricoryne elatior	Yellow Autumn-lily	Anthericaceae	N	-	-		Forb																		
Trifolium angustifolium	Narrow-leaved Clover	Fabaceae (Faboideae)	E	-	-																				
Trifolium arvense	Haresfoot Clover	Fabaceae (Faboideae)	E	-	-																				
Trifolium repens	White Clover	Fabaceae (Faboideae)	E	-	-													0.1	10	0.5	200				
Trifolium spp.	A Clover	Fabaceae (Faboideae)	E	-	-																			0.2	300
Urtica incisa	Stinging Nettle	Urticaceae	N	-	-		Forb																		
Verbascum spp.		Scrophulariaceae	E	-	-																				
Verbascum virgatum	Twiggy Mullein	Scrophulariaceae	E	-	-																				
Veronica calycina	Hairy Speedwell	Plantaginaceae	N	-	-		Forb																		
Veronica plebeia	Trailing Speedwell	Plantaginaceae	N	-	-		Forb																		
Veronica spp.		Plantaginaceae	N	-	-		Forb																		
Vicia sativa	Common vetch	Fabaceae (Faboideae)	E	-	-															0.5	500				
Vicia spp.	Vetch	Fabaceae (Faboideae)	E	-	-																				
Viola betonicifolia	Native Violet	Violaceae	N	-	-		Forb											0.1	50						
Viola spp.		Violaceae	N	-	-		Forb							0.1	10										
Vittadinia dissecta		Asteraceae	N	-	-		Forb																		
Vittadinia spp.	Fuzzweed	Asteraceae	N	-	-		Forb																		
Vulpia myuros	Rat's Tail Fescue	Poaceae	E	-	-																				
Wahlenbergia communis	Tufted Bluebell	Campanulaceae	N	-	-		Forb																	0.1	1
Wahlenbergia gracilenta	Annual Bluebell	Campanulaceae	N	-	-		Forb																		
Wahlenbergia gracilis	Sprawling Bluebell	Campanulaceae	N	-	-		Forb																		
Wahlenbergia spp.	Bluebell	Campanulaceae	N	-	-		Forb																		
Wahlenbergia stricta	Tall Bluebell	Campanulaceae	N	-	-		Forb																		
Wurmbea dioica	Early Nancy	Colchicaceae	N	-	-		Forb																		
Xerochrysum spp.		Asteraceae	N	-	-		Forb																		
Xerochrysum viscosum	Sticky Everlasting	Asteraceae	N	-	-		Forb	0.1	50																
Zieria cytisoides	Downy Zieria	Rutaceae	N	-	-		Shrub																		

ScientificName	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	R02DNG		1330Shrub 1		727-Shrubland1		727-Intact1		1197DNG1		1197-Sparse1		1197Shrub 1		1191-Sparse1		1330-Sparse1	
								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Acacia acinacea	Gold-dust Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia buxifolia	Box-leaved Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia dealbata	Silver Wattle	Fabaceae (Mimosoideae)	N	-	-		Tree			8	20			1	15					10	70				
Acacia deanei	Green Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia falciformis	Broad-leaved Hickory	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia gunnii	Ploughshare Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia implexa	Hickory Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																	1	2
Acacia melanoxylon	Blackwood	Fabaceae (Mimosoideae)	N	-	-		Tree					2	5	0.7	4	0.7	12			1	5	1	15		
Acacia nana	Small Red-leaved Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia obliquinervia	Mountain Hickory	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acacia spp.	Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub																		
Acaena agnipila	Hairy Sheep's Burr	Rosaceae	N	-	-		Forb					0.1	2												
Acaena echinata	Sheep's Burr	Rosaceae	N	-	-		Forb																		
Acaena novae-zelandiae	Bidgee-widgee	Rosaceae	N	-	-		Forb																		
Acaena ovina	Acaena	Rosaceae	N	-	-		Forb																		
Acaena spp.	Sheep's Burr	Rosaceae	N	-	-		Forb			0.1	2			0.1	1									0.1	2
Acetosella vulgaris	Sheep Sorrel	Polygonaceae	E	-	-	HTE				0.8	300	0.6	150			0.2	40			0.1	30				
Acrotriche serrulata	Honeypots	Ericaceae	N	-	-		Shrub																		
Acrotriche spp.		Ericaceae	N	-	-		Shrub																		
Aira cupaniana	Silvery Hairgrass	Poaceae	E	-	-																				
Alternanthera angustifolia		Amaranthaceae	N	-	-		Forb																		
Amperea xiphoclada		Euphorbiaceae	N	-	-		Shrub																		
Amyema miquelii	Box Mistletoe	Loranthaceae	N	-	-		Other																		
Amyema pendula		Loranthaceae	N	-	-		Other																		
Amyema spp.	Mistletoe	Loranthaceae	N	-	-		Other																		
Anagallis arvensis	Scarlet Pimpernel	Primulaceae	E	-	-																				
Anthosachne scabra	Common Wheatgrass	Poaceae	N	-	-		Grass & grasslike																		
Anthoxanthum odoratum	Sweet Vernal Grass	Poaceae	E	-	-							0.1	50												
Anthoxanthum spp.	Vernal Grass	Poaceae	E	-	-																	0.1	20		
Arctotheca calendula	Capeweed	Asteraceae	E	-	-																				
Aristida ramosa	Purple Wiregrass	Poaceae	N	-	-		Grass & grasslike	0.1	1	0.6	250														
Aristida spp.	A Wiregrass	Poaceae	N	-	-		Grass & grasslike																		
Aristida vagans	Threeawn Speargrass	Poaceae	N	-	-		Grass & grasslike																		
Asperula conferta	Common Woodruff	Rubiaceae	N	-	-		Forb																		
Asperula scoparia	Prickly Woodruff	Rubiaceae	N	-	-		Forb																		
Asperula spp.	Woodruff	Rubiaceae	N	-	-		Forb							0.2	40										
Asphodelus fistulosus	Onion Weed	Asphodelaceae	E	-	-																				
Astroloma humifusum	Native Cranberry	Ericaceae	N	-	-		Shrub					0.1	2												
Austrodanthonia spp.		Poaceae	N	-	-		Grass & grasslike																		
Austrostipa nodosa	A Speargrass	Poaceae	N	-	-		Grass & grasslike																		
Austrostipa scabra	Speargrass	Poaceae	N	-	-		Grass & grasslike			0.7	250							0.2	50					0.1	30
Austrostipa spp.	A Speargrass	Poaceae	N	-	-		Grass & grasslike							0.1	20					4	200				
Avena barbata	Bearded Oats	Poaceae	E	-	-																				

ScientificName	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	R02DNG		1330Shrub 1		727-Shrubland1		727-Intact1		1197DNG1		1197-Sparse1		1197Shrub 1		1191-Sparse1		1330-Sparse1	
								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Avena fatua	Wild Oats	Poaceae	E	-	-																				
Avena sativa	Oats	Poaceae	E	-	-																				
Avena spp.	Oats	Poaceae	E	-	-																			0.1	8
Bidens subalternans	Greater Beggar's Ticks	Asteraceae	E	-	-																			0.1	4
Billardiera scandens	Hairy Apple Berry	Pittosporaceae	N	-	-		Other																		
Blechnum spp.		Blechnaceae	N	-	-		Fern																		
Bossiaea buxifolia		Fabaceae (Faboideae)	N	-	-		Shrub																		
Bossiaea prostrata		Fabaceae (Faboideae)	N	-	-		Forb																		
Bothriochloa macra	Red Grass	Poaceae	N	-	-		Grass & grasslike			4	300													0.2	50
Brachyloma daphnoides	Daphne Heath	Ericaceae	N	-	-		Shrub			0.1	1														
Brachyscome rigidula	Hairy Cutleaf Daisy	Asteraceae	N	-	-		Forb																		
Brachyscome spp.		Asteraceae	N	-	-		Forb					0.1	1												
Brassica oleracea	Collards	Brassicaceae	E	-	-																				
Brassica spp.	Brassica	Brassicaceae	E	-	-					0.1	6													4	80
Brassica tournefortii	Mediterranean Turnip	Brassicaceae	E	-	-	HTE																			
Bromus catharticus	Praire Grass	Poaceae	E	-	-																				
Bromus diandrus	Great Brome	Poaceae	E	-	-	HTE																			
Bromus hordeaceus	Soft Brome	Poaceae	E	-	-																				
Bulbine bulbosa	Bulbine Lily	Asphodelaceae	N	-	-		Forb																		
Bursaria spinosa	Native Blackthorn	Pittosporaceae	N	-	-		Shrub																		
Caesia spp.		Anthericaceae	N	-	-		Forb																		
Callistemon citrinus	Crimson Bottlebrush	Myrtaceae	N	-	-		Shrub																		
Calotis lappulacea	Yellow Burr-daisy	Asteraceae	N	-	-		Forb																	0.1	20
Calotis spp.	A Burr-daisy	Asteraceae	N	-	-		Forb																		
Carex appressa	Tall Sedge	Cyperaceae	N	-	-		Grass & grasslike																		
Carex bichenoviana		Cyperaceae	N	-	-		Grass & grasslike																		
Carex fascicularis	Tassel Sedge	Cyperaceae	N	-	-		Grass & grasslike																		
Carex gaudichaudiana		Cyperaceae	N	-	-		Grass & grasslike																		
Carex spp.		Cyperaceae	N	-	-		Grass & grasslike																		
Cassinia aculeata	Dolly Bush	Asteraceae	N	-	-		Shrub																		
Cassinia arcuata	Sifton Bush	Asteraceae	N	-	-		Shrub			2	20					5	200	1	20			0.4	15		
Cassinia laevis	Cough Bush	Asteraceae	N	-	-		Shrub																		
Cassinia longifolia		Asteraceae	N	-	-		Shrub																		
Cassinia quinquefaria		Asteraceae	N	-	-		Shrub																		
Cassinia spp.		Asteraceae	N	-	-		Shrub					0.1	2												
Casuarina cunninghamiana	River Oak	Casuarinaceae	N	-	-		Tree																		
Centaurium spp.		Gentianaceae	E	-	-													0.1	2						
Centella asiatica	Indian Pennywort	Apiaceae	N	-	-		Forb																		
Cheilanthes austrotenuifolia	Rock Fern	Pteridaceae	N	-	-		Fern			0.1	1											0.1	1	0.1	1
Cheilanthes spp.	Rock Fern	Pteridaceae	N	-	-		Fern																		
Chenopodium album	Fat Hen	Chenopodiaceae	E	-	-																				
Chloris spp.		Poaceae	N	-	-		Grass & grasslike																		
Chloris truncata	Windmill Grass	Poaceae	N	-	-		Grass & grasslike																		

ScientificName	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	R02DNG		1330Shrub 1		727-Shrubland1		727-Intact1		1197DNG1		1197-Sparse1		1197Shrub 1		1191-Sparse1		1330-Sparse1	
								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Chloris ventricosa	Tall Chloris	Poaceae	N	-	-		Grass & grasslike			0.1	8														
Chondrilla juncea	Skeleton Weed	Asteraceae	E	-	-																			0.1	10
Chrysocephalum apiculatum	Common Everlasting	Asteraceae	N	-	-		Forb																	0.1	3
Chrysocephalum semicalvum		Asteraceae	N	-	-		Forb																		
Cirsium vulgare	Spear Thistle	Asteraceae	E	-	-											0.2	20			0.4	30				
Clematis aristata	Old Man's Beard	Ranunculaceae	N	-	-		Other							0.1	3										
Convolvulus angustissimus		Convolvulaceae	N	-	-		Other																		
Conyza bonariensis	Flaxleaf Fleabane	Asteraceae	E	-	-			0.1	1																
Conyza spp.	A Fleabane	Asteraceae	E	-	-					0.1	8					0.1	3			0.1	7	0.1	1		
Coronidium elatum		Asteraceae	N	-	-		Shrub							4	2000										
Coronidium rutidolepis		Asteraceae	N	-	-																				
Coronidium scorpioides	Button Everlasting	Asteraceae	N	-	-		Forb					4	2000									0.6	200		
Coronidium spp.		Asteraceae	N	-	-		Forb							0.1	2			0.1	1						
Cotoneaster spp.		Malaceae	E	-	-	HTE																			
Crassula sieberiana	Australian Stonecrop	Crassulaceae	N	-	-		Forb																		
Crataegus monogyna	Hawthorn	Malaceae	E	-	-	HTE																			
Crepis capillaris	Smooth Hawksbeard	Asteraceae	E	-	-																			0.1	60
Cullen tenax	Emu-foot	Fabaceae (Faboideae)	N	-	-		Forb																		
Cymbonotus lawsonianus	Bear's Ear	Asteraceae	N	-	-		Forb																		
Cymbonotus preissianus	Austral Bear's Ear	Asteraceae	N	-	-		Forb																		
Cynodon dactylon	Common Couch	Poaceae	N	-	-		Grass & grasslike			0.2	20													0.3	10
Cynodon spp.		Poaceae	N	-	-		Grass & grasslike																		
Cynodon transvaalensis	South African Couch	Poaceae	E	-	-																				
Cyperus brevifolius		Cyperaceae	E	-	-																				
Cyperus eragrostis	Umbrella Sedge	Cyperaceae	E	-	-	HTE																			
Cyperus lhotskyanus		Cyperaceae	N	-	-		Grass & grasslike																		
Cyperus spp.		Cyperaceae	N	-	-		Grass & grasslike																		
Cytisus scoparius	English Broom	Fabaceae (Faboideae)	E	-	-	HTE																			
Dactylis glomerata	Cocksfoot	Poaceae	E	-	-																				
Daucus glochidiatus	Native Carrot	Apiaceae	N	-	-		Forb											0.1	1						
Daviesia corymbosa		Fabaceae (Faboideae)	N	-	-		Shrub											0.1	1						
Daviesia latifolia	Bitter-pea	Fabaceae (Faboideae)	N	-	-		Shrub					0.2	3	0.1	1										
Daviesia leptophylla		Fabaceae (Faboideae)	N	-	-		Shrub																		
Daviesia spp.		Fabaceae (Faboideae)	N	-	-		Shrub															0.4	30		
Desmodium gunnii	Slender Tick-trefoil	Fabaceae (Faboideae)	N	-	-		Forb																		
Desmodium spp.	Tick-trefoil	Fabaceae (Faboideae)	N	-	-		Other																		
Dianella longifolia	Blueberry Lily	Phormiaceae	N	-	-		Forb																		
Dianella revoluta	Blueberry Lily	Phormiaceae	N	-	-		Forb					0.1	1												
Dianella spp.		Phormiaceae	N	-	-		Forb																		
Dichanthium spp.		Poaceae	N	-	-		Grass & grasslike							0.1	30										
Dichondra repens	Kidney Weed	Convolvulaceae	N	-	-		Forb					0.1	1	0.1	1										
Dichopogon spp.	Chocolate Lily	Anthericaceae	N	-	-		Forb					0.1	2												
Digitaria brownii	Cotton Panic Grass	Poaceae	N	-	-		Grass & grasslike	0.2	150	6	600													3	150

ScientificName	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	R02DNG		1330Shrub 1		727-Shrubland1		727-Intact1		1197DNG1		1197-Sparse1		1197Shrub 1		1191-Sparse1		1330-Sparse1	
								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Dillwynia cinerascens		Fabaceae (Faboideae)	N	-	-		Shrub																		
Dillwynia phylicoides	Parrot-pea	Fabaceae (Faboideae)	N	-	-		Shrub																		
Dillwynia sericea	Egg and Bacon Pea	Fabaceae (Faboideae)	N	-	-		Shrub																		
Dillwynia spp.		Fabaceae (Faboideae)	N	-	-		Shrub									0.2	8			0.1	1				
Dipodium hamiltonianum	Yellow Hyacinth-orchid	Orchidaceae	N	-	-		Forb																		
Dipsacus spp.		Dipsacaceae	E	-	-					0.1	1														
Drosera spp.		Droseraceae	N	-	-		Forb																		
Dysphania pumilio	Small Crumbweed	Chenopodiaceae	N	-	-		Forb	0.1	10																
Dysphania spp.		Chenopodiaceae	N	-	-		Forb																	0.1	50
Echinopogon ovatus	Forest Hedgehog Grass	Poaceae	N	-	-		Grass & grasslike																		
Echium plantagineum	Patterson's Curse	Boraginaceae	E	-	-					3	1000														
Echium spp.		Boraginaceae	E	-	-																				
Echium vulgare	Viper's Bugloss	Boraginaceae	E	-	-			0.2	20															4	500
Einadia hastata	Berry Saltbush	Chenopodiaceae	N	-	-		Forb																		
Einadia nutans	Climbing Saltbush	Chenopodiaceae	N	-	-		Forb																		
Einadia polygonoides	Knotweed Goosefoot	Chenopodiaceae	N	-	-		Forb			0.2	2													0.1	5
Eleocharis acuta		Cyperaceae	N	-	-		Grass & grasslike																		
Eleusine tristachya	Goose Grass	Poaceae	E	-	-																				
Elymus scaber	Common Wheatgrass	Poaceae	N	-	-		Grass & grasslike																		
Enneapogon nigricans	Niggerheads	Poaceae	N	-	-		Grass & grasslike																		
Enteropogon acicularis	Curly Windmill Grass	Poaceae	N	-	-		Grass & grasslike																		
Epacris spp.		Ericaceae	N	-	-		Shrub																		
Epilobium spp.		Onagraceae	N	-	-		Forb					0.1	1												
Eragrostis cilianensis	Stinkgrass	Poaceae	E	-	-			0.2	100															0.3	200
Eragrostis curvula	African Lovegrass	Poaceae	E	-	-	HTE		3	60	3	100														
Eragrostis leptostachya	Paddock Lovegrass	Poaceae	N	-	-		Grass & grasslike			0.4	100													0.2	50
Eragrostis parviflora	Weeping Lovegrass	Poaceae	N	-	-		Grass & grasslike	0.1	100															0.1	10
Eragrostis spp.	A Lovegrass	Poaceae	N	-	-		Grass & grasslike	40	6000													0.1	2		
Erodium botrys	Long Storksbill	Geraniaceae	E	-	-																				
Erodium cicutarium	Common Crowfoot	Geraniaceae	E	-	-																				
Erodium crinitum	Blue Crowfoot	Geraniaceae	N	-	-		Forb																		
Erodium malacoides		Geraniaceae	E	-	-																				
Erodium spp.	Crowfoot	Geraniaceae	N	-	-		Forb																	0.1	2
Eucalyptus blakelyi	Blakely's Red Gum	Myrtaceae	N	-	-		Tree																		
Eucalyptus bridgesiana	Apple Box	Myrtaceae	N	-	-		Tree																		
Eucalyptus cannonii	Capertee Stringybark	Myrtaceae	N	V	-		Tree																		
Eucalyptus dalrympleana	Mountain Gum	Myrtaceae	N	-	-		Tree					3	4	1	1			6	4			1	2		
Eucalyptus dives	Broad-leaved Peppermint	Myrtaceae	N	-	-		Tree											6	7						
Eucalyptus fastigata	Brown Barrel	Myrtaceae	N	-	-		Tree							45	30										
Eucalyptus goniocalyx	Bundy	Myrtaceae	N	-	-		Tree																	1	4
Eucalyptus macrorhyncha	Red Stringybark	Myrtaceae	N	-	-		Tree																		
Eucalyptus mannifera	Brittle Gum	Myrtaceae	N	-	-		Tree																		
Eucalyptus melliodora	Yellow Box	Myrtaceae	N	-	-		Tree											2	1					7	2

ScientificName	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	R02DNG		1330Shrub 1		727-Shrubland1		727-Intact1		1197DNG1		1197-Sparse1		1197Shrub 1		1191-Sparse1		1330-Sparse1	
								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Eucalyptus pauciflora	White Sally	Myrtaceae	N	-	-		Tree													0.7	1	4	8		
Eucalyptus rossii	Inland Scribbly Gum	Myrtaceae	N	-	-		Tree																		
Eucalyptus spp.		Myrtaceae	N	-	-		Tree																		
Eucalyptus stellulata	Black Sally	Myrtaceae	N	-	-		Tree																		
Eucalyptus viminalis	Ribbon Gum	Myrtaceae	N	-	-		Tree																		
Euchiton japonicus		Asteraceae	N	-	-		Forb																		
Euchiton sphaericus	Star Cudweed	Asteraceae	N	-	-		Forb					0.1	10												
Euchiton spp.	A Cudweed	Asteraceae	N	-	-		Forb									0.1	6	0.1	1						
Euphorbia dallachyana		Euphorbiaceae	N	-	-		Forb																		
Euphorbia drummondii	Caustic Weed	Euphorbiaceae	N	-	-		Forb																		
Euphorbia spp.		Euphorbiaceae	N	-	-		Forb																		
Exocarpos cupressiformis	Cherry Ballart	Santalaceae	N	-	-		Shrub																		
Exocarpos strictus	Dwarf Cherry	Santalaceae	N	-	-		Shrub																		
Foeniculum vulgare	Fennel	Apiaceae	E	-	-																			0.1	1
Galium murale	Small Bedstraw	Rubiaceae	E	-	-																				
Gamochaeta calviceps	Cudweed	Asteraceae	E	-	-																				
Geranium graniticola		Geraniaceae	N	-	-		Forb																		
Geranium molle	Cranesbill Geranium	Geraniaceae	E	-	-																				
Geranium solanderi	Native Geranium	Geraniaceae	N	-	-		Forb																		
Geranium spp.		Geraniaceae	N	-	-		Forb					0.1	20	0.1	4	0.1	2			0.1	4			0.1	2
Glycine clandestina	Twining glycine	Fabaceae (Faboideae)	N	-	-		Other							0.1	2										
Glycine microphylla	Small-leaf Glycine	Fabaceae (Faboideae)	N	-	-		Other																		
Gonocarpus humilis		Haloragaceae	N	-	-		Forb																		
Gonocarpus spp.	Raspwort	Haloragaceae	N	-	-		Forb																		
Gonocarpus tetragynus	Poverty Raspwort	Haloragaceae	N	-	-		Forb																		
Gonocarpus teucrioides	Germander Raspwort	Haloragaceae	N	-	-		Forb					0.1	3	0.1	4			0.1	3			0.1	2		
Goodenia hederacea	Ivy Goodenia	Goodeniaceae	N	-	-		Forb																		
Goodenia spp.		Goodeniaceae	N	-	-		Forb																		
Haloragis heterophylla	Variable Raspwort	Haloragaceae	N	-	-		Forb																		
Haloragis spp.	A Raspwort	Haloragaceae	N	-	-		Forb																		
Hardenbergia violacea	False Sarsaparilla	Fabaceae (Faboideae)	N	-	-		Other					0.1	2			0.2	4								
Helichrysum leucopsideum	Satin Everlasting	Asteraceae	N	-	-		Forb																		
Helichrysum spp.		Asteraceae	N	-	-		Forb																		
Heliotropium amplexicaule	Blue Heliotrope	Boraginaceae	E	-	-	HTE																			
Hibbertia obtusifolia	Hoary Guinea Flower	Dilleniaceae	N	-	-		Shrub					0.6	50			0.1	2					0.1	2		
Holcus lanatus	Yorkshire Fog	Poaceae	E	-	-																				
Hordeum leporinum	Barley Grass	Poaceae	E	-	-																				
Hovea heterophylla		Fabaceae (Faboideae)	N	-	-		Forb																		
Hovea spp.		Fabaceae (Faboideae)	N	-	-		Forb											0.1	1						
Hydrocotyle laxiflora	Stinking Pennywort	Apiaceae	N	-	-		Forb																		
Hydrocotyle sibthorpioides		Apiaceae	N	-	-		Forb																		
Hydrocotyle spp.		Apiaceae	N	-	-		Forb							0.2	30					0.1	2	0.1	3		
Hypericum gramineum	Small St John's Wort	Clusiaceae	N	-	-		Forb																		

ScientificName	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	R02DNG		1330Shrub 1		727-Shrubland1		727-Intact1		1197DNG1		1197-Sparse1		1197Shrub 1		1191-Sparse1		1330-Sparse1	
								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Hypericum perforatum	St. Johns Wort	Clusiaceae	E	-	-	HTE						0.1	4			0.1	10								
Hypericum spp.		Clusiaceae	N	-	-		Forb																		
Hypochaeris glabra	Smooth Catsear	Asteraceae	E	-	-																				
Hypochaeris radicata	Catsear	Asteraceae	E	-	-			0.2	250																
Hypochaeris spp.	A Catsear	Asteraceae	E	-	-																				
Hypochoeris radicata	Catsear	Asteraceae	E	-	-					6	2000	0.3	250	0.1	10	2	800	1	300	3	2000	2	70		
Hypoxis spp.		Hypoxidaceae	N	-	-		Forb																		
Isolepis hookeriana		Cyperaceae	N	-	-		Grass & grasslike																		
Joycea pallida	Redanther Wallaby Grass	Poaceae	N	-	-		Grass & grasslike																		
Juncus effusus		Juncaceae	E	-	-																				
Juncus gregiflorus		Juncaceae	N	-	-		Grass & grasslike																		
Juncus homalocaulis		Juncaceae	N	-	-		Grass & grasslike																		
Juncus spp.	A Rush	Juncaceae	N	-	-		Grass & grasslike																		
Lactuca serriola	Prickly Lettuce	Asteraceae	E	-	-																				
Lagenifera spp.		Asteraceae	N	-	-		Forb							0.1	4										
Lamarckia aurea	Goldentop	Poaceae	E	-	-																				
Lepidium africanum	Common Peppercress	Brassicaceae	E	-	-																				
Lepidium spp.	A Peppercress	Brassicaceae	N	-	-		Forb											0.1	1					0.1	20
Leptospermum myrtifolium		Myrtaceae	N	-	-		Shrub																		
Leptospermum spp.	Tea-tree	Myrtaceae	N	-	-		Shrub																		
Leucopogon appressus		Ericaceae	N	-	-		Shrub																		
Leucopogon fletcheri		Ericaceae	N	-	-		Shrub																		
Leucopogon virgatus		Ericaceae	N	-	-		Shrub																		
Linum marginale	Native Flax	Linaceae	N	-	-		Forb																		
Lissanthe spp.		Ericaceae	N	-	-		Shrub																	0.1	1
Lolium perenne	Perennial Ryegrass	Poaceae	E	-	-																			10	4000
Lomandra cylindrica		Lomandraceae	N	-	-		Grass & grasslike																		
Lomandra filiformis	Wattle Matt-rush	Lomandraceae	N	-	-		Grass & grasslike																		
Lomandra longifolia	Spiny-headed Mat-rush	Lomandraceae	N	-	-		Grass & grasslike					5	250	2	50	0.1	2	0.2	40						
Lomandra multiflora	Many-flowered Mat-rush	Lomandraceae	N	-	-		Grass & grasslike																		
Lomandra spp.	Mat-rush	Lomandraceae	N	-	-		Grass & grasslike					0.1	8			0.8	100			0.1	1			0.1	1
Lomatia ilicifolia	Holly Lomatia	Proteaceae	N	-	-		Shrub																		
Lomatia myricoides	River Lomatia	Proteaceae	N	-	-		Shrub																		
Luzula spp.		Juncaceae	N	-	-		Grass & grasslike					0.1	20												
Lycium ferocissimum	African Boxthorn	Solanaceae	E	-	-	HTE																			
Lysimachia arvensis	Scarlet Pimpernel	Primulaceae	E	-	-											0.4	200			0.3	80				
Lythrum hyssopifolia	Hyssop Loosestrife	Lythraceae	N	-	-		Forb									0.1	1								
Malus pumila	Apple	Malaceae	E	-	-																				
Malva neglecta	Dwarf Mallow	Malvaceae	E	-	-																				
Marrubium spp.		Lamiaceae	E	-	-																				
Marrubium vulgare	White Horehound	Lamiaceae	E	-	-																				
Medicago polymorpha	Burr Medic	Fabaceae (Faboideae)	E	-	-																				
Medicago spp.	A Medic	Fabaceae (Faboideae)	E	-	-																				

ScientificName	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	R02DNG		1330Shrub 1		727-Shrubland1		727-Intact1		1197DNG1		1197-Sparse1		1197Shrub 1		1191-Sparse1		1330-Sparse1	
								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Melichrus urceolatus	Urn Heath	Ericaceae	N	-	-		Shrub																		
Melicytus dentatus	Tree Violet	Violaceae	N	-	-		Shrub																		
Microlaena stipoides	Weeping Grass	Poaceae	N	-	-		Grass & grasslike			0.3	80	40	####	2	200	1	1000	8	3000	0.6	200	4	3000	0.1	20
Modiola caroliniana	Red-flowered Mallow	Malvaceae	E	-	-																			0.1	2
Modiola spp.		Malvaceae	E	-	-																				
Moenchia erecta	Erect Chickweed	Caryophyllaceae	E	-	-																				
Monoculus monstrosus		Asteraceae	E	-	-																				
Monotoca scoparia		Ericaceae	N	-	-		Shrub					0.1	1												
Nassella trichotoma	Serrated Tussock	Poaceae	E	-	-																				
Notothixos spp.		Viscaceae	N	-	-		Other																		
Olearia spp.		Asteraceae	N	-	-		Shrub																		
Onopordum acanthium	Scotch Thistle	Asteraceae	E	-	-																				
Ophioglossum lusitanicum	Adder's Tongue	Ophioglossaceae	N	-	-		Fern																		
Orobanche spp.		Scrophulariaceae	N	-	-		Forb																	0.1	3
Oxalis perennans		Oxalidaceae	N	-	-		Forb			0.1	20	0.1	4			0.2	80			0.2	100				
Oxalis spp.		Oxalidaceae	N	-	-		Forb																		
Ozothamnus diosmifolius	White Dogwood	Asteraceae	N	-	-		Shrub							0.1	1										
Panicum effusum	Hairy Panic	Poaceae	N	-	-		Grass & grasslike	0.2	400	0.1	6													0.1	3
Paspalum dilatatum	Paspalum	Poaceae	E	-	-	HTE				5	600													0.2	50
Paspalum spp.		Poaceae	N	-	-		Grass & grasslike																		
Pennisetum clandestinum	Kikuyu Grass	Poaceae	E	-	-																				
Pentaschistis airoides	False Hairgrass	Poaceae	E	-	-																				
Persicaria prostrata	Creeping Knotweed	Polygonaceae	N	-	-		Forb																		
Petrorhagia spp.		Caryophyllaceae	E	-	-																				
Phalaris aquatica	Phalaris	Poaceae	E	-	-																			0.2	100
Phalaris minor	Lesser Canary Grass	Poaceae	E	-	-																				
Phalaris spp.		Poaceae	E	-	-					20	5000					0.2	50	0.1	20						
Phragmites australis	Common Reed	Poaceae	N	-	-		Grass & grasslike																		
Phragmites spp.		Poaceae	N	-	-		Grass & grasslike																		
Pinus radiata	Radiata Pine	Pinaceae	E	-	-							0.2	2			1	4			2	2	0.2	20		
Plantago gaudichaudii	Narrow Plantain	Plantaginaceae	N	-	-		Forb																		
Plantago lanceolata	Lamb's Tongues	Plantaginaceae	E	-	-					2	700					0.7	300			4	2000			0.1	10
Plantago spp.	Plantain	Plantaginaceae	N	-	-		Forb																		
Platylobium formosum		Fabaceae (Faboideae)	N	-	-		Shrub					0.5	10	0.2	10										
Poa annua	Winter Grass	Poaceae	E	-	-																				
Poa induta		Poaceae	N	-	-		Grass & grasslike																		
Poa labillardierei	Tussock	Poaceae	N	-	-		Grass & grasslike											15	800	10	300				
Poa meionectes		Poaceae	N	-	-		Grass & grasslike																		
Poa sieberiana	Snowgrass	Poaceae	N	-	-		Grass & grasslike					5	1500	8	600			2	2000						
Poa spp.		Poaceae	N	-	-		Grass & grasslike									15	1500					15	5000		
Polycarpon tetraphyllum	Four-leaved Allseed	Caryophyllaceae	E	-	-																				
Polyscias sambucifolia	Elderberry Panax	Araliaceae	N	-	-		Shrub					0.1	1	0.1	5										
Populus spp.		Salicaceae	N	-	-		Tree																		

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								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Poranthera microphylla	Small Poranthera	Phyllanthaceae	N	-	-		Forb															0.1	20		
Portulaca oleracea	Pigweed	Portulacaceae	N	-	-		Forb																		
Potentilla spp.		Rosaceae	E	-	-					0.1	4														
Pseudognaphalium luteoalbum	Jersey Cudweed	Asteraceae	N	-	-		Forb																		
Pteridium esculentum	Bracken	Dennstaedtiaceae	N	-	-		Fern					2	150	5	150							0.4	40		
Pteridium spp.		Dennstaedtiaceae	N	-	-		Fern																		
Pultenaea microphylla	A Bush Pea	Fabaceae (Faboideae)	N	-	-		Shrub																		
Rosa rubiginosa	Sweet Briar	Rosaceae	E	-	-	HTE																			
Rosa spp.		Rosaceae	E	-	-																				
Rubus fruticosus	Blackberry complex	Rosaceae	E	-	-					0.6	2	0.1	3	0.1	4	0.5	3	0.2	4	25	400	0.1	3		
Rubus parvifolius	Native Raspberry	Rosaceae	N	-	-		Shrub																		
Rumex acetosella	Sheep Sorrel	Polygonaceae	E	-	-																				
Rumex brownii	Swamp Dock	Polygonaceae	N	-	-		Forb			0.1	2														
Rumex crispus	Curled Dock	Polygonaceae	E	-	-																				
Rumex spp.	Dock	Polygonaceae	N	-	-		Forb																		
Rytidosperma caespitosum	Ringed Wallaby Grass	Poaceae	N	-	-		Grass & grasslike																		
Rytidosperma longifolium	Long-leaved Wallaby Grass	Poaceae	N	-	-		Grass & grasslike															2	30		
Rytidosperma monticola	Mountain Wallaby Grass	Poaceae	N	-	-		Grass & grasslike																		
Rytidosperma pallidum	Redanther Wallaby Grass	Poaceae	N	-	-		Grass & grasslike																		
Rytidosperma spp.		Poaceae	N	-	-		Grass & grasslike			0.4	150	0.2	400	0.1	50	5	4000	2	1000	5	3000	1	500	4	2000
Salix fragilis	Crack Willow	Salicaceae	E	-	-																				
Schoenus apogon	Fluke Bogrush	Cyperaceae	N	-	-		Grass & grasslike																		
Scleranthus biflorus	Two-flowered Knawel	Caryophyllaceae	N	-	-		Forb					1	300												
Scolymus hispanicus	Golden Thistle	Asteraceae	E	-	-																				
Senecio diaschides		Asteraceae	N	-	-		Forb																		
Senecio gunnii		Asteraceae	N	-	-		Forb							0.1	4	0.2	20	0.1	2						
Senecio prenanthoides		Asteraceae	N	-	-		Forb																		
Senecio quadridentatus	Cotton Fireweed	Asteraceae	N	-	-		Forb			0.2	8					0.2	30			0.1	4				
Senecio spp.	Fireweed	Asteraceae	N	-	-		Forb													0.1	10				
Setaria gracilis		Poaceae	E	-	-			0.1	100	0.2	30														
Setaria pumila	Pale Pigeon Grass	Poaceae	E	-	-																				
Solanum nigrum	Black-berry Nightshade	Solanaceae	E	-	-					0.1	1					0.1	10			0.2	40			0.1	1
Solenogyne spp.		Asteraceae	N	-	-		Forb							0.1	2										
Sonchus asper	Prickly Sowthistle	Asteraceae	E	-	-					0.1	4					0.1	10			0.2	20				
Sonchus spp.	Sowthistle	Asteraceae	N	-	-		Forb																	0.1	1
Spergularia rubra	Sandspurry	Caryophyllaceae	E	-	-																				
Sporobolus caroli	Fairy Grass	Poaceae	N	-	-		Grass & grasslike																		
Sporobolus creber	Slender Rat's Tail Grass	Poaceae	N	-	-		Grass & grasslike	2	100																
Stackhousia viminea	Slender Stackhousia	Stackhousiaceae	N	-	-		Forb					0.1	8	0.1	2										
Stellaria media	Common Chickweed	Caryophyllaceae	E	-	-																				
Stellaria pungens	Prickly Starwort	Caryophyllaceae	N	-	-		Forb							0.1	20										
Stylidium graminifolium	Grass Triggerplant	Stylidiaceae	N	-	-		Forb															0.1	6		
Styphelia spp.		Ericaceae	N	-	-		Shrub					0.2	1												

ScientificName	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	R02DNG		1330Shrub 1		727-Shrubland1		727-Intact1		1197DNG1		1197-Sparse1		1197Shrub 1		1191-Sparse1		1330-Sparse1	
								Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Styphelia triflora	Pink Five-Corners	Ericaceae	N	-	-		Shrub																		
Taraxacum officinale	Dandelion	Asteraceae	E	-	-																			0.1	10
Taraxacum spp.	Dandelion	Asteraceae	N	-	-		Forb																		
Themeda australis		Poaceae	N	-	-		Grass & grasslike															0.2	20		
Themeda triandra		Poaceae	N	-	-		Grass & grasslike																		
Thinopyrum ponticum	Tall Wheat Grass	Poaceae	E	-	-																				
Tribulus terrestris	Cat-head	Zygophyllaceae	E	-	-			0.1	1															0.1	3
Tricoryne elatior	Yellow Autumn-lily	Anthericaceae	N	-	-		Forb																		
Trifolium angustifolium	Narrow-leaved Clover	Fabaceae (Faboideae)	E	-	-																				
Trifolium arvense	Haresfoot Clover	Fabaceae (Faboideae)	E	-	-																			0.2	2000
Trifolium repens	White Clover	Fabaceae (Faboideae)	E	-	-			5	4000																
Trifolium spp.	A Clover	Fabaceae (Faboideae)	E	-	-					0.1	20	0.1	2			0.1	50			0.2	300			0.3	1000
Urtica incisa	Stinging Nettle	Urticaceae	N	-	-		Forb																		
Verbascum spp.		Scrophulariaceae	E	-	-					0.2	20														
Verbascum virgatum	Twiggy Mullein	Scrophulariaceae	E	-	-																				
Veronica calycina	Hairy Speedwell	Plantaginaceae	N	-	-		Forb					0.1	20												
Veronica plebeia	Trailing Speedwell	Plantaginaceae	N	-	-		Forb							0.1	8	0.2	20								
Veronica spp.		Plantaginaceae	N	-	-		Forb																	0.1	20
Vicia sativa	Common vetch	Fabaceae (Faboideae)	E	-	-																				
Vicia spp.	Vetch	Fabaceae (Faboideae)	E	-	-																				
Viola betonicifolia	Native Violet	Violaceae	N	-	-		Forb							0.2	80			0.1	2			0.1	5		
Viola spp.		Violaceae	N	-	-		Forb							0.1	20										
Vittadinia dissecta		Asteraceae	N	-	-		Forb																		
Vittadinia spp.	Fuzzweed	Asteraceae	N	-	-		Forb																		
Vulpia myuros	Rat's Tail Fescue	Poaceae	E	-	-																				
Wahlenbergia communis	Tufted Bluebell	Campanulaceae	N	-	-		Forb																		
Wahlenbergia gracilenta	Annual Bluebell	Campanulaceae	N	-	-		Forb																		
Wahlenbergia gracilis	Sprawling Bluebell	Campanulaceae	N	-	-		Forb																		
Wahlenbergia spp.	Bluebell	Campanulaceae	N	-	-		Forb																	0.1	1
Wahlenbergia stricta	Tall Bluebell	Campanulaceae	N	-	-		Forb																		
Wurmbea dioica	Early Nancy	Colchicaceae	N	-	-		Forb																		
Xerochrysum spp.		Asteraceae	N	-	-		Forb									0.2	6	0.4	30						
Xerochrysum viscosum	Sticky Everlasting	Asteraceae	N	-	-		Forb																		
Zieria cytisoides	Downy Zieria	Rutaceae	N	-	-		Shrub																		

								0.3	200

ScientificName	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	1330-fragments1		277DNG1	
								Cover	Abundance	Cover	Abundance
Acacia acinacea	Gold-dust Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub				
Acacia buxifolia	Box-leaved Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub				
Acacia dealbata	Silver Wattle	Fabaceae (Mimosoideae)	N	-	-		Tree			0.2	3
Acacia deanei	Green Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub				
Acacia falciformis	Broad-leaved Hickory	Fabaceae (Mimosoideae)	N	-	-		Shrub				
Acacia gunnii	Ploughshare Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub				
Acacia implexa	Hickory Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub				
Acacia melanoxylon	Blackwood	Fabaceae (Mimosoideae)	N	-	-		Tree				
Acacia nana	Small Red-leaved Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub				
Acacia obliquinervia	Mountain Hickory	Fabaceae (Mimosoideae)	N	-	-		Shrub				
Acacia spp.	Wattle	Fabaceae (Mimosoideae)	N	-	-		Shrub				
Acaena agnipila	Hairy Sheep's Burr	Rosaceae	N	-	-		Forb				
Acaena echinata	Sheep's Burr	Rosaceae	N	-	-		Forb				
Acaena novae-zelandiae	Bidgee-widgee	Rosaceae	N	-	-		Forb				
Acaena ovina	Acaena	Rosaceae	N	-	-		Forb				
Acaena spp.	Sheep's Burr	Rosaceae	N	-	-		Forb				
Acetosella vulgaris	Sheep Sorrel	Polygonaceae	E	-	-	HTE		0.1	3		
Acrotriche serrulata	Honeypots	Ericaceae	N	-	-		Shrub				
Acrotriche spp.		Ericaceae	N	-	-		Shrub				
Aira cupaniana	Silvery Hairgrass	Poaceae	E	-	-						
Alternanthera angustifolia		Amaranthaceae	N	-	-		Forb				
Amperea xiphoclada		Euphorbiaceae	N	-	-		Shrub				
Amyema miquelii	Box Mistletoe	Loranthaceae	N	-	-		Other				
Amyema pendula		Loranthaceae	N	-	-		Other				
Amyema spp.	Mistletoe	Loranthaceae	N	-	-		Other				
Anagallis arvensis	Scarlet Pimpernel	Primulaceae	E	-	-						
Anthosachne scabra	Common Wheatgrass	Poaceae	N	-	-		Grass & grasslike				
Anthoxanthum odoratum	Sweet Vernal Grass	Poaceae	E	-	-						
Anthoxanthum spp.	Vernal Grass	Poaceae	E	-	-						
Arctotheca calendula	Capeweed	Asteraceae	E	-	-						
Aristida ramosa	Purple Wiregrass	Poaceae	N	-	-		Grass & grasslike				
Aristida spp.	A Wiregrass	Poaceae	N	-	-		Grass & grasslike				
Aristida vagans	Threeawn Speargrass	Poaceae	N	-	-		Grass & grasslike				
Asperula conferta	Common Woodruff	Rubiaceae	N	-	-		Forb			0.1	2
Asperula scoparia	Prickly Woodruff	Rubiaceae	N	-	-		Forb				
Asperula spp.	Woodruff	Rubiaceae	N	-	-		Forb				
Asphodelus fistulosus	Onion Weed	Asphodelaceae	E	-	-						
Astroloma humifusum	Native Cranberry	Ericaceae	N	-	-		Shrub				
Austrodanthonia spp.		Poaceae	N	-	-		Grass & grasslike				
Austrostipa nodosa	A Speargrass	Poaceae	N	-	-		Grass & grasslike				
Austrostipa scabra	Speargrass	Poaceae	N	-	-		Grass & grasslike	0.2	30	2	1000
Austrostipa spp.	A Speargrass	Poaceae	N	-	-		Grass & grasslike				
Avena barbata	Bearded Oats	Poaceae	E	-	-						

ScientificName	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	1330-fragments1		277DNG1	
								Cover	Abundance	Cover	Abundance
Avena fatua	Wild Oats	Poaceae	E	-	-						
Avena sativa	Oats	Poaceae	E	-	-						
Avena spp.	Oats	Poaceae	E	-	-						
Bidens subalternans	Greater Beggar's Ticks	Asteraceae	E	-	-						
Billardiera scandens	Hairy Apple Berry	Pittosporaceae	N	-	-		Other				
Blechnum spp.		Blechnaceae	N	-	-		Fern				
Bossiaea buxifolia		Fabaceae (Faboideae)	N	-	-		Shrub				
Bossiaea prostrata		Fabaceae (Faboideae)	N	-	-		Forb				
Bothriochloa macra	Red Grass	Poaceae	N	-	-		Grass & grasslike	0.2	50	0.1	2
Brachyloma daphnoides	Daphne Heath	Ericaceae	N	-	-		Shrub				
Brachyscome rigidula	Hairy Cutleaf Daisy	Asteraceae	N	-	-		Forb				
Brachyscome spp.		Asteraceae	N	-	-		Forb				
Brassica oleracea	Collards	Brassicaceae	E	-	-						
Brassica spp.	Brassica	Brassicaceae	E	-	-			0.2	20		
Brassica tournefortii	Mediterranean Turnip	Brassicaceae	E	-	-	HTE					
Bromus catharticus	Praire Grass	Poaceae	E	-	-			0.1	7		
Bromus diandrus	Great Brome	Poaceae	E	-	-	HTE					
Bromus hordeaceus	Soft Brome	Poaceae	E	-	-						
Bulbine bulbosa	Bulbine Lily	Asphodelaceae	N	-	-		Forb				
Bursaria spinosa	Native Blackthorn	Pittosporaceae	N	-	-		Shrub				
Caesia spp.		Anthericaceae	N	-	-		Forb				
Callistemon citrinus	Crimson Bottlebrush	Myrtaceae	N	-	-		Shrub				
Calotis lappulacea	Yellow Burr-daisy	Asteraceae	N	-	-		Forb	0.1	2		
Calotis spp.	A Burr-daisy	Asteraceae	N	-	-		Forb				
Carex appressa	Tall Sedge	Cyperaceae	N	-	-		Grass & grasslike	0.7	20		
Carex bichenoviana		Cyperaceae	N	-	-		Grass & grasslike				
Carex fascicularis	Tassel Sedge	Cyperaceae	N	-	-		Grass & grasslike				
Carex gaudichaudiana		Cyperaceae	N	-	-		Grass & grasslike	0.1	8		
Carex spp.		Cyperaceae	N	-	-		Grass & grasslike				
Cassinia aculeata	Dolly Bush	Asteraceae	N	-	-		Shrub				
Cassinia arcuata	Sifton Bush	Asteraceae	N	-	-		Shrub				
Cassinia laevis	Cough Bush	Asteraceae	N	-	-		Shrub				
Cassinia longifolia		Asteraceae	N	-	-		Shrub				
Cassinia quinquefaria		Asteraceae	N	-	-		Shrub				
Cassinia spp.		Asteraceae	N	-	-		Shrub				
Casuarina cunninghamiana	River Oak	Casuarinaceae	N	-	-		Tree				
Centaurium spp.		Gentianaceae	E	-	-						
Centella asiatica	Indian Pennywort	Apiaceae	N	-	-		Forb				
Cheilanthes austrotenuifolia	Rock Fern	Pteridaceae	N	-	-		Fern				
Cheilanthes spp.	Rock Fern	Pteridaceae	N	-	-		Fern				
Chenopodium album	Fat Hen	Chenopodiaceae	E	-	-						
Chloris spp.		Poaceae	N	-	-		Grass & grasslike	4	800		
Chloris truncata	Windmill Grass	Poaceae	N	-	-		Grass & grasslike	0.2	70	0.1	50

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								Cover	Abundance	Cover	Abundance
Chloris ventricosa	Tall Chloris	Poaceae	N	-	-		Grass & grasslike				
Chondrilla juncea	Skeleton Weed	Asteraceae	E	-	-						
Chrysocephalum apiculatum	Common Everlasting	Asteraceae	N	-	-		Forb				
Chrysocephalum semicalvum		Asteraceae	N	-	-		Forb				
Cirsium vulgare	Spear Thistle	Asteraceae	E	-	-						
Clematis aristata	Old Man's Beard	Ranunculaceae	N	-	-		Other				
Convolvulus angustissimus		Convolvulaceae	N	-	-		Other				
Conyza bonariensis	Flaxleaf Fleabane	Asteraceae	E	-	-						
Conyza spp.	A Fleabane	Asteraceae	E	-	-						
Coronidium elatum		Asteraceae	N	-	-		Shrub				
Coronidium rutidolepis		Asteraceae	N	-	-						
Coronidium scorpioides	Button Everlasting	Asteraceae	N	-	-		Forb				
Coronidium spp.		Asteraceae	N	-	-		Forb				
Cotoneaster spp.		Malaceae	E	-	-	HTE					
Crassula sieberiana	Australian Stonecrop	Crassulaceae	N	-	-		Forb	0.2	6000		
Crataegus monogyna	Hawthorn	Malaceae	E	-	-	HTE					
Crepis capillaris	Smooth Hawksbeard	Asteraceae	E	-	-						
Cullen tenax	Emu-foot	Fabaceae (Faboideae)	N	-	-		Forb				
Cymbonotus lawsonianus	Bear's Ear	Asteraceae	N	-	-		Forb				
Cymbonotus preissianus	Austral Bear's Ear	Asteraceae	N	-	-		Forb				
Cynodon dactylon	Common Couch	Poaceae	N	-	-		Grass & grasslike	0.2	3		
Cynodon spp.		Poaceae	N	-	-		Grass & grasslike	0.1	3		
Cynodon transvaalensis	South African Couch	Poaceae	E	-	-			2	200		
Cyperus brevifolius		Cyperaceae	E	-	-						
Cyperus eragrostis	Umbrella Sedge	Cyperaceae	E	-	-	HTE		0.1	1		
Cyperus lhotskyanus		Cyperaceae	N	-	-		Grass & grasslike				
Cyperus spp.		Cyperaceae	N	-	-		Grass & grasslike				
Cytisus scoparius	English Broom	Fabaceae (Faboideae)	E	-	-	HTE					
Dactylis glomerata	Cocksfoot	Poaceae	E	-	-						
Daucus glochidiatus	Native Carrot	Apiaceae	N	-	-		Forb				
Daviesia corymbosa		Fabaceae (Faboideae)	N	-	-		Shrub				
Daviesia latifolia	Bitter-pea	Fabaceae (Faboideae)	N	-	-		Shrub				
Daviesia leptophylla		Fabaceae (Faboideae)	N	-	-		Shrub				
Daviesia spp.		Fabaceae (Faboideae)	N	-	-		Shrub				
Desmodium gunnii	Slender Tick-trefoil	Fabaceae (Faboideae)	N	-	-		Forb				
Desmodium spp.	Tick-trefoil	Fabaceae (Faboideae)	N	-	-		Other				
Dianella longifolia	Blueberry Lily	Phormiaceae	N	-	-		Forb				
Dianella revoluta	Blueberry Lily	Phormiaceae	N	-	-		Forb				
Dianella spp.		Phormiaceae	N	-	-		Forb				
Dichanthium spp.		Poaceae	N	-	-		Grass & grasslike				
Dichondra repens	Kidney Weed	Convolvulaceae	N	-	-		Forb				
Dichopogon spp.	Chocolate Lily	Anthericaceae	N	-	-		Forb				
Digitaria brownii	Cotton Panic Grass	Poaceae	N	-	-		Grass & grasslike	0.4	80		

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								Cover	Abundance	Cover	Abundance
Dillwynia cinerascens		Fabaceae (Faboideae)	N	-	-		Shrub				
Dillwynia phylicoides	Parrot-pea	Fabaceae (Faboideae)	N	-	-		Shrub				
Dillwynia sericea	Egg and Bacon Pea	Fabaceae (Faboideae)	N	-	-		Shrub				
Dillwynia spp.		Fabaceae (Faboideae)	N	-	-		Shrub				
Dipodium hamiltonianum	Yellow Hyacinth-orchid	Orchidaceae	N	-	-		Forb				
Dipsacus spp.		Dipsacaceae	E	-	-						
Drosera spp.		Droseraceae	N	-	-		Forb				
Dysphania pumilio	Small Crumbweed	Chenopodiaceae	N	-	-		Forb				
Dysphania spp.		Chenopodiaceae	N	-	-		Forb				
Echinopogon ovatus	Forest Hedgehog Grass	Poaceae	N	-	-		Grass & grasslike				
Echium plantagineum	Patterson's Curse	Boraginaceae	E	-	-						
Echium spp.		Boraginaceae	E	-	-						
Echium vulgare	Viper's Bugloss	Boraginaceae	E	-	-			0.2	20		
Einadia hastata	Berry Saltbush	Chenopodiaceae	N	-	-		Forb				
Einadia nutans	Climbing Saltbush	Chenopodiaceae	N	-	-		Forb				
Einadia polygonoides	Knotweed Goosefoot	Chenopodiaceae	N	-	-		Forb				
Eleocharis acuta		Cyperaceae	N	-	-		Grass & grasslike				
Eleusine tristachya	Goose Grass	Poaceae	E	-	-						
Elymus scaber	Common Wheatgrass	Poaceae	N	-	-		Grass & grasslike				
Enneapogon nigricans	Niggerheads	Poaceae	N	-	-		Grass & grasslike				
Enteropogon acicularis	Curly Windmill Grass	Poaceae	N	-	-		Grass & grasslike				
Epacris spp.		Ericaceae	N	-	-		Shrub				
Epilobium spp.		Onagraceae	N	-	-		Forb				
Eragrostis cilianensis	Stinkgrass	Poaceae	E	-	-						
Eragrostis curvula	African Lovegrass	Poaceae	E	-	-	HTE		0.3	20		
Eragrostis leptostachya	Paddock Lovegrass	Poaceae	N	-	-		Grass & grasslike	0.1	20		
Eragrostis parviflora	Weeping Lovegrass	Poaceae	N	-	-		Grass & grasslike				
Eragrostis spp.	A Lovegrass	Poaceae	N	-	-		Grass & grasslike				
Erodium botrys	Long Storksbill	Geraniaceae	E	-	-						
Erodium cicutarium	Common Crowfoot	Geraniaceae	E	-	-						
Erodium crinitum	Blue Crowfoot	Geraniaceae	N	-	-		Forb	0.1	100		
Erodium malacoides		Geraniaceae	E	-	-						
Erodium spp.	Crowfoot	Geraniaceae	N	-	-		Forb				
Eucalyptus blakelyi	Blakely's Red Gum	Myrtaceae	N	-	-		Tree	15	8		
Eucalyptus bridgesiana	Apple Box	Myrtaceae	N	-	-		Tree				
Eucalyptus cannonii	Capertee Stringybark	Myrtaceae	N	V	-		Tree				
Eucalyptus dalrympleana	Mountain Gum	Myrtaceae	N	-	-		Tree				
Eucalyptus dives	Broad-leaved Peppermint	Myrtaceae	N	-	-		Tree				
Eucalyptus fastigata	Brown Barrel	Myrtaceae	N	-	-		Tree				
Eucalyptus goniocalyx	Bundy	Myrtaceae	N	-	-		Tree				
Eucalyptus macrorhyncha	Red Stringybark	Myrtaceae	N	-	-		Tree				
Eucalyptus mannifera	Brittle Gum	Myrtaceae	N	-	-		Tree				
Eucalyptus melliodora	Yellow Box	Myrtaceae	N	-	-		Tree				

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								Cover	Abundance	Cover	Abundance
Eucalyptus pauciflora	White Sally	Myrtaceae	N	-	-		Tree				
Eucalyptus rossii	Inland Scribbly Gum	Myrtaceae	N	-	-		Tree				
Eucalyptus spp.		Myrtaceae	N	-	-		Tree				
Eucalyptus stellulata	Black Sally	Myrtaceae	N	-	-		Tree				
Eucalyptus viminalis	Ribbon Gum	Myrtaceae	N	-	-		Tree				
Euchiton japonicus		Asteraceae	N	-	-		Forb				
Euchiton sphaericus	Star Cudweed	Asteraceae	N	-	-		Forb				
Euchiton spp.	A Cudweed	Asteraceae	N	-	-		Forb				
Euphorbia dallachyana		Euphorbiaceae	N	-	-		Forb				
Euphorbia drummondii	Caustic Weed	Euphorbiaceae	N	-	-		Forb	0.1	4		
Euphorbia spp.		Euphorbiaceae	N	-	-		Forb				
Exocarpos cupressiformis	Cherry Ballart	Santalaceae	N	-	-		Shrub				
Exocarpos strictus	Dwarf Cherry	Santalaceae	N	-	-		Shrub				
Foeniculum vulgare	Fennel	Apiaceae	E	-	-						
Galium murale	Small Bedstraw	Rubiaceae	E	-	-						
Gamochaeta calviceps	Cudweed	Asteraceae	E	-	-						
Geranium graniticola		Geraniaceae	N	-	-		Forb				
Geranium molle	Cranesbill Geranium	Geraniaceae	E	-	-						
Geranium solanderi	Native Geranium	Geraniaceae	N	-	-		Forb				
Geranium spp.		Geraniaceae	N	-	-		Forb	0.1	4		
Glycine clandestina	Twining glycine	Fabaceae (Faboideae)	N	-	-		Other				
Glycine microphylla	Small-leaf Glycine	Fabaceae (Faboideae)	N	-	-		Other				
Gonocarpus humilis		Haloragaceae	N	-	-		Forb				
Gonocarpus spp.	Raspwort	Haloragaceae	N	-	-		Forb				
Gonocarpus tetragynus	Poverty Raspwort	Haloragaceae	N	-	-		Forb				
Gonocarpus teucrioides	Germander Raspwort	Haloragaceae	N	-	-		Forb				
Goodenia hederacea	Ivy Goodenia	Goodeniaceae	N	-	-		Forb				
Goodenia spp.		Goodeniaceae	N	-	-		Forb				
Haloragis heterophylla	Variable Raspwort	Haloragaceae	N	-	-		Forb				
Haloragis spp.	A Raspwort	Haloragaceae	N	-	-		Forb				
Hardenbergia violacea	False Sarsaparilla	Fabaceae (Faboideae)	N	-	-		Other				
Helichrysum leucopsideum	Satin Everlasting	Asteraceae	N	-	-		Forb				
Helichrysum spp.		Asteraceae	N	-	-		Forb				
Heliotropium amplexicaule	Blue Heliotrope	Boraginaceae	E	-	-	HTE					
Hibbertia obtusifolia	Hoary Guinea Flower	Dilleniaceae	N	-	-		Shrub				
Holcus lanatus	Yorkshire Fog	Poaceae	E	-	-						
Hordeum leporinum	Barley Grass	Poaceae	E	-	-						
Hovea heterophylla		Fabaceae (Faboideae)	N	-	-		Forb				
Hovea spp.		Fabaceae (Faboideae)	N	-	-		Forb				
Hydrocotyle laxiflora	Stinking Pennywort	Apiaceae	N	-	-		Forb				
Hydrocotyle sibthorpioides		Apiaceae	N	-	-		Forb				
Hydrocotyle spp.		Apiaceae	N	-	-		Forb				
Hypericum gramineum	Small St John's Wort	Clusiaceae	N	-	-		Forb				

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								Cover	Abundance	Cover	Abundance
Hypericum perforatum	St. Johns Wort	Clusiaceae	E	-	-	HTE				0.1	2
Hypericum spp.		Clusiaceae	N	-	-		Forb				
Hypochaeris glabra	Smooth Catsear	Asteraceae	E	-	-						
Hypochaeris radicata	Catsear	Asteraceae	E	-	-						
Hypochaeris spp.	A Catsear	Asteraceae	E	-	-						
Hypochoeris radicata	Catsear	Asteraceae	E	-	-			0.3	200	5	2000
Hypoxis spp.		Hypoxidaceae	N	-	-		Forb				
Isolepis hookeriana		Cyperaceae	N	-	-		Grass & grasslike				
Joycea pallida	Redanther Wallaby Grass	Poaceae	N	-	-		Grass & grasslike				
Juncus effusus		Juncaceae	E	-	-						
Juncus gregiflorus		Juncaceae	N	-	-		Grass & grasslike				
Juncus homalocaulis		Juncaceae	N	-	-		Grass & grasslike				
Juncus spp.	A Rush	Juncaceae	N	-	-		Grass & grasslike				
Lactuca serriola	Prickly Lettuce	Asteraceae	E	-	-						
Lagenifera spp.		Asteraceae	N	-	-		Forb				
Lamarckia aurea	Goldentop	Poaceae	E	-	-						
Lepidium africanum	Common Peppercress	Brassicaceae	E	-	-						
Lepidium spp.	A Peppercress	Brassicaceae	N	-	-		Forb	0.1	6		
Leptospermum myrtifolium		Myrtaceae	N	-	-		Shrub				
Leptospermum spp.	Tea-tree	Myrtaceae	N	-	-		Shrub				
Leucopogon appressus		Ericaceae	N	-	-		Shrub				
Leucopogon fletcheri		Ericaceae	N	-	-		Shrub				
Leucopogon virgatus		Ericaceae	N	-	-		Shrub				
Linum marginale	Native Flax	Linaceae	N	-	-		Forb				
Lissanthe spp.		Ericaceae	N	-	-		Shrub				
Lolium perenne	Perennial Ryegrass	Poaceae	E	-	-						
Lomandra cylindrica		Lomandraceae	N	-	-		Grass & grasslike				
Lomandra filiformis	Wattle Matt-rush	Lomandraceae	N	-	-		Grass & grasslike			0.1	50
Lomandra longifolia	Spiny-headed Mat-rush	Lomandraceae	N	-	-		Grass & grasslike	2	30		
Lomandra multiflora	Many-flowered Mat-rush	Lomandraceae	N	-	-		Grass & grasslike				
Lomandra spp.	Mat-rush	Lomandraceae	N	-	-		Grass & grasslike				
Lomatia ilicifolia	Holly Lomatia	Proteaceae	N	-	-		Shrub				
Lomatia myricoides	River Lomatia	Proteaceae	N	-	-		Shrub				
Luzula spp.		Juncaceae	N	-	-		Grass & grasslike				
Lycium ferocissimum	African Boxthorn	Solanaceae	E	-	-	HTE					
Lysimachia arvensis	Scarlet Pimpernel	Primulaceae	E	-	-					0.1	1
Lythrum hyssopifolia	Hyssop Loosestrife	Lythraceae	N	-	-		Forb				
Malus pumila	Apple	Malaceae	E	-	-						
Malva neglecta	Dwarf Mallow	Malvaceae	E	-	-						
Marrubium spp.		Lamiaceae	E	-	-						
Marrubium vulgare	White Horehound	Lamiaceae	E	-	-						
Medicago polymorpha	Burr Medic	Fabaceae (Faboideae)	E	-	-						
Medicago spp.	A Medic	Fabaceae (Faboideae)	E	-	-			0.2	7000		

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								Cover	Abundance	Cover	Abundance
Melichrus urceolatus	Urn Heath	Ericaceae	N	-	-		Shrub				
Melicytus dentatus	Tree Violet	Violaceae	N	-	-		Shrub				
Microlaena stipoides	Weeping Grass	Poaceae	N	-	-		Grass & grasslike	0.2	80	0.2	100
Modiola caroliniana	Red-flowered Mallow	Malvaceae	E	-	-			0.1	3		
Modiola spp.		Malvaceae	E	-	-						
Moenchia erecta	Erect Chickweed	Caryophyllaceae	E	-	-						
Monoculus monstrosus		Asteraceae	E	-	-						
Monotoca scoparia		Ericaceae	N	-	-		Shrub				
Nassella trichotoma	Serrated Tussock	Poaceae	E	-	-						
Notothixos spp.		Viscaceae	N	-	-		Other				
Olearia spp.		Asteraceae	N	-	-		Shrub				
Onopordum acanthium	Scotch Thistle	Asteraceae	E	-	-						
Ophioglossum lusitanicum	Adder's Tongue	Ophioglossaceae	N	-	-		Fern				
Orobanche spp.		Scrophulariaceae	N	-	-		Forb				
Oxalis perennans		Oxalidaceae	N	-	-		Forb	0.1	3	0.1	1
Oxalis spp.		Oxalidaceae	N	-	-		Forb				
Ozothamnus diosmifolius	White Dogwood	Asteraceae	N	-	-		Shrub				
Panicum effusum	Hairy Panic	Poaceae	N	-	-		Grass & grasslike	0.1	3	0.1	80
Paspalum dilatatum	Paspalum	Poaceae	E	-	-	HTE		4	250		
Paspalum spp.		Poaceae	N	-	-		Grass & grasslike				
Pennisetum clandestinum	Kikuyu Grass	Poaceae	E	-	-						
Pentaschistis airoides	False Hairgrass	Poaceae	E	-	-						
Persicaria prostrata	Creeping Knotweed	Polygonaceae	N	-	-		Forb				
Petrorhagia spp.		Caryophyllaceae	E	-	-						
Phalaris aquatica	Phalaris	Poaceae	E	-	-						
Phalaris minor	Lesser Canary Grass	Poaceae	E	-	-						
Phalaris spp.		Poaceae	E	-	-			20	3000	1	500
Phragmites australis	Common Reed	Poaceae	N	-	-		Grass & grasslike				
Phragmites spp.		Poaceae	N	-	-		Grass & grasslike				
Pinus radiata	Radiata Pine	Pinaceae	E	-	-					0.2	1
Plantago gaudichaudii	Narrow Plantain	Plantaginaceae	N	-	-		Forb			0.2	200
Plantago lanceolata	Lamb's Tongues	Plantaginaceae	E	-	-			0.2	30		
Plantago spp.	Plantain	Plantaginaceae	N	-	-		Forb				
Platylobium formosum		Fabaceae (Faboideae)	N	-	-		Shrub				
Poa annua	Winter Grass	Poaceae	E	-	-						
Poa induta		Poaceae	N	-	-		Grass & grasslike				
Poa labillardierei	Tussock	Poaceae	N	-	-		Grass & grasslike				
Poa meionectes		Poaceae	N	-	-		Grass & grasslike				
Poa sieberiana	Snowgrass	Poaceae	N	-	-		Grass & grasslike				
Poa spp.		Poaceae	N	-	-		Grass & grasslike				
Polycarpon tetraphyllum	Four-leaved Allseed	Caryophyllaceae	E	-	-						
Polyscias sambucifolia	Elderberry Panax	Araliaceae	N	-	-		Shrub				
Populus spp.		Salicaceae	N	-	-		Tree				

ScientificName	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	1330-fragments1		277DNG1	
								Cover	Abundance	Cover	Abundance
Poranthera microphylla	Small Poranthera	Phyllanthaceae	N	-	-		Forb				
Portulaca oleracea	Pigweed	Portulacaceae	N	-	-		Forb				
Potentilla spp.		Rosaceae	E	-	-						
Pseudognaphalium luteoalbum	Jersey Cudweed	Asteraceae	N	-	-		Forb				
Pteridium esculentum	Bracken	Dennstaedtiaceae	N	-	-		Fern				
Pteridium spp.		Dennstaedtiaceae	N	-	-		Fern				
Pultenaea microphylla	A Bush Pea	Fabaceae (Faboideae)	N	-	-		Shrub				
Rosa rubiginosa	Sweet Briar	Rosaceae	E	-	-	HTE					
Rosa spp.		Rosaceae	E	-	-						
Rubus fruticosus	Blackberry complex	Rosaceae	E	-	-						
Rubus parvifolius	Native Raspberry	Rosaceae	N	-	-		Shrub				
Rumex acetosella	Sheep Sorrel	Polygonaceae	E	-	-						
Rumex brownii	Swamp Dock	Polygonaceae	N	-	-		Forb				
Rumex crispus	Curled Dock	Polygonaceae	E	-	-						
Rumex spp.	Dock	Polygonaceae	N	-	-		Forb				
Rytidosperma caespitosum	Ringed Wallaby Grass	Poaceae	N	-	-		Grass & grasslike				
Rytidosperma longifolium	Long-leaved Wallaby Grass	Poaceae	N	-	-		Grass & grasslike				
Rytidosperma monticola	Mountain Wallaby Grass	Poaceae	N	-	-		Grass & grasslike				
Rytidosperma pallidum	Redanther Wallaby Grass	Poaceae	N	-	-		Grass & grasslike				
Rytidosperma spp.		Poaceae	N	-	-		Grass & grasslike	0.1	40	10	4000
Salix fragilis	Crack Willow	Salicaceae	E	-	-						
Schoenus apogon	Fluke Bogrush	Cyperaceae	N	-	-		Grass & grasslike				
Scleranthus biflorus	Two-flowered Knawel	Caryophyllaceae	N	-	-		Forb				
Scolymus hispanicus	Golden Thistle	Asteraceae	E	-	-						
Senecio diaschides		Asteraceae	N	-	-		Forb				
Senecio gunnii		Asteraceae	N	-	-		Forb				
Senecio prenanthoides		Asteraceae	N	-	-		Forb				
Senecio quadridentatus	Cotton Fireweed	Asteraceae	N	-	-		Forb				
Senecio spp.	Fireweed	Asteraceae	N	-	-		Forb				
Setaria gracilis		Poaceae	E	-	-			0.1	30		
Setaria pumila	Pale Pigeon Grass	Poaceae	E	-	-						
Solanum nigrum	Black-berry Nightshade	Solanaceae	E	-	-						
Solenogyne spp.		Asteraceae	N	-	-		Forb			0.1	1
Sonchus asper	Prickly Sowthistle	Asteraceae	E	-	-						
Sonchus spp.	Sowthistle	Asteraceae	N	-	-		Forb				
Spergularia rubra	Sandspurry	Caryophyllaceae	E	-	-						
Sporobolus caroli	Fairy Grass	Poaceae	N	-	-		Grass & grasslike				
Sporobolus creber	Slender Rat's Tail Grass	Poaceae	N	-	-		Grass & grasslike	0.1	10		
Stackhousia viminea	Slender Stackhousia	Stackhousiaceae	N	-	-		Forb				
Stellaria media	Common Chickweed	Caryophyllaceae	E	-	-						
Stellaria pungens	Prickly Starwort	Caryophyllaceae	N	-	-		Forb				
Stylidium graminifolium	Grass Triggerplant	Stylidiaceae	N	-	-		Forb				
Styphelia spp.		Ericaceae	N	-	-		Shrub				

ScientificName	Common Name	Family	Native / Exotic	BC status	EPBC status	High Threat Weed	Plot Number (right) BAM growth form (below)	1330-fragments1		277DNG1	
								Cover	Abundance	Cover	Abundance
Styphelia triflora	Pink Five-Corners	Ericaceae	N	-	-		Shrub				
Taraxacum officinale	Dandelion	Asteraceae	E	-	-			0.1	1		
Taraxacum spp.	Dandelion	Asteraceae	N	-	-		Forb				
Themeda australis		Poaceae	N	-	-		Grass & grasslike				
Themeda triandra		Poaceae	N	-	-		Grass & grasslike				
Thinopyrum ponticum	Tall Wheat Grass	Poaceae	E	-	-						
Tribulus terrestris	Cat-head	Zygophyllaceae	E	-	-						
Tricoryne elatior	Yellow Autumn-lily	Anthericaceae	N	-	-		Forb				
Trifolium angustifolium	Narrow-leaved Clover	Fabaceae (Faboideae)	E	-	-						
Trifolium arvense	Haresfoot Clover	Fabaceae (Faboideae)	E	-	-						
Trifolium repens	White Clover	Fabaceae (Faboideae)	E	-	-						
Trifolium spp.	A Clover	Fabaceae (Faboideae)	E	-	-			0.2	2000	0.4	1000
Urtica incisa	Stinging Nettle	Urticaceae	N	-	-		Forb				
Verbascum spp.		Scrophulariaceae	E	-	-			0.1	1		
Verbascum virgatum	Twiggy Mullein	Scrophulariaceae	E	-	-						
Veronica calycina	Hairy Speedwell	Plantaginaceae	N	-	-		Forb				
Veronica plebeia	Trailing Speedwell	Plantaginaceae	N	-	-		Forb				
Veronica spp.		Plantaginaceae	N	-	-		Forb				
Vicia sativa	Common vetch	Fabaceae (Faboideae)	E	-	-						
Vicia spp.	Vetch	Fabaceae (Faboideae)	E	-	-			0.1	5		
Viola betonicifolia	Native Violet	Violaceae	N	-	-		Forb				
Viola spp.		Violaceae	N	-	-		Forb				
Vittadinia dissecta		Asteraceae	N	-	-		Forb				
Vittadinia spp.	Fuzzweed	Asteraceae	N	-	-		Forb				
Vulpia myuros	Rat's Tail Fescue	Poaceae	E	-	-						
Wahlenbergia communis	Tufted Bluebell	Campanulaceae	N	-	-		Forb				
Wahlenbergia gracilenta	Annual Bluebell	Campanulaceae	N	-	-		Forb				
Wahlenbergia gracilis	Sprawling Bluebell	Campanulaceae	N	-	-		Forb				
Wahlenbergia spp.	Bluebell	Campanulaceae	N	-	-		Forb				
Wahlenbergia stricta	Tall Bluebell	Campanulaceae	N	-	-		Forb				
Wurmbea dioica	Early Nancy	Colchicaceae	N	-	-		Forb				
Xerochrysum spp.		Asteraceae	N	-	-		Forb				
Xerochrysum viscosum	Sticky Everlasting	Asteraceae	N	-	-		Forb				
Zieria cytisoides	Downy Zieria	Rutaceae	N	-	-		Shrub				

Appendix C

Protected Matters Search Results

C.1 Mine development

Australian Government
Department of the Environment and Energy

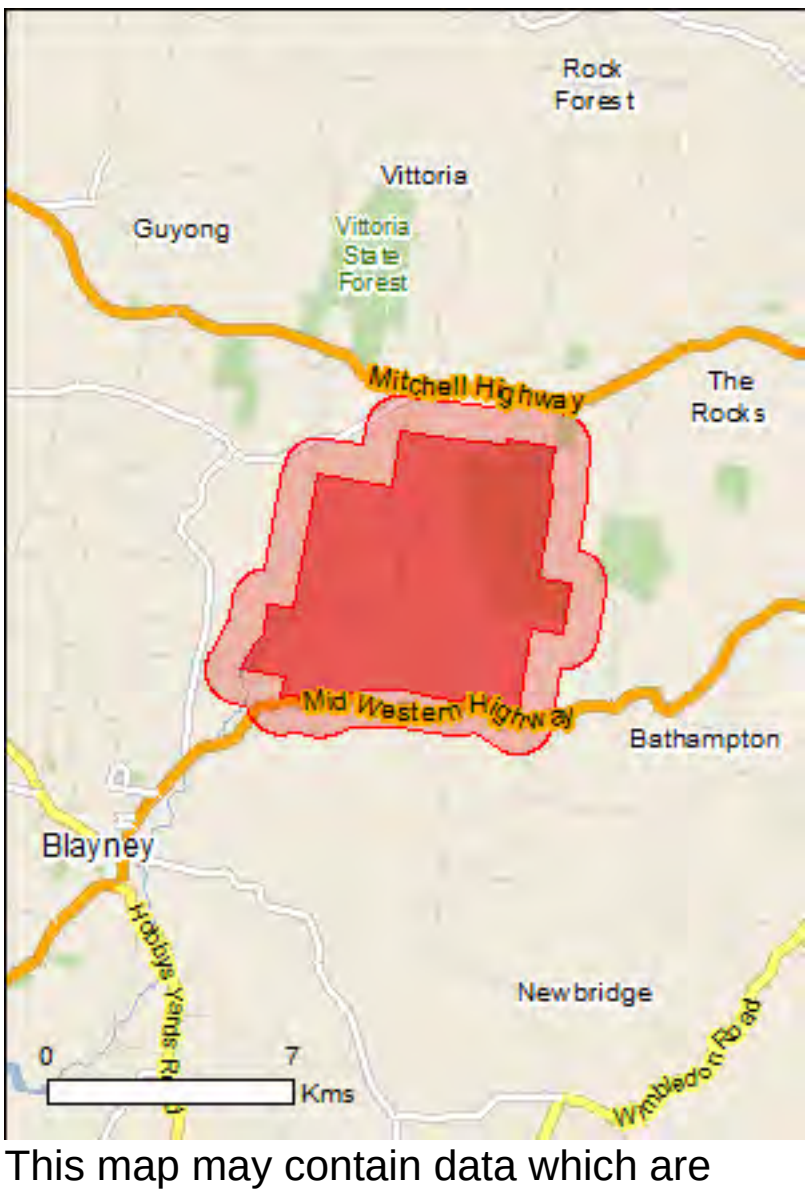
EPBC Act Protected Matters Report

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.

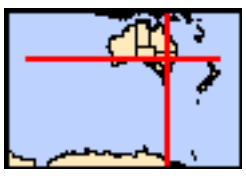
Report created: 31/08/20 11:30:08



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

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:	29
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]

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]

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
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat likely 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

Name	Status	Type of Presence
		habitat known to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Fish		
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 likely to occur within area
Litoria castanea Yellow-spotted Tree Frog, Yellow-spotted Bell Frog [1848]	Critically Endangered	Species or species habitat likely to occur within area
Insects		
Synemon plana Golden Sun Moth [25234]	Critically Endangered	Species or species habitat may 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 likely to 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 subsp. tricolor Hoary Sunray, Grassland Paper-daisy [89104]	Endangered	Species or species habitat likely to occur within area

Name	Status	Type of Presence
[Swainsona recta](#) Small Purple-pea, Mountain Swainson-pea, Small Purple Pea [7580]	Endangered	Species or species habitat may 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 likely to occur within area
[Delma impar](#) Striped Legless Lizard, Striped Snake-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]	Vulnerable	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 within area
Ardea ibis Cattle Egret [59542]		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
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		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]	Vulnerable	Species or species habitat likely to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	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]		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]	Critically Endangered	Species or species habitat may occur within

Name	Threatened	Type of Presence
		area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to 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		

Name	Status	Type of Presence
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
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

Name	Status	Type of Presence
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 149.36545,-33.44562 149.36538,-33.45164 149.36417,-33.45436 149.3646,-33.4661 149.36237,-33.47319 149.36126,-33.47448 149.36932,-33.48501 149.36727,-33.48379 149.35911,-33.50319 149.35576,-33.49925 149.34855,-33.49832 149.34521,-33.49939 149.34109,-33.49846 149.33568,-33.49725 149.32667,-33.49725 149.31997,-33.49775 149.31139,-33.49918 149.30727,-33.49954 149.30538,-33.49868 149.30195,-33.49832 149.298,-33.49896 149.29551,-33.49417 149.29637,-33.49259 149.28523,-33.48679 149.28918,-33.48522 149.29124,-33.4787 149.29193,-33.47921 149.29871,-33.45096 149.30506,-33.45375 149.32377,-33.44199 149.32606,-33.44493 149.35292,-33.44385 149.35318,-33.44557 149.36545

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.

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C.2 Pipeline development

Australian Government
Department of the Environment and Energy

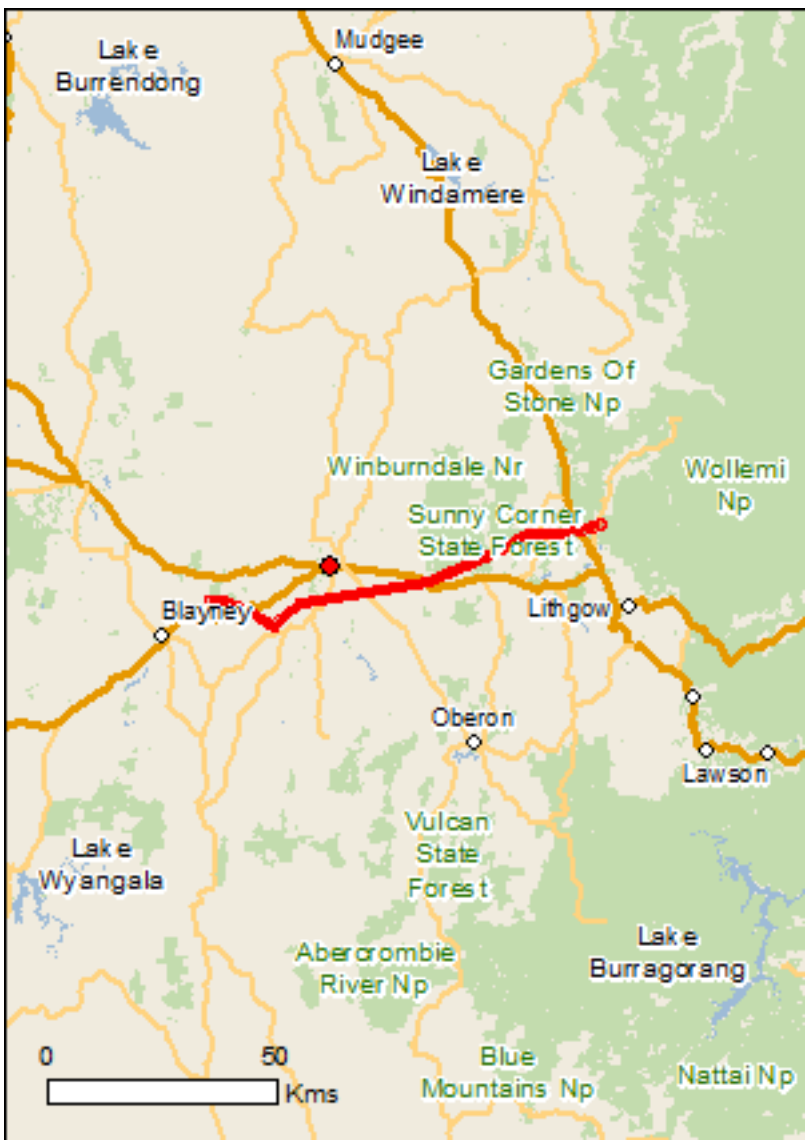
EPBC Act Protected Matters Report

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.

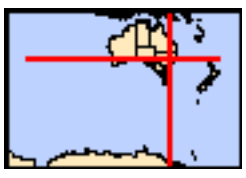
Report created: 20/05/20 10:31:59



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

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:	3
Listed Threatened Species:	49
Listed Migratory Species:	12

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:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	19
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:	1
Regional Forest Agreements:	None
Invasive Species:	32
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]

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
Upland Basalt Eucalypt Forests of the Sydney Basin Bioregion	Endangered	Community may 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]
Name	Status	Type of Presence
Birds		
Anthochaera phrygia		
Regent Honeyeater [82338]	Critically Endangered	Breeding known to occur within area
Botaurus poiciloptilus		
Australasian Bittern [1001]	Endangered	Species or species habitat likely to 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
Hirundapus caudacutus		
White-throated Needletail [682]	Vulnerable	Species or species habitat likely 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

Name	Status	Type of Presence
[Polytelis swainsonii](#) Superb Parrot [738]	Vulnerable	Species or species habitat may occur within area
[Rostratula australis](#) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Fish		
[Maccullochella macquariensis](#) Trout Cod [26171]	Endangered	Species or species habitat may occur within area
[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
[Prototroctes maraena](#) Australian Grayling [26179]	Vulnerable	Species or species habitat may occur within area
Frogs		
[Heleioporus australiacus](#) Giant Burrowing Frog [1973]	Vulnerable	Species or species habitat may occur within area
[Litoria aurea](#) Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat may occur within area
[Litoria booroolongensis](#) Booroolong Frog [1844]	Endangered	Species or species habitat known to occur within area
[Litoria castanea](#) Yellow-spotted Tree Frog, Yellow-spotted Bell Frog [1848]	Critically Endangered	Species or species habitat likely to occur within area
[Litoria littlejohni](#) Littlejohn's Tree Frog, Heath Frog [64733]	Vulnerable	Species or species habitat likely to occur within area
Insects		
[Paralucia spinifera](#) Bathurst Copper Butterfly, Purple Copper Butterfly, Bathurst Copper, Bathurst Copper Wing, Bathurst-Lithgow Copper, Purple Copper [26335]	Vulnerable	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 known to 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
[Nyctophilus corbeni](#) Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat may occur within area
[Petauroides volans](#) Greater Glider [254]	Vulnerable	Species or species habitat known to occur within area
[Petrogale penicillata](#) Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
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
Pseudomys novaehollandiae		
New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat likely to occur within area
Pteropus poliocephalus		
Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Plants		
Acacia bynoeana		
Bynoe's Wattle, Tiny Wattle [8575]	Vulnerable	Species or species habitat may occur within area
Boronia deanei		
Deane's Boronia [8397]	Vulnerable	Species or species habitat may occur within area
Cryptostylis hunteriana		
Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat may occur within area
Dichanthium setosum		
bluegrass [14159]	Vulnerable	Species or species habitat likely to occur within area
Eucalyptus aggregata		
Black Gum [20890]	Vulnerable	Species or species habitat known to occur within area
Eucalyptus pulverulenta		
Silver-leaved Mountain Gum, Silver-leaved Gum [21537]	Vulnerable	Species or species habitat likely to occur within area
Eucalyptus robertsonii subsp. hemisphaerica		
Robertson's Peppermint [56223]	Vulnerable	Species or species habitat known 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 known to occur within area
Leucochrysum albicans var. tricolor		
Hoary Sunray, Grassland Paper-daisy [56204]	Endangered	Species or species habitat likely to occur within area
Persoonia marginata		
Clandulla Geebung [10852]	Vulnerable	Species or species habitat may occur within area
Prasophyllum petilum		
Tarengo Leek Orchid [55144]	Endangered	Species or species habitat may occur within area
Prasophyllum sp. Wybong (C.Phelps ORG 5269)		
a leek-orchid [81964]	Critically Endangered	Species or species habitat may occur within area
Pultenaea glabra		
Smooth Bush-pea, Swamp Bush-pea [11887]	Vulnerable	Species or species habitat known to occur within area
Swainsona recta		
Small Purple-pea, Mountain Swainson-pea, Small Purple Pea [7580]	Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
[Thesium australe](#) Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat known to occur within area
[Xerochrysum palustre](#) Swamp Everlasting, Swamp Paper Daisy [76215]	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 likely to occur within area
[Delma impar](#) Striped Legless Lizard, Striped Snake-lizard [1649]	Vulnerable	Species or species habitat may occur within area
[Eulamprus leuraensis](#) Blue Mountains Water Skink [59199]	Endangered	Species or species habitat may occur within area
[Hoplocephalus bungaroides](#) Broad-headed Snake [1182]	Vulnerable	Species or species habitat likely to 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]	Vulnerable	Species or species habitat likely to occur within area
[Monarcha melanopsis](#) Black-faced Monarch [609]		Species or species habitat known 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 known 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

Name	Threatened	Type of Presence
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

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land - Australian Telecommunications Corporation

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 within area
Ardea ibis		
Cattle Egret [59542]		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
Chrysococcyx osculans		
Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within

Name	Threatened	Type of Presence
		area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known 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
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Forestry Management Areas in Bathurst (FMZ2)	NSW

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

Name	Status	Type of Presence
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
Pycnonotus jocosus Red-whiskered Bulbul [631]		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
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

Name	Status	Type of Presence
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
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		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

-33.347827 150.103626,-33.363025 150.035991,-33.363025 149.960803,-33.389975 149.909991,-33.441271 149.765796,-33.470774 149.554652,-33.477361 149.516544,-33.51272 149.466418,-33.49039 149.419383,-33.479222 149.389514,-33.474927 149.381446,-33.474068 149.375438,-33.473781 149.361533,-33.470917 149.341964

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
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-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
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-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.

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Appendix D

Biodiversity credit report

D.1 Mine development

BAM Credit Summary Report

Proposal Details

Assessment Id
00016791/BAAS17013/19/00016792

Proposal Name
McPhillamys Gold Project - mine development

BAM data last updated *
18/06/2020

Assessor Name

Report Created
05/08/2020

BAM Data version *
29

Assessor Number

BAM Case Status
Open

Date Finalised
To be finalised

Assessment Revision
0

Assessment Type
Major Projects

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetation zone name	Vegetation integrity loss / gain	Area (ha)	Constant	Species sensitivity to gain class (for BRW)	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion								
1	727_High	31.6	3.9	0.25	High Sensitivity to Potential Gain	1.75		54
2	727_Poor	36.4	12.1	0.25	High Sensitivity to Potential Gain	1.75		193

3	727_Medium	44.1	36.7	0.25	High Sensitivity to Potential Gain	1.75		708
							Subtotal	**955**
Carex sedgeland of the slopes and tablelands								
4	766_Poor	17.4	3.0	0.25	High Sensitivity to Potential Gain	2.00		26
							Subtotal	**26**
Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion								
5	951_Poor	27.6	33.7	0.25	High Sensitivity to Potential Gain	2.00		464
							Subtotal	**464**
Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion								
6	1330_Other	26.4	0.8	0.25	High Sensitivity to Potential Gain	2.00	TRUE	10
7	1330_High	35.9	1.6	0.25	High Sensitivity to Potential Gain	2.00	TRUE	29
8	1330_Medium	49.8	21.0	0.25	High Sensitivity to Potential Gain	2.00	TRUE	523
9	1330_Poor	42.2	25.3	0.25	High Sensitivity to Potential Gain	2.00	TRUE	534
							Subtotal	**1096**
							Total	**2541**

Species credits for threatened species

Vegetation zone name	Habitat condition (HC)	Area (ha) / individual (HL)	Constant	Biodiversity risk weighting	Potential SAII	Species credits
Petaurus norfolcensis / Squirrel Glider (Fauna)						
951_Poor	27.6	33.68	0.25	2	False	464
1330_High	35.9	1.63	0.25	2	False	29

1330_Medium	49.8	21	0.25	2	False	523
1330_Poor	42.2	25.3	0.25	2	False	534
1330_Other	26.4	0.76	0.25	2	False	10
727_High	31.6	3.89	0.25	2	False	62
727_Medium	44.0	36.74	0.25	2	False	809
727_Poor	36.4	12.08	0.25	2	False	220
					Subtotal	**2651**
Phascolarctos cinereus / Koala (Fauna)						
951_Poor	27.6	33.68	0.25	2	False	464
1330_High	35.9	1.63	0.25	2	False	29
1330_Medium	49.8	21	0.25	2	False	523
1330_Poor	42.2	25.3	0.25	2	False	534
1330_Other	26.4	0.76	0.25	2	False	10
727_High	31.6	3.89	0.25	2	False	62
727_Medium	44.1	36.74	0.25	2	False	809
					Subtotal	**2431**

D.2 Pipeline development

BAM Credit Summary Report

Proposal Details

Assessment Id
00020208/BAAS17013/20/00021140

Proposal Name
McPhillamys Pipeline - Bathurst_northern option

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Assessment Type
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* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetation zone name	Vegetation integrity loss / gain	Area (ha)	Constant	Species sensitivity to gain class (for BRW)	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion								
1	277_DNG	1.3	0.5	0.25	High Sensitivity to Potential Gain	2.00	TRUE	0
2	277_Moderate	1.5	0.0	0.25	High Sensitivity to Potential Gain	2.00	TRUE	1

							Subtotal	**1**
Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion								
3	1330_DNG	7.2	10.2	0.25	High Sensitivity to Potential Gain	2.00	TRUE	37
4	1330_Fragments	1.4	1.4	0.25	High Sensitivity to Potential Gain	2.00	TRUE	0
5	1330_Intact	7.6	1.7	0.25	High Sensitivity to Potential Gain	2.00	TRUE	6
6	1330_Shrubland	22.9	0.1	0.25	High Sensitivity to Potential Gain	2.00	TRUE	1
7	1330_Sparse	9.0	4.7	0.25	High Sensitivity to Potential Gain	2.00	TRUE	21
							Subtotal	**65**
							Total	**66**

Species credits for threatened species

Vegetation zone name	Habitat condition (HC)	Area (ha) / individual (HL)	Constant	Biodiversity risk weighting	Potential SAII	Species credits
Lepidium hyssopifolium / Aromatic Peppercress (Flora)						
277_DNG	1.3	0.48	0.25	2	False	0
277_Moderate	1.5	0.02	0.25	2	False	0
1330_DNG	7.2	10.21	0.25	2	False	37
1330_Intact	7.6	0.29	0.25	2	False	1
1330_Shrubland	22.9	0.07	0.25	2	False	1
					Subtotal	**39**
Litoria booroolongensis / Booroolong Frog (Fauna)						
1330_Intact	7.6	0.3	0.25	2	False	1

1330_Sparse	9.0	0.26	0.25	2	False	1
					Subtotal	**2**
Petaurus norfolcensis / Squirrel Glider (Fauna)						
1330_Intact	7.6	0.43	0.25	2	False	2
1330_Shrubland	22.9	0.07	0.25	2	False	1
1330_Sparse	9.0	0.25	0.25	2	False	1
					Subtotal	**4**
Phascolarctos cinereus / Koala (Fauna)						
1330_Intact	7.6	0.43	0.25	2	False	2
1330_Sparse	9.0	0.25	0.25	2	False	1
					Subtotal	**3**
Swainsona sericea / Silky Swainson-pea (Flora)						
1330_DNG	7.2	10.21	0.25	2	False	37
1330_Intact	7.6	0.29	0.25	2	False	1
1330_Shrubland	22.9	0.07	0.25	2	False	1
					Subtotal	**39**
Thesium australe / Austral Toadflax (Flora)						
1330_DNG	7.2	10.21	0.25	1.5	False	28
1330_Intact	7.6	0.29	0.25	1.5	False	1
1330_Shrubland	22.9	0.07	0.25	1.5	False	1

					Subtotal	**30**

BAM Credit Summary Report

Proposal Details

Assessment Id
00020208/BAAS17013/20/00020209

Proposal Name
McPhillamys Pipeline Bathurst_southern option

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* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetation zone name	Vegetation integrity loss / gain	Area (ha)	Constant	Species sensitivity to gain class (for BRW)	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion								
1	277_DNG	1.4	0.4	0.25	High Sensitivity to Potential Gain	2.00	TRUE	0
2	277_Moderate	1.5	0.0	0.25	High Sensitivity to Potential Gain	2.00	TRUE	1

							Subtotal	**1**
Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion								
3	1330_DNG	7.6	18.9	0.25	High Sensitivity to Potential Gain	2.00	TRUE	72
4	1330_Intact	7.4	0.8	0.25	High Sensitivity to Potential Gain	2.00	TRUE	3
5	1330_Shrubland	22.9	0.1	0.25	High Sensitivity to Potential Gain	2.00	TRUE	1
6	1330_Sparse	8.9	4.8	0.25	High Sensitivity to Potential Gain	2.00	TRUE	21
							Subtotal	**97**
							Total	**98**

Species credits for threatened species

Vegetation zone name	Habitat condition (HC)	Area (ha) / individual (HL)	Constant	Biodiversity risk weighting	Potential SAII	Species credits
Aprasia parapulchella / Pink-tailed Legless Lizard (Fauna)						
1330_DNG	7.6	2.93	0.25	2	False	11
1330_Intact	7.4	0.02	0.25	2	False	0
1330_Sparse	8.9	0.05	0.25	2	False	0
					Subtotal	**11**
Lepidium hyssopifolium / Aromatic Peppercress (Flora)						
277_DNG	1.4	0.44	0.25	2	False	0
1330_DNG	7.6	18.88	0.25	2	False	72
1330_Intact	7.4	0.29	0.25	2	False	1
1330_Shrubland	22.9	0.07	0.25	2	False	1

277_Moderate	1.5	0.02	0.25	2	False	0
					Subtotal	**74**
Litoria booroolongensis / Booroolong Frog (Fauna)						
1330_Intact	7.4	0.3	0.25	2	False	1
1330_Sparse	8.9	0.49	0.25	2	False	2
					Subtotal	**3**
Petaurus norfolcensis / Squirrel Glider (Fauna)						
1330_Intact	7.4	0.43	0.25	2	False	2
1330_Shrubland	22.9	0.07	0.25	2	False	1
1330_Sparse	8.9	0.25	0.25	2	False	1
					Subtotal	**4**
Phascolarctos cinereus / Koala (Fauna)						
1330_Intact	7.4	0.43	0.25	2	False	2
1330_Sparse	8.9	0.25	0.25	2	False	1
					Subtotal	**3**
Swainsona sericea / Silky Swainson-pea (Flora)						
1330_DNG	7.6	18.88	0.25	2	False	72
1330_Intact	7.4	0.29	0.25	2	False	1
1330_Shrubland	22.9	0.07	0.25	2	False	1
					Subtotal	**74**

Thesium australe / Austral Toadflax (Flora)						
1330_DNG	7.6	18.88	0.25	1.5	False	54
1330_Intact	7.4	0.29	0.25	1.5	False	1
1330_Shrubland	22.9	0.07	0.25	1.5	False	1
					Subtotal	**56**

BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00020208/BAAS17013/20/00020212	McPhillamys pipeline Capertee	18/06/2020
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	10/08/2020	29
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Assessment Revision	Assessment Type	
0	Major Projects	

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Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetation zone name	Vegetation integrity loss / gain	Area (ha)	Constant	Species sensitivity to gain class (for BRW)	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion								
1	1093_Fragments	18.7	0.9	0.25	High Sensitivity to Potential Gain	1.75		7
2	1093_Intact	24.9	5.3	0.25	High Sensitivity to Potential Gain	1.75		58
3	1093_Shrubland	18.3	2.6	0.25	High Sensitivity to Potential Gain	1.75		21

							Subtotal	**86**
Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion								
4	1191_DNG	12.2	0.3	0.25	High Sensitivity to Potential Gain	2.50	TRUE	3
5	1191_Fragments	13.5	0.3	0.25	High Sensitivity to Potential Gain	2.50	TRUE	2
6	1191_Intact	20.1	3.6	0.25	High Sensitivity to Potential Gain	2.50	TRUE	45
7	1191_Shrubland	20.8	1.3	0.25	High Sensitivity to Potential Gain	2.50	TRUE	16
8	1191_Sparse	0.8	0.3	0.25	High Sensitivity to Potential Gain	2.50	TRUE	0
							Subtotal	**66**
							Total	**152**

Species credits for threatened species

Vegetation zone name	Habitat condition (HC)	Area (ha) / individual (HL)	Constant	Biodiversity risk weighting	Potential SAII	Species credits
Cercartetus nanus / Eastern Pygmy-possum (Fauna)						
1093_Fragments	18.7	0.83	0.25	2	False	8
1093_Intact	24.9	5.2	0.25	2	False	65
1093_Shrubland	18.3	1.77	0.25	2	False	16
1191_Intact	20.1	3.27	0.25	2	False	33
1191_Shrubland	20.8	0.75	0.25	2	False	8
1191_Sparse	0.8	0.17	0.25	2	False	0
					Subtotal	**130**

Chalinolobus dwyeri / Large-eared Pied Bat (Fauna)						
1191_Shrubland	20.8	0.29	0.25	3	True	5
1191_Sparse	0.8	0.17	0.25	3	True	0
					Subtotal	**5**
Eucalyptus aggregata / Black Gum (Flora)						
1191_Sparse	N/A	1	0.25	2	False	2
					Subtotal	**2**
Litoria booroolongensis / Booroolong Frog (Fauna)						
1191_DNG	12.2	0.03	0.25	2	False	0
1191_Intact	20.1	3.11	0.25	2	False	31
1191_Sparse	0.8	0.26	0.25	2	False	0
					Subtotal	**31**
Ninox connivens / Barking Owl (Fauna)						
1191_Intact	20.1	0.58	0.25	2	False	6
					Subtotal	**6**
Ninox strenua / Powerful Owl (Fauna)						
1093_Intact	24.9	0.39	0.25	2	False	5
1093_Shrubland	18.3	0.19	0.25	2	False	2
1191_Intact	20.1	0.78	0.25	2	False	8
					Subtotal	**15**

Paralucia spinifera / Purple Copper Butterfly, Bathurst Copper Butterfly (Fauna)						
1093_Intact	24.9	0.43	0.25	2	False	5
1093_Shrubland	18.3	0.18	0.25	2	False	2
					Subtotal	**7**
Persoonia marginata / Clandulla Geebung (Flora)						
1093_Intact	24.9	0.24	0.25	2	False	3
1093_Shrubland	18.3	0.06	0.25	2	False	1
					Subtotal	**4**
Petaurus norfolcensis / Squirrel Glider (Fauna)						
1093_Intact	24.9	5.25	0.25	2	False	65
1191_Intact	20.1	3.61	0.25	2	False	36
					Subtotal	**101**
Petrogale penicillata / Brush-tailed Rock-wallaby (Fauna)						
1191_Shrubland	20.8	0.29	0.25	3	True	5
1191_Sparse	0.8	0.1	0.25	3	True	0
					Subtotal	**5**
Phascogale tapoatafa / Brush-tailed Phascogale (Fauna)						
1093_Intact	24.9	5.25	0.25	2	False	65
					Subtotal	**65**
Phascolarctos cinereus / Koala (Fauna)						
1093_Intact	24.9	5.25	0.25	2	False	65

1191_Intact	20.1	3.61	0.25	2	False	36
					Subtotal	**101**
Tyto novaehollandiae / Masked Owl (Fauna)						
1093_Intact	24.9	0.39	0.25	2	False	5
1093_Shrubland	18.3	0.19	0.25	2	False	2
1191_Intact	20.1	0.78	0.25	2	False	8
					Subtotal	**15**

BAM Credit Summary Report

Proposal Details

Assessment Id
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Proposal Name
McPhillamys Pipeline Hill End

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Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetation zone name	Vegetation integrity loss / gain	Area (ha)	Constant	Species sensitivity to gain class (for BRW)	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion								
1	727_Intact	6.0	0.3	0.25	High Sensitivity to Potential Gain	1.75		1
2	727_Shrubland	3.1	0.5	0.25	High Sensitivity to Potential Gain	1.75		1
							Subtotal	**2**

Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion								
3	1093_DNG	4.9	0.2	0.25	High Sensitivity to Potential Gain	1.75		1
4	1093_Fragments	19.0	0.4	0.25	High Sensitivity to Potential Gain	1.75		3
5	1093_Intact	16.3	1.0	0.25	High Sensitivity to Potential Gain	1.75		7
6	1093_Shrubland	11.4	0.6	0.25	High Sensitivity to Potential Gain	1.75		3
							Subtotal	**14**
Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion								
7	1191_Fragments	10.0	0.1	0.25	High Sensitivity to Potential Gain	2.50	TRUE	1
8	1191_Intact	10.6	0.6	0.25	High Sensitivity to Potential Gain	2.50	TRUE	4
9	1191_Sparse	0.5	0.3	0.25	High Sensitivity to Potential Gain	2.50	TRUE	0
							Subtotal	**5**
Snow Gum - Mountain Gum tussock grass-herb forest of the South Eastern Highlands Bioregion								
10	1197_DNG	2.6	0.2	0.25	High Sensitivity to Potential Gain	2.50	TRUE	1
11	1197_Intact	17.2	4.4	0.25	High Sensitivity to Potential Gain	2.50	TRUE	48
12	1197_Shrubland	7.5	0.4	0.25	High Sensitivity to Potential Gain	2.50	TRUE	2
13	1197_Sparse	7.0	0.3	0.25	High Sensitivity to Potential Gain	2.50	TRUE	1
							Subtotal	**52**
Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion								
14	1330_DNG	7.3	1.8	0.25	High Sensitivity to Potential Gain	2.00	TRUE	6
15	1330_Fragments	0.0	0.1	0.25	High Sensitivity to Potential Gain	2.00	TRUE	0
16	1330_Intact	4.6	0.9	0.25	High Sensitivity to Potential Gain	2.00	TRUE	2

17	1330_Shrubland	9.3	0.1	0.25	High Sensitivity to Potential Gain	2.00	TRUE	1
18	1330_Sparse	7.4	0.2	0.25	High Sensitivity to Potential Gain	2.00	TRUE	1
							Subtotal	**10**
							Total	**83**

Species credits for threatened species

Vegetation zone name	Habitat condition (HC)	Area (ha) / individual (HL)	Constant	Biodiversity risk weighting	Potential SAII	Species credits
Burhinus grallarius / Bush Stone-curlew (Fauna)						
1191_Intact	10.6	0.24	0.25	2	False	1
1197_Intact	17.2	3.78	0.25	2	False	32
1197_Shrubland	7.5	0.02	0.25	2	False	0
					Subtotal	**33**
Callocephalon fimbriatum / Gang-gang Cockatoo (Fauna)						
727_Intact	6.0	0.29	0.25	2	False	1
727_Shrubland	3.1	0.12	0.25	2	False	0
1197_Intact	17.2	1.2	0.25	2	False	10
1197_Shrubland	7.5	0.04	0.25	2	False	0
					Subtotal	**11**
Cercartetus nanus / Eastern Pygmy-possum (Fauna)						
727_Intact	6.0	0.29	0.25	2	False	1
1093_Intact	16.3	0.91	0.25	2	False	7

1093_Shrubland	11.4	0.03	0.25	2	False	0
1191_Intact	10.6	0.6	0.25	2	False	3
1191_Sparse	0.5	0.32	0.25	2	False	0
					Subtotal	**11**
Ninox strenua / Powerful Owl (Fauna)						
727_Intact	6.0	0.16	0.25	2	False	0
727_Shrubland	3.1	0.03	0.25	2	False	0
1093_Intact	16.3	0.41	0.25	2	False	3
1093_Shrubland	11.4	0.02	0.25	2	False	0
1197_Intact	17.2	0.55	0.25	2	False	5
1197_Shrubland	7.5	0.02	0.25	2	False	0
					Subtotal	**8**
Paralucia spinifera / Purple Copper Butterfly, Bathurst Copper Butterfly (Fauna)						
1093_DNG	4.9	0.06	0.25	2	False	0
1093_Fragments	19.0	0.01	0.25	2	False	0
1093_Shrubland	11.4	0.05	0.25	2	False	0
1197_Intact	17.2	0.25	0.25	2	False	2
1330_DNG	7.3	0.05	0.25	2	False	0
1330_Intact	4.6	0.15	0.25	2	False	0
					Subtotal	**2**

Petaurus norfolcensis / Squirrel Glider (Fauna)						
1191_Intact	10.6	0.24	0.25	2	False	1
1191_Sparse	0.5	0.06	0.25	2	False	0
1197_Intact	17.2	3.78	0.25	2	False	32
1197_Shrubland	7.5	0.02	0.25	2	False	0
1330_Intact	4.6	0.74	0.25	2	False	2
					Subtotal	**35**
Phascogale tapoatafa / Brush-tailed Phascogale (Fauna)						
1093_Intact	16.3	0.95	0.25	2	False	8
					Subtotal	**8**
Phascolarctos cinereus / Koala (Fauna)						
727_Intact	6.0	0.29	0.25	2	False	1
1093_Intact	16.3	0.95	0.25	2	False	8
1191_Intact	10.6	0.6	0.25	2	False	3
1197_Intact	17.2	3.78	0.25	2	False	32
1330_Intact	4.6	0.47	0.25	2	False	1
					Subtotal	**45**
Swainsona sericea / Silky Swainson-pea (Flora)						
1191_Intact	10.6	0.6	0.25	2	False	3
1330_Intact	4.6	0.85	0.25	2	False	2
					Subtotal	**5**

Tyto novaehollandiae / Masked Owl (Fauna)						
727_Intact	6.0	0.16	0.25	2	False	0
727_Shrubland	3.1	0.03	0.25	2	False	0
1093_Intact	16.3	0.41	0.25	2	False	3
1093_Shrubland	11.4	0.02	0.25	2	False	0
1197_Intact	17.2	0.55	0.25	2	False	5
1197_Shrubland	7.5	0.02	0.25	2	False	0
					Subtotal	**8**
Veronica blakelyi / Veronica blakelyi (Flora)						
1197_Intact	17.2	4.43	0.25	2	False	38
					Subtotal	**38**

BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00020208/BAAS17013/20/00020216	McPhillamys Pipeline Orange	18/06/2020
Assessor Name	Report Created	BAM Data version *
	10/08/2020	29
Assessor Number	BAM Case Status	Date Finalised
	Open	To be finalised
Assessment Revision	Assessment Type	
0	Major Projects	

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetation zone name	Vegetation integrity loss / gain	Area (ha)	Constant	Species sensitivity to gain class (for BRW)	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion								
2	277_Intact	10.2	1.1	0.25	High Sensitivity to Potential Gain	2.00	TRUE	6
3	277_DNG	1.2	1.6	0.25	High Sensitivity to Potential Gain	2.00	TRUE	0
4	277_Moderate	11.8	3.8	0.25	High Sensitivity to Potential Gain	2.00	TRUE	23

							Subtotal	**29**
Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion								
1	1093_Intact	4.8	0.5	0.25	High Sensitivity to Potential Gain	1.75		1
							Subtotal	**1**
							Total	**30**

Species credits for threatened species

Vegetation zone name	Habitat condition (HC)	Area (ha) / individual (HL)	Constant	Biodiversity risk weighting	Potential SAII	Species credits
Aprasia parapulchella / Pink-tailed Legless Lizard (Fauna)						
277_Intact	10.2	0.53	0.25	2	False	3
					Subtotal	**3**
Ninox connivens / Barking Owl (Fauna)						
277_Intact	10.2	0.09	0.25	2	False	0
					Subtotal	**0**
Ninox strenua / Powerful Owl (Fauna)						
277_Intact	10.2	0.09	0.25	2	False	0
277_Moderate	11.8	0.99	0.25	2	False	6
1093_Intact	4.8	0.12	0.25	2	False	0
					Subtotal	**6**
Petaurus norfolcensis / Squirrel Glider (Fauna)						
277_Intact	10.2	1.1	0.25	2	False	6

1093_Intact	4.8	0.54	0.25	2	False	1
					Subtotal	**7**
Phascogale tapoatafa / Brush-tailed Phascogale (Fauna)						
277_Intact	10.2	1.1	0.25	2	False	6
1093_Intact	4.8	0.54	0.25	2	False	1
					Subtotal	**7**
Phascolarctos cinereus / Koala (Fauna)						
277_Intact	10.2	1.01	0.25	2	False	5
1093_Intact	4.8	0.4	0.25	2	False	1
					Subtotal	**6**
Swainsona recta / Small Purple-pea (Flora)						
277_Intact	10.2	1	0.25	2	False	5
277_Moderate	11.8	3.84	0.25	2	False	23
					Subtotal	**28**
Swainsona sericea / Silky Swainson-pea (Flora)						
277_Intact	10.2	1	0.25	2	False	5
277_Moderate	11.8	3.84	0.25	2	False	23
					Subtotal	**28**

Appendix E

Expert reports

Katie Diver

From: Katie Diver
Sent: Monday, 1 June 2020 6:09 PM
To: Michelle Howarth; Renee Shepherd; Samantha Wynn
Cc: Janet Krick
Subject: McPhillamys Gold Project pipeline - candidate species assessment

Evening ladies,

Thanks again for making the time to work through the candidate species assessment with me today. Here are some notes regarding what we discussed, and any actions identified.

Assessment component	Comment	Action/s
Targeted flora species with potential to occur, where targeted survey may not be possible	The BAMC predicts that *Acacia meiantha* (SAII candidate entity) may occur in PCT 1093 in the Hill End and Capertee Uplands IBRA subregions. The species can be surveyed in July, but our report is due mid-August so this doesn't leave much time to discuss avoidance/minimisation measures. The BAMC predicts that *Prasophyllum petilum* may be associated with PCT 1197 in the Capertee Uplands IBRA subregion, but targeted survey is not possible until September, which is post-lodgement of the RTS.	We would prefer to send out an expert (Colin Bower, who studied the known populations) out this month to do a targeted survey for *Acacia meiantha* as he can confidently identify the species outside the flowering season. The reasons for this and Colin's CV demonstrating his expertise will be included in the BDAR. We would look to get Colin Bower approved as an expert for *Prasophyllum petilum* so that he could conduct a habitat-based survey concurrent with the *Acacia meiantha* survey. The average time to get an expert approved is 14-21 days, so we may send out Colin to do the survey concurrent with his application to become an expert. If this process could be expedited by BCD given our time constraints we would be much obliged.
Area polygons for threatened flora species	Section 6.4.1.29 of the BAM states that for count-based flora species (ie *Eucalyptus aggregata)* that the assessor must place a 30 m buffer around each individual plant or group of plants. If this is a count-based species, only the count goes into the BAMC, and not the area of the buffer.	BCD to confirm that my assumption is correct for count-based species and if we are required to map a species polygon.
General approach to determining species polygons	The general approach to calculating species polygons was to first check if the species has a listed habitat constraint and map based on these, and if not to map based on the instructions in the threatened species profile database and supporting information if needed. The approach adopted thus far was not to map all vegetation	BCD commented that these decisions must be fully justified in the BDAR and it was better to err on the side of caution when assuming presence. EMM will consider this in finalising the species polygons.

	zones within a PCT as candidate species habitat where it was too degraded or didn't contain suitable habitat features.	
Approach to determining direct and indirect offsets	The approach to calculating direct (total clearance for the pipeline corridor) and indirect impacts (tree root and weed management zones) was shown.	BCD showed in principle support for this approach however suggested that the underpinning assumptions should be fully justified in the BDAR. EMM will justify assumptions in the BDAR which were developed for linear infrastructure and supported by field monitoring data.

Feel free to comment if there's anything I've missed.

Many thanks,

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Please note that my work days are Monday to Wednesday.

Katie Diver

From: Katie Diver
Sent: Tuesday, 12 May 2020 9:17 AM
To: Michelle Howarth
Cc: Renee Shepherd
Subject: RE: McPhillamys Gold Project

That was quick! Thanks so much, Michelle. Our discussion with Regis on limiting their disturbance footprint went well yesterday. Just to give you a quick update as to where we are at, we've revised the vegetation mapping dataset and will be heading to site tomorrow to start collecting the remaining plots. After that, I'll re-run the calculations with the complete plot dataset and the new footprint that is being prepared.

So far, we've set up a parent case with all the child cases for each IBRA subregion and it is working well. Each IBRA subregion has a mix of different PCTs and vegetation zones, and is predicting slightly different candidate species. Regis will present two different pipeline options in the RTS, which will likely require 5-6 different child cases. I've set up a different parent case for the mine as its not a linear development. So that will be about 6-7 cases for you to assess in total. It's been a bit of a learning curve for me nutting out how this can be applied to a complex project across different IBRA subs – I'm truly down the rabbit hole of the BAMC!

I'll let you know how we are travelling and when I'll be at the stage where the calcs are complete, so we can work through the VI scores, management zones and species polygons together.

Thanks,

Katie

From: Michelle Howarth <Michelle.Howarth@environment.nsw.gov.au>
Sent: Tuesday, 12 May 2020 9:04 AM
To: Katie Diver <kdiver@emmconsulting.com.au>
Cc: Renee Shepherd <Renee.Shepherd@environment.nsw.gov.au>
Subject: RE: McPhillamys Gold Project

Hi Katie

I have confirmed that the hybrid is not considered to be the threatened species.

Happy to have those discussions when you are ready. Look forward to hearing from you.

Thanks

Michelle Howarth
Senior Conservation Planning Officer, Planning North West
I work part time Monday, Friday and alternate Tuesday's
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The Department of Planning, Industry and Environment acknowledges that it stands on Aboriginal land. We acknowledge the traditional custodians of the land and we show our respect for elders past, present and emerging through thoughtful and collaborative approaches to our work, seeking to demonstrate our ongoing commitment to providing places in which Aboriginal people are included socially, culturally and economically.

From: Katie Diver <kdiver@emmconsulting.com.au>
Sent: Monday, 11 May 2020 4:49 PM
To: Michelle Howarth <Michelle.Howarth@environment.nsw.gov.au>
Cc: Renee Shepherd <Renee.Shepherd@environment.nsw.gov.au>
Subject: RE: McPhillamys Gold Project

Hi Michelle,

Thanks for the quick chat earlier. As I mentioned, we found a number of trees in the eastern most part of the pipeline alignment that looked to be the vulnerable Capertee Stringybark (*Eucalyptus cannonii*) or a hybrid of Capertee Stringybark and the non-threatened Red Stringybark (*Eucalyptus macrorhyncha*). We sent a number of specimens with a range of features off to the National Herbarium for confirmation of their ID. Some came back as Red Stringybark, while others came back as Capertee Stringybark x Red Stringybark. I just wanted to confirm with you that the hybrid individuals wouldn't be treated as a threatened species. I've come across this situation before when doing work on a modification for Moolarben and it was not treated as a threatened species.

We are getting closer to a construction footprint with the client so I would like to continue our discussions soon regarding VI scores as most plots were undertaken during drought conditions, and discuss our approach to calculating candidate species polygons. I also want to discuss our approach to offsetting direct (ie total clearance) and indirect pipeline impacts. Once I have some things sorted with the client I'll send an invite for a teleconference over teams, and you can let me know if the date/time works for you.

Thanks,

Katie

From: Michelle Howarth <Michelle.Howarth@environment.nsw.gov.au>
Sent: Friday, 13 March 2020 10:01 AM
To: Katie Diver <kdiver@emmconsulting.com.au>
Cc: Janet Krick <jkrick@emmconsulting.com.au>; Renee Shepherd <Renee.Shepherd@environment.nsw.gov.au>
Subject: RE: McPhillamys Gold Project

Hi Katie

For linear developments the assessor must carry out a separate habitat suitability assessment for each IBRA subregion for both ecosystem and species credits. The IBRA subregion used for the assessment does not simply affect the candidate species list, it will also affect the trading groups for ecosystems credits and potentially the Biodiversity Risk Weighting used to calculate the ecosystems credits. As such the assessor must carry out a separate habitat suitability assessment for each IBRA subregion. This requires the accredited assessor to submit separate cases in the BAM credit calculator.

Happy to discuss if you have any further questions.

Michelle Howarth
Senior Conservation Planning Officer, Planning North West
I work part time Monday, Friday and alternate Tuesday's
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T 02 6883 5339 | **E** michelle.howarth@environment.nsw.gov.au

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The Department of Planning, Industry and Environment acknowledges that it stands on Aboriginal land. We acknowledge the traditional custodians of the land and we show our respect for elders past, present and emerging through thoughtful and collaborative approaches to our work, seeking to demonstrate our ongoing commitment to providing places in which Aboriginal people are included socially, culturally and economically.

From: Katie Diver <kdiver@emmconsulting.com.au>
Sent: Tuesday, 10 March 2020 11:40 AM
To: Michelle Howarth <Michelle.Howarth@environment.nsw.gov.au>
Cc: Janet Krick <jkrick@emmconsulting.com.au>
Subject: McPhillamys Gold Project

Hi Michelle,

Thanks again for making the time to meet with us yesterday and the offer to contact you with any additional questions. I was reviewing my notes this morning and realised I forgot to ask you an important question with regard to the different cases required for each of the IBRA subregions that intersect the pipeline development.

We propose an alternative that we think might reduce data entry errors and minimise your review time. Could we set up a single case in the calculator for the pipeline in one IBRA subregion, then check the TSPD to see if any other species credit species would be filtered in, and add them to the single case, manually?

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Please note that my work days are Monday to Wednesday.

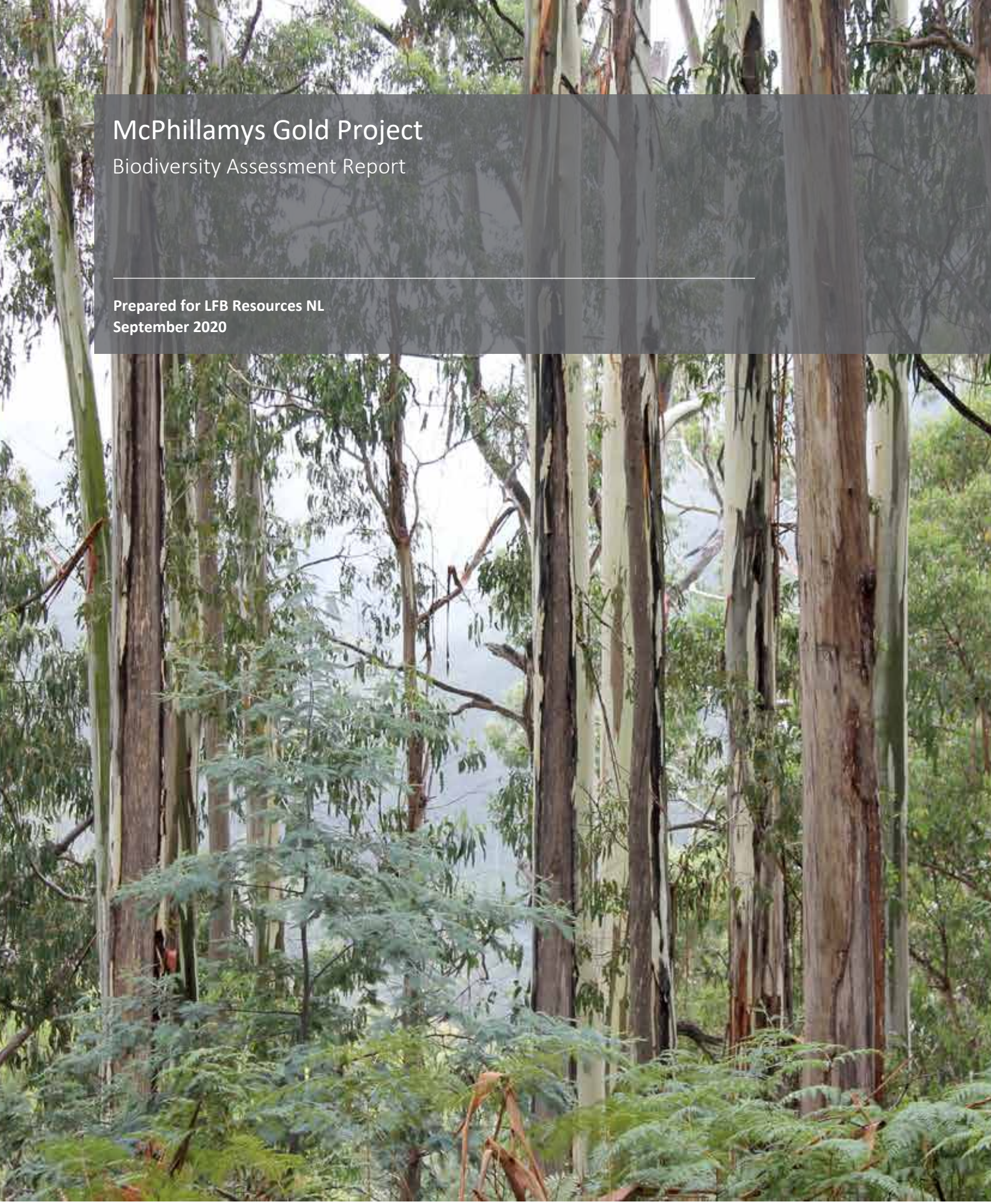
Appendix F

Biodiversity Assessment Report in accordance with the Framework for Biodiversity Assessment

McPhillamys Gold Project

Biodiversity Assessment Report

Prepared for LFB Resources NL
September 2020



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McPhillamys Gold Project

Biodiversity Assessment Report

Report Number

J180395 RP7

Client

LFB Resources NL

Date

3 September 2020

Version

Final

Prepared by	**Approved by**
	
Katie Diver	**Nathan Garvey**
National Technical Leader - Ecology	Associate Director - Ecology
3 September 2020	3 September 2020

Executive Summary

ES1 The project

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

The project for which development consent is sought comprises the mine site where the ore will be extracted, processed and gold produced for distribution to the market (the mine development). The mine development project area is approximately 8 kilometres (km) north-east of Blayney, within the Blayney and Cabonne local government areas, and within the Orange IBRA sub-region of the former Lachlan Catchment Management Authority (CMA).

In accordance with the requirements of the EP&A Act, the NSW *Environmental Planning & Assessment Regulation 2000* (EP&A Regulation) and the Secretary's Environmental Assessment Requirements (SEARs) for the project, an Environmental Impact Statement (EIS) was prepared to assess the potential environmental, economic and social impacts of the project. The development application and accompanying EIS was submitted to the NSW Department of Planning, Industry and Environment (DPIE) and subsequently publicly exhibited for six weeks, from 12 September 2019 to 24 October 2019. During this exhibition period Regis received submissions from government agencies, the community, businesses and other organisations regarding varying aspects of the project.

In response to issues raised in submissions received, as well as a result of further detailed mine planning and design, Regis has made a number of refinements to the project. Accordingly, an Amendment Report has been prepared by EMM Consulting Pty Ltd (EMM 2020a) to outline the changes to the project that have been made since the public exhibition of the EIS and to assess the potential impacts of the amended project, compared to those that were presented in the EIS. This report forms part of the Amendment Report and presents an assessment of the biodiversity impacts of the amended project.

ES2 Ecological values

Field surveys revealed that vegetation within the mine site, which has experienced historic pastural 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 varied from higher condition patches to poor condition patches.

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 a critically endangered ecological community (CEEC) 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, also listed as a CEEC under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999.*

Two ecosystem credit species, namely Little Lorikeet (*Glossopsitta pusilla*) and Swift Parrot (*Lathamus discolor*) were predicted to be associated with the PCTs in the mine development project area by the Biodiversity Assessment Method Calculator (BAMC). Two candidate species, comprising the Koala (*Phascolarctos cinereus*) and Squirrel Glider (*Petaurus norfolcensis*) were also recorded in the mine development project area. The Koala is associated with three PCTs across the site, namely PCT 727 (medium and high condition vegetation zones only), PCT 951 and PCT 1330. PCT 727 contains Broad-leaved Peppermint (*E. dives*), Bundy (*E. goniocalyx*), Apple Box (*E. bridgesiana*) and sparse areas of Brittle Gum (*E. mannifera*). PCT 951 contains Manna Gum (*Eucalyptus viminalis*). PCT 1330 contains Apple Box (*E. bridgesiana;* and Yellow Box (*E. melliodora*). The aforementioned tree species have been identified by *State Environmental Planning Policy (Koala Habitat Protection) 2019* as koala feed trees in the central and southern tablelands koala management area, in which the mine is located. The Squirrel Glider has been associated with all woody communities on site. Approximately 116.95 ha of Koala habitat and 127.35 ha of Squirrel Glider habitat occurs in the mine disturbance footprint. Three species listed under the EPBC Act were recorded in the mine development project area. These comprised two species listed as vulnerable (Koala and Superb Parrot *Polytelis swainsonii*) and two migratory species (Latham's Snipe (*Gallinago hardwickii*) and Rainbow Bee-eater (*Merops ornatus*)). PCTs 727, 951 and 1330 in the mine development project area were assessed against the Koala habitat assessment tool in the EPBC Act referral guidelines for the vulnerable Koala (Commonwealth of Australia 2014). With a total score of seven, vegetation in the mine development 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 mine development project area. The breeding range is concentrated on the NSW South Western Slopes and Riverina Bioregions; however, the mine development 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 mine development project area; however, the mine development 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 mine development 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 mine development project area.

A single Rainbow Bee-eater was recorded in the mine development project area. The Rainbow Bee-eater is widely distributed throughout Australia, Asia, Papua New Guinea and Solomon Islands. The majority of the global population breeds in Australia (including on Rottnest Island and islands in the south-west Torres Strait). Breeding has also been recorded in eastern Papua New Guinea (around Port Moresby and the Ramu Valley) and may possibly occur in the Lesser Sundas. The species important breeding habitat occurs outside the mine development 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 mine disturbance footprint was minimised to avoid and minimise biodiversity impacts, particularly impacts to White Box Yellow Box Blakely's Red Gum Woodland CEEC and threatened species habitat.

Key avoidance measures implemented by Regis into the mine development design comprise:

- avoidance of all areas of PCT 1330 Moderate/Good (High) condition within the mine development 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 mine development;
- minimisation of impacts to PCT 1330_Medium condition wherever feasible; and
- 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.

ES4 Biodiversity impacts

ES4.1 Comparison of EIS impacts with amended project

Impacts on biodiversity have changed for the mine development due to a revision of the mine disturbance footprint. Changes to the mine disturbance footprint have resulted in no change for some PCTS, decreased impacts for some PCTs and small increases for others. Overall, the amended project will reduce the impact on PCTs by 1.97 ha, reducing from 132.36 for the EIS mine disturbance footprint to 130.39 in the amended project mine disturbance footprint. Of this area of native vegetation impacted, the amended project will increase the impacts on Box Gum Woodland as listed under the BC Act and EPBC Act by 1.93 ha.

The method for calculating Koala impacts has changed since the EIS, with the introduction of State Environmental Planning Policy (SEPP) (Koala Habitat Protection) 2019. Koala habitat impacts were calculated in the EIS based on the repealed SEPP 44 and the feed tree species for the central and southern tablelands koala management area in the Koala Recovery Plan (DECC 2008). Koala impacts were estimated to be 75.77 ha in the EIS, which would increase to 78.57 ha for the amended project, representing a 2.8 ha increase.

Koala impacts have been re-calculated in this BDAR in accordance with the feed tree species for the central and southern tablelands koala management area in SEPP (Koala Habitat Protection) 2019. Using SEPP (Koala Habitat Protection) 2019, the EIS mine disturbance footprint would have directly impacted 115.06 ha, increasing by 1.89 ha to 116.95 ha for the amended project.

In the EIS, direct impacts on the Squirrel Glider were 129.32 ha. The amended project would reduce direct Squirrel Glider impacts by 1.97 ha to 127.35 ha.

ES4.2 Potential biodiversity impacts

Following the implementation of avoidance and minimisation measures, the mine development will remove 130.39 ha of native vegetation. The mine development will remove 45.60 ha of vegetation (PCT 1330) that represents White Box Yellow Box Blakely's Red Gum Woodland CEEC listed under the NSW BC Act; 20.43 ha of which also represents Box Gum Woodland CEEC listed under the Commonwealth EPBC Act. These impacts will be compensated through the implementation of the project's biodiversity offset strategy.

Three PCTs, comprising retained patches of PCT 727, 951 and 1330 surrounding the mine disturbance footprint overlie shallow groundwater ranging from 0 to 20 metres below ground level. A high proportion of the distribution of two PCTs (951 and 1330) had access to groundwater. Accordingly, these PCTs were identified as opportunistic users of groundwater. The predicted watertable levels at the end of mining and 100 years following mining were compared with existing levels. No negative groundwater access impacts are expected to occur for GDEs.

A conservative approach was used in the groundwater assessment (Appendix K of the EIS) to simulate seepage from the TSF and assess any changes in groundwater quality. The Groundwater Assessment (Appendix K of the EIS) and Groundwater Assessment Addendum (Appendix H of the Amendment Report) identified the potential for groundwater quality changes because of:

- seepage from the TSF to the watertable and towards the Belubula River;
- seepage from stockpiles to the watertable;
- seepage from water storage ponds to the watertable; and

Potential impacts related to the last three hazard items have been assessed in the Groundwater Assessment (Appendix K of the EIS) and assessed to present minimal to no impacts on the water environment from a water quality perspective. The potential impacts of seepage from the TSF was also assessed in the Groundwater Assessment (Appendix K of the EIS), however as the TSF schedule has been adjusted for the amended project, this assessment has been revisited and is included in Groundwater Assessment Addendum (Appendix H of the Amendment Report).

ES5 Biodiversity credits required

The mine development requires 3,863 ecosystem credits to compensate for impacts on native PCTs and ecosystem credit species. In addition to ecosystem credits, the mine development also requires 3,041 species credits for the Koala and 2,802 species credits for the Squirrel Glider. Regis will compensate for these residual impacts through the implementation of a biodiversity offset strategy.

The above ecosystem and species credits have been provided for the amended project in accordance with the FBA, purposes of DAWE's assessment. However, it is intended that ecosystem and species credits requirements will be in accordance with the Biodiversity Assessment Method (BAM), provided in the McPhillamys Gold Project Amendment Report – Biodiversity Development Assessment Report (BDAR), provided in Appendix M of the Amendment Report.

ES6 Biodiversity offset strategy

Under the NSW Biodiversity Offsets Scheme, proponents can meet their offset requirements through one, or a combination of the following actions:

1. establishment of a biodiversity stewardship site containing the required ecosystem and species credits;
2. purchase and retirement of the required ecosystem and species credits from the biodiversity credit market;
3. payment into the Biodiversity Conservation Fund; and
4. fund a management action that directly benefits the species and/or ecological communities impacted.

The disturbance footprint may shift within the construction envelope.

The proponent has purchased and conducted detailed studies to assess native PCTs and threatened species at a future stewardship site in Blayney (ie option 1, above). The property is approximately 388 ha and contains some of the required ecosystem and species credits (PCT 951, PCT 1330 and Koala). It is the proponent's intention to secure the property under a Biodiversity Stewardship Agreement with the Biodiversity Conservation Trust. The proponent will assess the residual ecosystem and species credits and secure these under one, or a combination of options 2 to 4, in accordance with the Biodiversity Offset Scheme.

ES7 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 mine development requires 3,863 ecosystem credits to compensate for impacts on native PCTs and ecosystem credit species. In addition to ecosystem credits, the mine development also requires 3,041 species credits for the Koala and 2,802 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 mine development 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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Stage 1

Biodiversity Assessment

1 Introduction

1.1 Background

LFB Resources NL is seeking State significant development (SSD) consent under Part 4 of the New South Wales (NSW) *Environmental Planning and Assessment Act 1979* (EP&A Act) to develop and operate a greenfield open cut gold mine and associated mine infrastructure in Central West NSW. The project application area is illustrated at a regional scale in Figure 1.1. LFB Resources NL is a 100% owned subsidiary of Regis Resources Limited (herein referred to as Regis).

As shown in Figure 1.1, the McPhillamys Gold Project (the project) is comprised of 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 supply pipeline which will enable the supply of water from approximately 90 kilometres (km) away near Lithgow to the mine site (the pipeline development). The mine development project area is around 8 km north-east of Blayney, within the Blayney and Cabonne local government areas (LGAs). The pipeline is an approximately 90 km long pipeline alignment from Centennial's Angus Place and Springvale Coal Services Operations (SCSO) and Energy Australia's Mount Piper Power Station (MPPS), near Lithgow, to the mine development area. The pipeline development runs through the LGAs of Bathurst and Lithgow.

Up to 8.5 Million tonnes per annum (Mtpa) of ore will be extracted from the McPhillamys gold deposit over a total project life of 15 years. The mine development will include a conventional carbon-in-leach processing facility, waste rock emplacement, an engineered tailings storage facility (TSF) and associated mine infrastructure including workshops, administration buildings, roads, water management infrastructure, laydown and hardstand areas, and soil stockpiles.

In accordance with the requirements of the EP&A Act, the NSW *Environmental Planning & Assessment Regulation 2000* (EP&A Regulation) and the Secretary's Environmental Assessment Requirements (SEARs) for the project, an Environmental Impact Statement (EIS) was prepared to assess the potential environmental, economic and social impacts of the project. The development application and accompanying EIS was submitted to the NSW Department of Planning, Industry and Environment (DPIE) and subsequently publicly exhibited for six weeks, from 12 September 2019 to 24 October 2019. During this exhibition period Regis received submissions from government agencies, the community, businesses and other organisations regarding varying aspects of the project.

In response to issues raised in submissions received, as well as a result of further detailed mine planning and design, Regis has made a number of refinements to the project. Accordingly, an Amendment Report has been prepared by EMM Consulting Pty Ltd (EMM) (2020a) to outline the changes to the project that have been made since the public exhibition of the EIS and to assess the potential impacts of the amended project, compared to those that were presented in the EIS. This report forms part of the Amendment Report and presents an assessment of the biodiversity impacts of the amended project.

1.2 Development proposal

A summary of the key amendments to the project since the exhibition of the EIS are summarised below and described in detail in Chapter 2 of the Amendment Report (EMM 2020a):

- **Site access** – a new location for the site access intersection off the Mid Western Highway is proposed, approximately 1 km east of the original location assessed in the EIS, in response to feedback from Transport for NSW (TfNSW, former Roads and Maritime Services) and the community. A new alignment is subsequently proposed for the site access road to the mine administration and infrastructure area.

- **Mine and waste rock emplacement schedule** – revision of the mine schedule and the subsequent construction sequence of the waste rock emplacement has been undertaken, in particular consideration of predicted noise levels in Kings Plains. This achieved a reduction in predicted noise levels at nearby residences while extending the construction timeframe for the southern amenity bund.

- **Pit amenity bund** – the size of the pit amenity bund has been reduced as a result of optimisation of the open cut pit design and the improved location of exit ramps for haul trucks.

- **Tailings Storage Facility (TSF)** – amendments to the design include changes to the embankment design and construction timing, the TSF footprint, and the TSF post closure landform.

- **Water management system** – the secondary water management facility (WMF) has been removed from the water management system resulting in an avoidance of impacts to a potential item of historic heritage (MGP 23 - Hallwood Farm Complex (Hallwood)). The size of the WMFs has also been revised to achieve a reduced likelihood of discharge from the storages within the operational water management system as part of a revised nil discharge design.

- **Mine administration and infrastructure area** – the layout of this area has been revised and optimised.

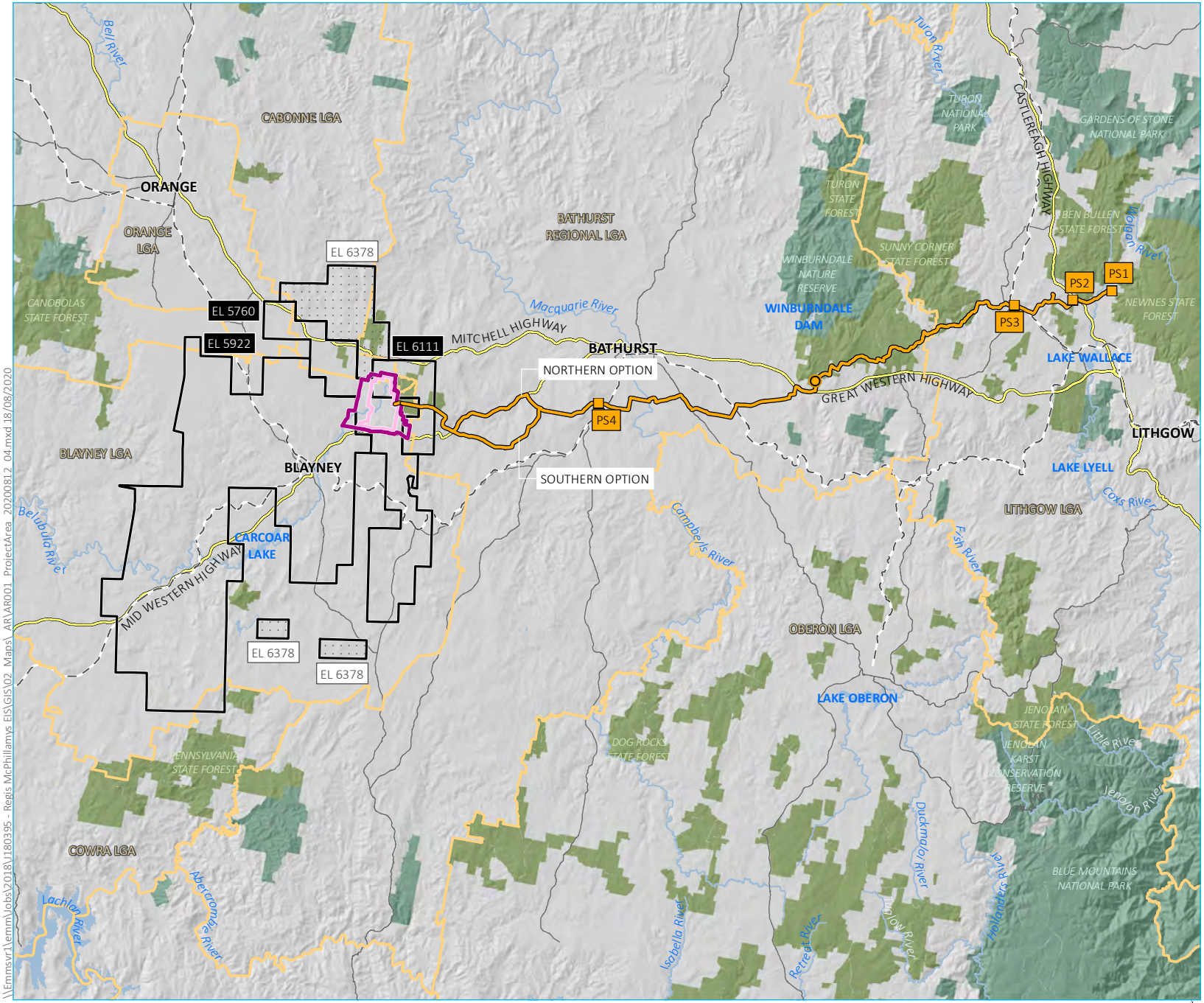
- **Mine development project area** – a very small change has been made to the mine development project area along the eastern boundary (an additional 1 hectare (ha), or 0.04% change), to accommodate the required clean water management system. The change takes the mine development project area from 2,513 ha to 2,514 ha.

No amendments have been made to other key aspects of the mine development as presented in the EIS for which approval is sought, such as the proposed mining method, operating hours, annual ore extraction rate of 8.5 Mtpa, annual ore processing rate of up to 7 Mtpa, employee numbers, and rehabilitation methods and outcomes.

The amended mine development project layout, compared to that assessed in the EIS, is shown in Figure 1.2. A comparison of the biodiversity impacts of the amended mine development project with the mine development project assessed in the EIS is provided in Section 7.2 of this report.

1.2.1 Water supply pipeline

As noted in Section 1.1, the water supply pipeline component of the project is being assessed separately under the NSW *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

Project application area
- Mine development project area (2,514.06 ha)
- Mining lease application area (1,806.17 ha) (Note: boundary offset for clarity)
- Pressure reducing system
- Pumping station facility
- Pipeline

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

Source: EMM (2020); Regis Resources (2020); DPE (2018); DFSI (2017); GA (2011)

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Project application area – regional setting

McPhillamys Gold Project
Amendment report – biodiversity assessment report
Figure 1.1

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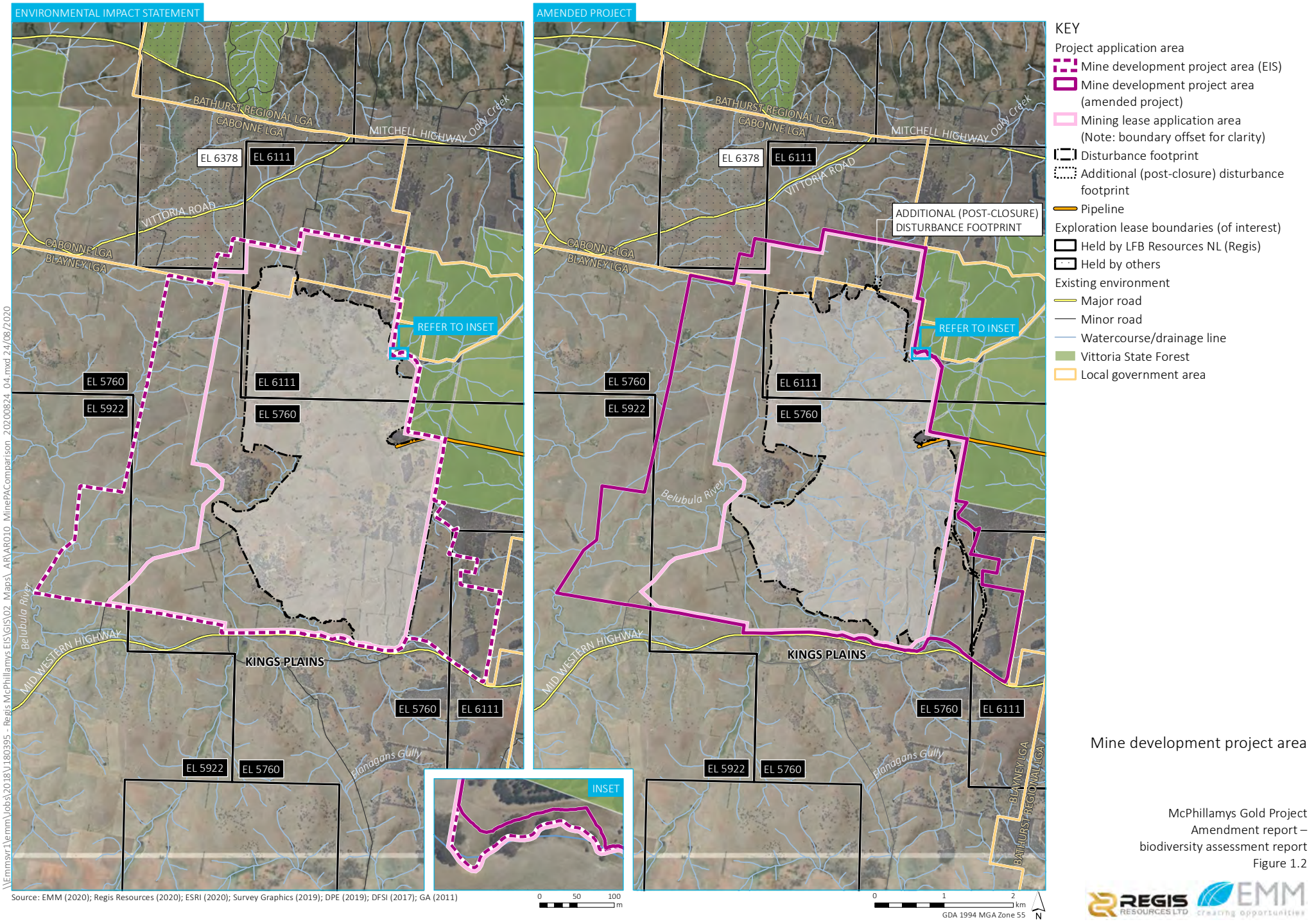
EMM creating opportunities



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Mine development project area

McPhillamys Gold Project
Amendment report – biodiversity assessment report
Figure 1.2

1.3 Information sources

1.3.1 Publications and databases

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

- Department of Agriculture, Water and the Environment (DAWE) 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 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 2018a); 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 mine development 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 mine development 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 in March 2019.

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

1.4 Purpose of this report

The requirements of the SEARs issued for the project in relation to the assessment of biodiversity impacts at the state level under the EP&A Act requested a 'hybrid' biodiversity assessment where:

- the mine development was to be assessed against the *Framework for Biodiversity Assessment* (FBA) (OEH 2014) and the NSW *Biodiversity Offsets Policy for Major Projects* (Major Projects Policy) as per the *Biodiversity Conservation (Savings and Transitional) Regulation 2017* (BC Transitional Regulation); and

- a separate biodiversity assessment was required for the pipeline development under BC Act, in accordance with the Biodiversity Assessment Method (BAM; OEH 2017).

In accordance with the SEARs, two biodiversity assessments were prepared for the project and included in the EIS; one for the mine development in accordance with the FBA (EMM 2019), and one for the pipeline development in accordance with the requirements of the BC Act using the BAM (OzArk 2019).

While the EIS was prepared strictly in accordance with the SEARs issued by DPIE, a separate BDAR has been prepared in accordance with the BAM (OEH 2017) to assess the potential biodiversity impacts of the amended project, considering both the mine development and pipeline development components together. The BDAR assessment considers and outlines the differences in impacts associated with the amended project compared to the original project as presented in the EIS. The purpose of the BDAR of the amended project is to allow assessment of the amended project under EP&A Act and BC Act.

The EPBC Act referral decision concluded the referred mine development was a controlled action (while the pipeline development was not a controlled action) on 28 May 2019. The mine development required assessment under the EPBC Act as the DAWE considered that the action would be likely to have a significant impact on White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grasslands (a threatened ecological community) and the Koala.

Due to the amendments made to the project since the submission of the EPBC Act referral, an application to vary the action to reflect the amended project under section 156A of the EPBC Act will be submitted to to DAWE. The purpose of the variation will be to provide a revised assessment for the threatened species and ecological communities listed under the EPBC Act, following amendments to the mine development and pipeline development footprints and the additional biodiversity assessments undertaken. The variation application will also provide additional strategies to avoid, minimise, mitigate, and offset biodiversity impacts relating to the amended project.

Since the time that the mine development was declared to be a controlled action, and following the commencement of the BC Act, an amending bilateral agreement has been executed between the Commonwealth and NSW (in March 2020). However, while an assessment is presented with the Amendment Report of biodiversity impacts in accordance with the BC Act requirements, the varied action needs to be assessed under the FBA and Major Projects Policy in order to be compliant with the 2015 bilateral agreement referenced in the controlled action determination and SEARs.

Accordingly, this revised BAR has been prepared for the mine development component of the amended project in accordance with the FBA, for the purposes of DAWE's assessment.

The specific objectives of this assessment are to:

- describe biodiversity values of the mine development project area associated with the amended project;

- assess the likelihood that threatened species and communities (threatened biodiversity) listed under relevant the BC Act and EPBC Act could occur in the mine development project area associated with the amended project;

- document the strategies implemented to avoid and/or minimise impacts of the amended project on threatened biodiversity;
- assess residual threatened biodiversity impacts potentially associated with the amended project, after avoidance and minimisation strategies have been implemented;
- provide environmental safeguards to mitigate threatened biodiversity impacts during construction and operation of the amended project; and
- provide a strategy to offset residual threatened biodiversity impacts associated with the amended project.

1.5 Submissions on the EIS

Several minor issues were raised relating to the Mine Development BAR (EMM 2019) in the DPIE - Biodiversity Conservation Division's (BCD's) submission on the EIS. These issues have been considered and incorporated into this revised assessment.

Detailed responses to all the submissions received are provided in the Submissions Report prepared for the project (EMM 2020b), which has been prepared in conjunction with the Amendment Report (EMM 2020a). A summary of the key issues relevant to this assessment are provided in Table 1.1, together with how each matter has been addressed within this report.

Table 1.1 Key comments received in BCD's submissions relating to Mine Development BAR and Pipeline Development BDAR, and how they have been addressed

Issue	Where addressed
Mine development	
1. Further assessment of Silky Swainson-pea (*Swainsona sericea*) is required. Targeted surveys were conducted in 2013 for Small Purple-pea (*Swainsona recta*). The 2013 surveys were conducted in Spring, with adequate coverage of two plant community types: • - PCT 654 Apple Box – Yellow Box dry grassy woodland of the South Eastern Highlands Bioregion. • - PCT 727 Broad-leaved Peppermint – Brittle Gum – Red Stringybark dry open forest on the South Eastern Highlands Bioregion. In a letter to the consultants (DOC19/182640) BCD noted that no transects were conducted in the northernmost part of the proposed disturbance footprint. This area contains PCT 1298 – Wet tussock grasslands of cold air drainage areas of the tablelands. As PCT 1298 is potential habitat for Silky Swainson-pea the exclusion of species within this PCT will need to be fully justified. The BAR states that the Silky Swainson-pea is not identified as a threatened species requiring consideration by the BBAM calculator and therefore requires no further assessment. Section 6.5.1.2 of the FBA states that a threatened species is identified as a candidate species for the development site if the geographic distribution of the species is known or predicted to include the IBRA subregion in which the development site is located. As Silky Swainson-pea is predicted to occur in the Orange IBRA subregion it should be assessed and, as no targeted surveys were conducted in PCT 1298, it should either be assumed to be present or an expert report should be obtained. *Recommendation 1* Justification for the exclusion of Silky Swainson-pea should be provided, or conduct targeted surveys, assume presence or obtain an expert report.	Targeted surveys were conducted in PCT 1298 (since revised to PCT 766) for Silky Swainson-pea. The methods for the targeted surveys are described in Section 5.3.1. The survey did not record any Silky Swainson-pea.

Table 1.1 Key comments received in BCD's submissions relating to Mine Development BAR and Pipeline Development BDAR, and how they have been addressed

Issue	Where addressed
2. A species polygon is required for the Squirrel Glider. Section 7.3 of the BAR concludes that there will be a residual impact of 129.3 ha of habitat for the Squirrel Glider and 75.77 ha of habitat for the Koala. However, Figure 7.3 of the BAR depicts a species credit polygon that is labelled for both Koala and Squirrel Glider totalling 75.76 ha. It is a requirement of the FBA that species polygons for species credit species be provided in the BAR. The species polygon provided reflects the area of habitat likely to be used by the koala (75.77 ha). An additional species polygon is required for the Squirrel Glider (129.3 ha). *Recommendation 2* A figure showing the species polygon for the Squirrel Glider is required.	The species polygons for Koala and Squirrel Glider have been revised to account for changes in the mine footprint and the revised list of feed tree species in the central and southern tablelands koala management area defined in *State Environmental Planning Policy (Koala Habitat Protection) 2019*. These are discussed in Section 8.2.1 and shown on Figure 7.3.
3. Relocation of koala will require consultation with BCD. Section 7.2 of the BAR includes a mitigation measure to "develop specific procedures for koala pre-clearance inspections and safe relocations outside the clearing area". Any planned relocation of koalas should be consistent with the Office of Environment and Heritage (OEH) Translocation Operational Policy (OEH 2019). The proponent should demonstrate how they will maximise and report on animal welfare outcomes at each stage of the translocation process. Procedures for the potential relocation of koalas, including the selection of nearby habitat suitable for release and monitoring of translocation success, should be developed in consultation with BCD. *Recommendation 3* Any planned relocation of Koalas should be consistent with the OEH Translocation Operational Policy (OEH 2019) and be developed in consultation with BCD.	It is not the intention to formally translocate Koalas from the mine project development area. Rather, the intention is to conduct pre-clearance inspections to determine if Koalas are present in areas of native vegetation prior to clearing. In the unlikely event that Koalas are found to be present, appropriate methods (such as staged clearing) will be followed to allow Koalas to move unassisted into adjacent retained vegetation. Such measures are outlined in Section 7.3 and will be detailed in the Biodiversity Management Plan that would be prepared if development consent is granted.

1.6 Terminology

The following terms were used throughout the EIS to describe the project, and remain relevant for this assessment and the amended project:

- **the project** – the project in its entirety; encompassing the mine development and the pipeline development. In this report, the term 'the project' refers to the amended project for which approval is now sought. Where the original project design as presented in the EIS is being discussed, this will be clarified;

- **project application area** – the area in its entirety to which the development application (SSD 9505) relates; comprising the mine development project area and the pipeline corridor as illustrated in Figure 1.1. In this report, the term 'the project application area' refers to the amended area that relates to the development for which approval is now sought. Where the original project application area, as presented in the EIS, is being discussed, this will be clarified;

- **mine development project area** – refers to the mine development project area as illustrated in Figure 1.1;

- **mine development** – construction and operation of the mine and associated mine infrastructure within the mine development project area; and

- **mine disturbance footprint -** refers to the mine development disturbance footprint as illustrated in Figure 1.1.

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 (MNES) protected under the Act.

Nine MNES 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 MNES must be referred to the Commonwealth Minister for the Environment for assessment.

A proposed action was referred to the Commonwealth Minister in April 2019 under the EPBC Act. The referred action included the mine development but excluded the pipeline on the basis that the pipeline was considered unlikely to result in a significant impact on MNES.

The EPBC Act referral decision concluded the referred mine development (the action) was a controlled action on 28 May 2019 requiring assessment under the EPBC Act as the DAWE considered that the action would be likely to have a significant impact on the following MNES:

- 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 decision also stated that the assessment process for the listed threatened species and communities (ss 18 and 18A of the EPBC Act) impacted by the action was to be completed by the NSW Government pursuant to the accredited bilateral agreement, which commenced on 26 February 2015. Supplementary SEARs for the MNES relevant to the project were provided on 30 May 2019.

The amended project involves a change in the layout and disturbance footprint of the mine development, which has resulted in a small change to the predicted impacts on MNES; particularly the area of Box Gum Woodland to be cleared. Approximately 20.43 ha of the EPBC Act listed White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland will be removed because of the amended project. This is compared to 18.5 ha which was proposed to be removed in the EIS.

Due to the amendments made to the project since the submission of the EPBC Act referral, an application to vary the action to reflect the amended project under section 156A of the EPBC Act will be submitted to DAWE. The purpose of the variation will be to provide a revised assessment for the threatened species and ecological communities listed under the EPBC Act, following amendments to the mine development and pipeline development footprints and the additional biodiversity assessments undertaken. The variation application will also provide additional strategies to avoid, minimise, mitigate, and offset biodiversity impacts relating to the amended project.

As described above, a revised BDAR (Appendix M of the Amendment Report) has been prepared for the amended project (comprising both the mine development and the pipeline development) in accordance with the BC Act using the BAM to address requirements at a State level. Since the time that the mine development was declared to be a controlled action and following the commencement of the BC Act, an amending bilateral agreement has been executed between the Commonwealth and NSW (in March 2020). However, while the BDAR presented in Appendix M of Amendment Report assesses biodiversity impacts in accordance with the NSW BC Act requirements, the varied action needs to be assessed under the FBA and Major Projects Policy in order to be compliant with the 2015 bilateral agreement referenced in the controlled action determination and SEARs.

Accordingly, this revised BAR has been prepared for the amended project in accordance with the FBA, for the purposes of DAWE's assessment.

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 DPIE (previously Department of Planning and Environment (DPE)).

As described in Chapter 1, the 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 of the EP&A Act for the project.

As described above, SEARs were issued by the DPIE on 24 August 2018 and revised on 19 December 2018. The SEARs required that biodiversity impacts related to the project were to be assessed and documented in accordance with the FBA (OEH 2014) by an appropriately accredited person. The report was prepared by Accredited Assessors Katie Diver and Nathan Garvey. Following the declaration of the project as a controlled action, supplementary SEARs relating to MNES were issued by DPIE on 30 May 2019.

The SEARs and supplementary SEARs were satisfied following lodgement of the Mine Development Biodiversity Assessment Report for the project (EMM 2019).

2.2.2 State Environmental Planning Policy (Koala Habitat Protection) 2019

The S*tate Environmental Planning Policy (Koala Habitat Protection) 2019* (the Koala Habitat Protection SEPP) 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. It triggers consideration of a Development Application Map and if areas are mapped as Koala habitat, the subject lots are greater than 1 ha size, and within local government areas listed in Schedule 1 of the Koala Habitat Protection SEPP, then a Koala assessment report is required for development.

Assessment of the Koala SEPP is required for development applications under Part 4 of the EP&A Act, which includes SSD projects. The Koala SEPP does not strictly apply to this BAR in accordance with the savings and transitional provision in Clause 15, as the development application was made upon lodgement of the EIS but has not yet been determined. Notwithstanding, consideration has been given to the potential occurrence and impacts upon the Koala within this report and has been provided in Section 8.2.1.

2.2.3 Threatened Species Conservation Act 1995

The *Threatened Species Conservation Act 1995 (*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 OEH). This Act is now repealed and has been replaced by the BC Act.

The BC Transitional Regulation 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 SEARs, the amended project has been assessed in accordance with the FBA, and the TSC Act provisions still apply for the purposes of DAWE’s assessment.

Notwithstanding, a separate BDAR has been prepared in accordance with the BAM (OEH 2017) to assess the potential biodiversity impacts of the amended project, considering both the mine development and pipeline development components together, for the purposes of the BCD’s assessment.

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.

For the purposes of the Commonwealth assessment (Section 2.1.1), 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 project area is 2,514.06 ha. It lies approximately 8 km north-east of Blayney within the Blayney and Cabonne LGAs and the South Eastern Highlands Interim Biogeographic Regionalization of Australia (IBRA) region and Orange IBRA sub-region. Landform elements within the mine development project area consist of low hills, small plains and gullies, which is consistent with the broader locality. Vegetation within the site has experienced historical pastural use and is therefore mainly open paddock with some fragmented patches of timbered natural vegetation scattered throughout (Photograph 3.1). The upper reaches of the Belubula River catchment lie within the mine development project area, and several small unnamed tributaries run through the site with some feeding into dams scattered throughout.

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

3.2 Bioregions and landscape regions

Bioregions and landscapes relevant to the mine development are listed in Table 3.1.

Table 3.1 Landscape features

Landscape feature	Mine development
IBRA Bioregion/s	South Eastern Highlands
IBRA subregion/s	Orange
NSW Landscape Regions	Byng Ultramafics
	Mullion Slopes
	Upper Lachlan Channels and Floodplains

3.2.1 Rivers, streams and estuaries

The mine development project area is located within the Lachlan catchment, in eastern NSW. One mapped watercourse, the Belubula River, and several smaller tributaries intersect the mine development project area (Figure 3.1). The headwaters of the Belubula River form to the north-east of the mine development project area, before flowing through the mine development project area and then south-west towards Blayney and, beyond that, Carcoar Dam. In the mine development project area, the Belubula River forms a 3rd, 4th and 5th order stream. A 5th order unnamed tributary of the Belubula River occurs within the mine development project area to the south-west of the mine disturbance footprint. Where these two waterways meet, within the mine development project area but south-west of the mine disturbance footprint, they become a 6th order stream.

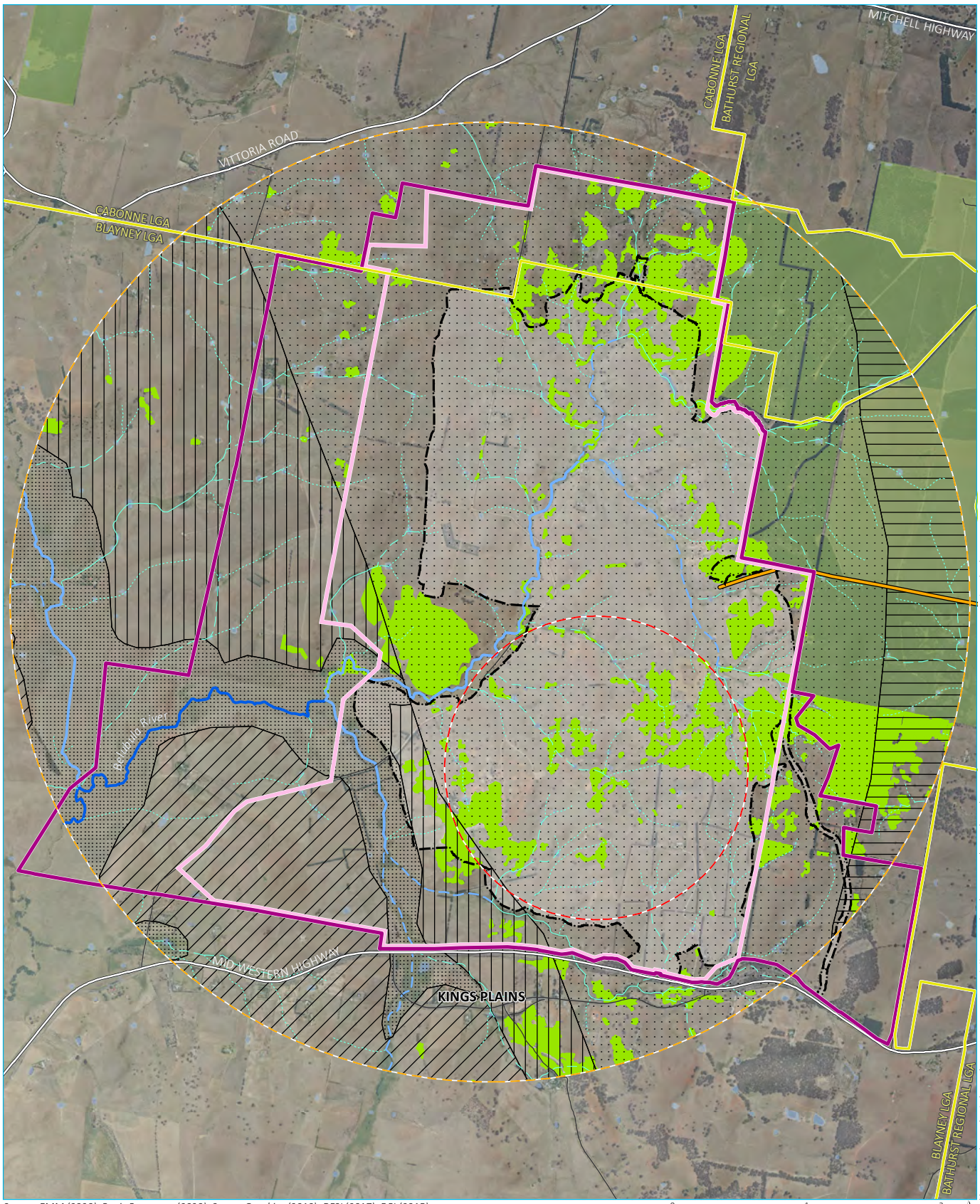
3.2.2 Wetlands

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

3.2.3 Connectivity

The locality of the mine development project area 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 mine development project area.

The mine development project area is located within the riparian buffer of a 5th order stream. A riparian buffer 40 meters (m) either side of a 4th order stream will be removed for the amended project, as shown on Figure 3.2 These riparian buffers occur in a highly disturbed state due to past agricultural practices.



Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); DPI (2015)

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KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline

Existing environment
- Major road
- Minor road
- Waterbody
- Vittoria State Forest
- Local government area boundary
- Inner assessment circle (400 ha)
- Outer assessment circle (4,000 ha)
- Native vegetation within assessment circles

Strahler stream order
- 1st order
- 2nd order
- 3rd order
- 4th order
- 5th order
- 6th order

Mitchell landscape
- Byng Ultramafics
- Mandurama Slopes
- Mullion Slopes
- Rockley Plains
- Upper Lachlan Channels and Floodplains

NOTE: The entire view extent is within the IBRA7 South Eastern Highlands region (Orange subregion)

Location map

McPhillamys Gold Project
Amendment report – biodiversity assessment report
Figure 3.1

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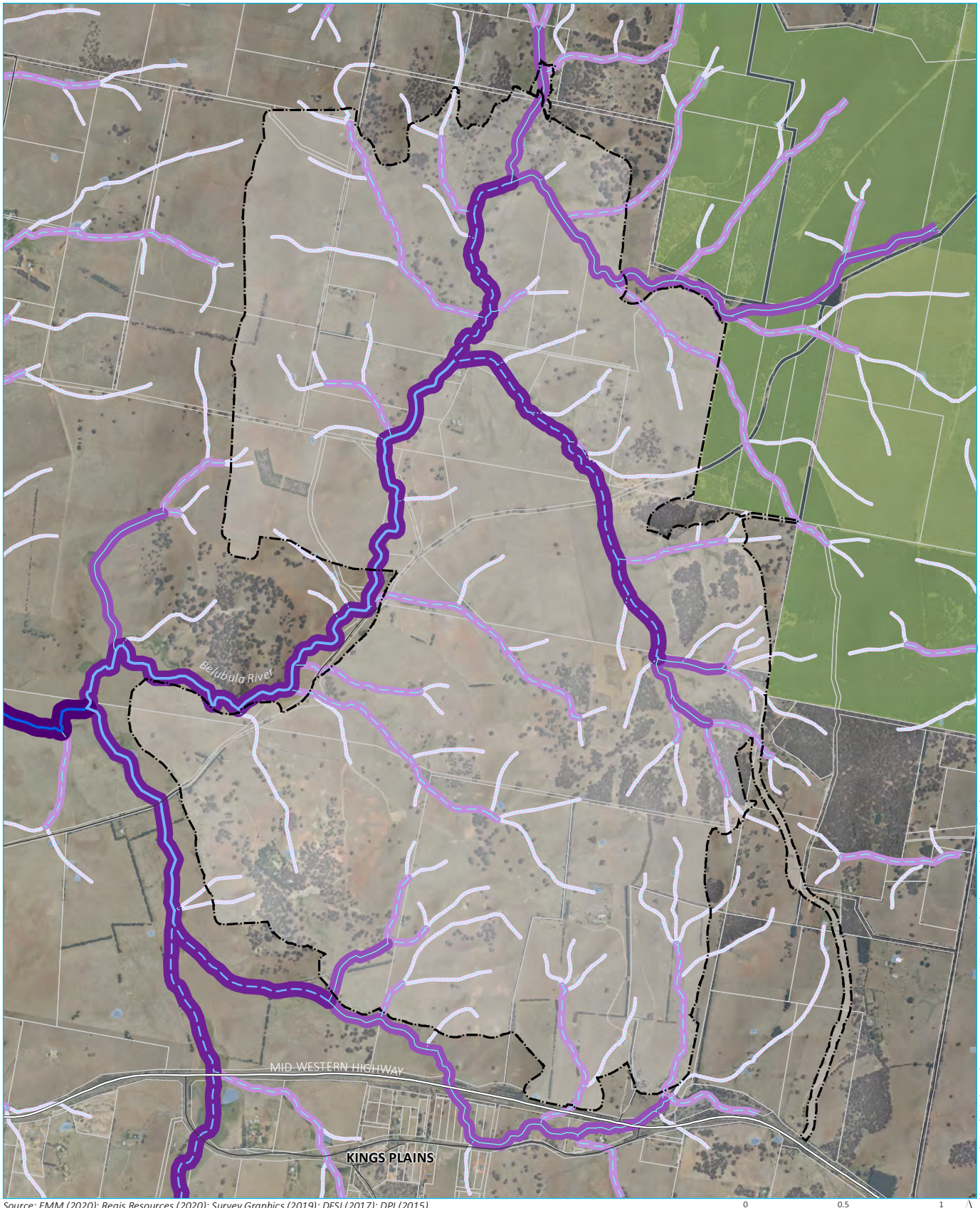
EMM creating opportunities



Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); DPI (2015)

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GDA 1994 MGA Zone 55

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KEY

- Disturbance footprint
- Existing environment
  - Major road
  - Minor road
  - Waterbody
  - Cadastral boundary
  - Vittoria State Forest
- Strahler stream order
  - 1st order
  - 2nd order
  - 3rd order
  - 4th order
  - 5th order
  - 6th order
- Riparian buffer
  - 10 m
  - 20 m
  - 30 m
  - 40 m
  - 50 m

Site map

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Figure 3.2

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3.3 Assessment of site context

In the EIS, vegetation mapping for the locality (OEH 2018) was used to determine the extent of native vegetation for the mine development project area and the assessment circles. In accordance with the FBA, the native vegetation extent should be calculated using a combination of mapping for the mine development project area and locality. For this revised BAR, the native vegetation extent has been corrected, and uses a combination of the mapped native vegetation in the mine development project area and the locality (OEH 2018). 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 3.2 provides a summary of the extent of native vegetation cover within the inner and outer assessments circles, before and after development.

Table 3.2 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)	362.38	9.06	231.98	5.8
Inner assessment circle (400 ha)	57.39	14.35	0.17	0.04

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 mine development 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 mine development 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 2014).

Surveys identified four PCTs across the mine development 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 mine development 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]	-

Notes: 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 mine development project area by air photo interpretation and on-ground validation into PCTs. 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 FBA (OEH 2014). 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 mine development 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 mine development 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 2014). 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 mine development 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 2014) requirements. The collection of data from these plots was in accordance with the FBA (OEH 2014). 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 2014). A total of 23 plots/transects were completed across the broader mine development 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

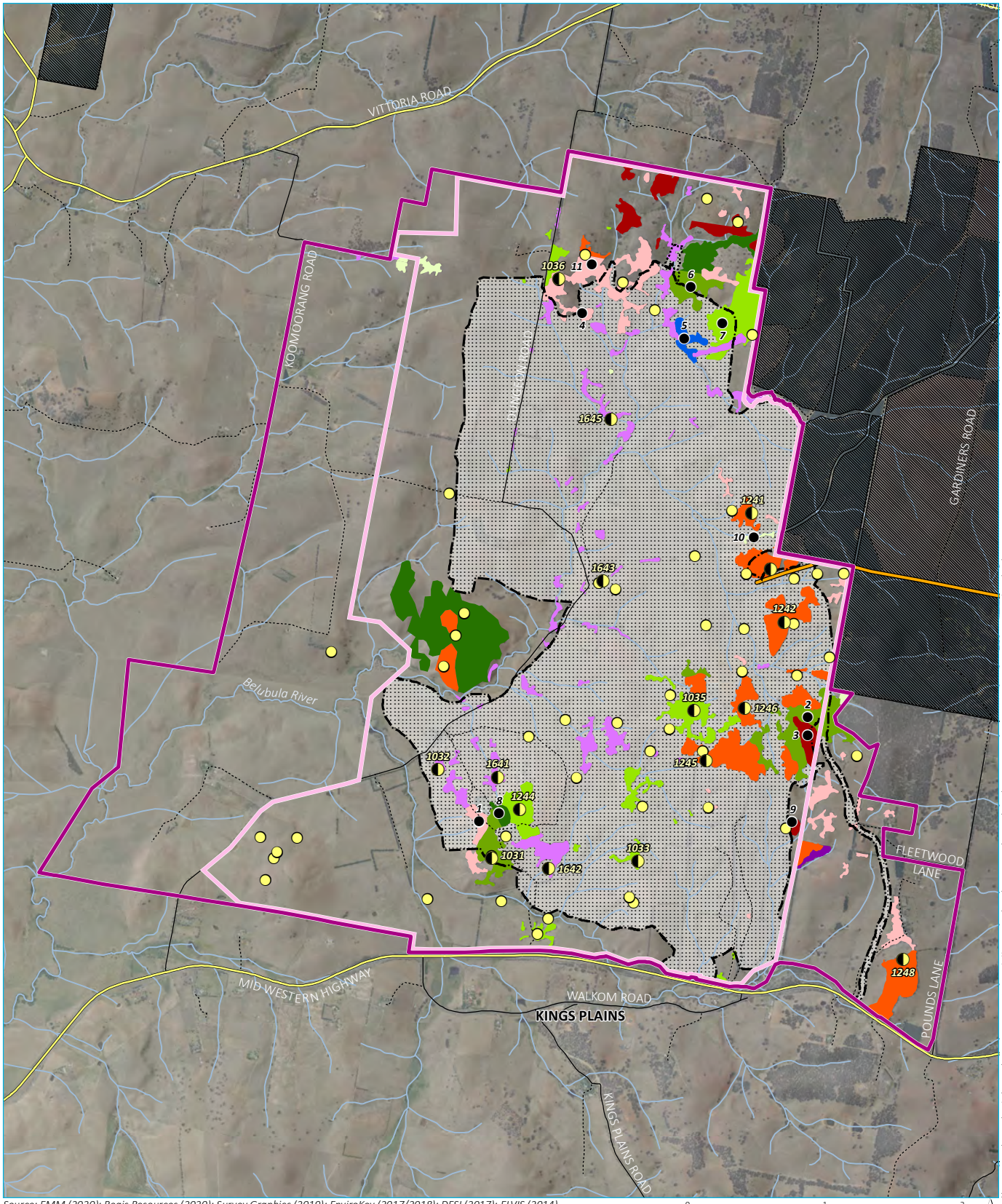
Four PCTs and seven vegetation zones were initially identified across the mine development project area (Section 4.1). Vegetation zones were delineated by the presence/absence of canopy and condition of derived grasslands. During the background review (Section 4.1), PCT 1375 – Wet tussock grasslands 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 mine development 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 mine development 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 (986.79 ha) across the three identified PCTs.

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

Table 4.2 Plant community types mapped within the mine development project area

PCT ID	PCT name	Vegetation formation	Vegetation class	Extent in disturbance footprint (ha)
727	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion (LA124)	Dry Sclerophyll Forests (shrubby sub-formation)	Southern Tableland Dry Sclerophyll Forests	48.78
951	Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion (LA164)	Wet Sclerophyll Forests (shrubby sub-formation)	Southern Tableland Wet Sclerophyll Forests	32.73
766	Carex sedgeland of the slopes and tablelands (LA130)	Freshwater Wetlands	Montane Bogs and Fens	3.04
1330	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion (LA276)	Grassy Woodlands	Southern Tableland Grassy Woodlands	45.84
-	Exotic grassland	-	-	986.79
Sub-total (native vegetation)				**130.39**
Sub-total (exotic grassland)				**986.79**
Total				**1,117.18**



Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); EnviroKey (2017/2018); DFSI (2017); ELVIS (2014)

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KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Additional (post-closure) disturbance footprint
- Pipeline

Existing environment
- Major road
- Minor road
- Vehicular track
- Watercourse/drainage line
- Vittoria State Forest

Flora survey effort
- Plot location (EMM, 2019)
- Plot location (EMM (2019); EnviroKey (2017/2018))
- Plot location (EnviroKey (2017/2018))
- Exotic grassland (986.79 ha)

Plant community types

PCT 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)

PCT 766 | Carex sedgeland of the slopes and tablelands
- Moderate/Good (Poor)

PCT 951 | Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion
- Moderate/Good (Medium)
- Moderate/Good (Poor)

PCT 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

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Figure 4.1

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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. Species recorded were largely canopy and groundcover species as a result of the removal of midstorey vegetation due to cattle and sheep continuing to graze on the property.

ii Plant community types

To identify PCTs within the mine development 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 mine development 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 2014) and better define Threatened Ecological Communities (TECs). A summary of vegetation zones is provided in Table 4.3.

Table 4.3 Summary of vegetation zones

Plant community type	Vegetation formation	Vegetation class	Zone	Area (ha)	Total (ha)
PCT 727 – Broad-leaved Peppermint – Brittle Gum – Red Stringybark dry open forest of the South Eastern Highlands Bioregion	Dry Sclerophyll Forests (shrubby sub-formation)	Southern Tableland Dry Sclerophyll Forests	Moderate/good_high	2.84	48.78
			Moderate/good_medium	35.54	
			Moderate/good_poor	10.40	
PCT 766 – Carex sedgeland of the slopes and tablelands	Freshwater Wetlands	Montane Bogs and Fens	Moderate/good_poor	3.04	3.04
PCT 951 – Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion	Wet Sclerophyll Forests (shrubby sub-formation)	Southern Tableland Wet Sclerophyll Forests	Moderate/good_poor	32.73	32.73
PCT 1330 – Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	Grassy Woodlands	Southern Tableland Grassy Woodlands	Moderate/good_high	1.47	45.84
			Moderate/good_medium	18.96	
			Moderate/good_poor	24.65	
			Moderate/good_other	0.76	
Total	-	-	-	**130.39**	**130.39**

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 mine development project area. Areas of high to poor quality are distinguished largely by presence or absence of woody debris, and by the species composition. Table 4.4 provides a description of the vegetation zones attributed to this PCT.

Table 4.4 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_poor Vegetation zone 4 – moderate/good_other
Extent within disturbance footprint	**45.84 ha** 1.47 ha (moderate/good_high) 18.96 ha (moderate/good_medium) 24.65 ha (moderate/good_poor) 0.76 ha (moderate/good_other)
Description	The canopy is co-dominated by Yellow Box (*Eucalyptus melliodora*) with occasional stands of Apple Box (*Eucalyptus bridgesiana*). The midstorey is largely absent. A single native shrub occurs, being Silver Wattle (*Acacia dealbata* subsp. *dealbata*). Two exotic shrub species occur rarely within the PCT, being Blackberry complex (*Rubus fruticosis* aggregate) and Briar Rose (*Rosa rubiginosa*). The groundlayer is co-dominated by native and exotic grass species. Dominant native grasses are Purplish Wallaby Grass (*Rytidosperma tenuius*), Short Wallaby Grass (*Rytidosperma carphoides*), Snow Grass (*Poa sieberiana*), Common Wheatgrass (*Anthosachne scaber*) and Weeping Grass (*Microlaena stipoides*). Dominant exotic grass species recorded include Harding Grass (*Phalaris aquatica*) and Creeping Bentgrass (*Agrostis stolonifera*).
Survey effort	Nine plots/transects within the disturbance footprint: • Vegetation zone 1 – moderate/good_high: 1 • Vegetation zone 2 – moderate/good_medium: 3 • Vegetation zone 3 – moderate/good_poor: 1 • Vegetation zone 4 – moderate/good_other: 4
Condition description	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. The midstorey (shrub layer) is largely absent. An exotic forb and grass species occur within the PCT, being Flatweed (*Hypochaeris radicata*) and Rhodes grass (*Chloris gayana*) respectively. Surrounding land use (mostly grazing and forestry) and associated edge impacts contribute even further to the existing condition of this PCT.
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 Yellow Box and Apple Box, although Blakely's Red Gum (*Eucalyptus blakelyi*) 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 *Lissanthe strigosa* and *Melichrus urceolatus*. These two species were not present at McPhillamys, even in ungrazed areas adjacent to the site. 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.

Table 4.4 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)	
Justification of evidence used to identify the PCT	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): • 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 *Lissanthe strigosa* and *Melichrus urceolatus*. 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 mine development project area. PCT 654 is mapped adjacent, while PCT 277 is not mapped in the vicinity of the site (further than 20 km distance). 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.
Status	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: • 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. 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: • 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. 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. 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 7.6.
Estimate of percent cleared value of PCT across its distribution	95%

Photograph 4.1 **Yellow Box Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion within the mine development 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 48.78 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 mine development project area. Areas of high quality are distinguished largely by presence or absence of woody debris, and by the species composition. Table 4.5 provides a description of the vegetation zones attributed to this PCT.

Table 4.5 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	**48.78 ha** 2.84 ha (high) 35.54 ha (medium) 10.40 ha (poor)
Description	The canopy is co-dominated by Broad-leaved Peppermint (*Eucalyptus dives*) and Long-leaved box (*Eucalyptus goniocalyx*), with occasional stands of Brittle Gum (*Eucalyptus mannifera*), Yellow Box, and Apple Box (*Eucalyptus bridgesiana*). The native midstorey comprises a sparse cover of Hoary Guinea Flower (*Hibbertia obtusifolia*). About half of the ground layer cover consists of bare ground. The remaining area is dominated by native grasses, comprising of Snow Grass (*Poa sieberiana*), Purplish Wallaby Grass (*Rytidosperma tenuius*), Common Wheatgrass (*Anthosachne scaber*), Weeping Grass (*Microlaena stipoides*), Red-anthered Wallaby Grass (*Rytidosperma pallidum*) and Kangaroo Grass (*Themeda triandra*). All other species recorded occur at covers of less than 1% within the PCT.
Survey effort	Thirteen plots/transects within the disturbance footprint. • Vegetation zone 5 – moderate/good_high: 3 • Vegetation zone 6 – moderate/good_medium: 6 • Vegetation zone 7 – moderate/good_poor: 4
Condition description	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 mine development project area and to the east. 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.
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	Commonwealth EPBC Act: not listed NSW BC Act: not listed
Estimate of percent cleared value of PCT across its distribution	50%

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 32.73 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 4.6 provides a description of the vegetation zone attributed to this PCT.

Table 4.6 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	**32.73 ha**
Description	The canopy is dominated by Manna Gum (*Eucalyptus viminalis*). The midstorey is largely absent. Two native shrubs, Silver Wattle and White Dogwood (*Ozothamnus diosmifolius*) occur rarely. One high-threat-exotic species, Blackberry complex (*Rubus fruticosus* sp. aggregate) occurs rarely. 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 (*Themeda triandra*). Dominant native grass-like plants are Tall Sedge (*Carex appressa*) and Common Rush (*Juncus usitatus*). One native forb species is co-dominant, being Slender Knot Weed (*Persicaria decipiens*). Dominant exotic grasses comprise of Harding Grass (*Phalaris aquatica*), Rye Grass (*Lolium perenne*), Prairie Grass (*Bromus catharticus*), Tall Fescue (*Festuca arundinacea*), Soft Brome (*Bromus hordeaceus*), Windmill Grass and Couch Grass (*Cynodon dactylon*). Dominant exotic forbs are Burrclover (*Medicago* spp.), Flatweed (*Hypochaeris radicata*) and White Clover (*Trifolium repens*).
Survey effort	Five plots/transects within the disturbance footprint: • Vegetation zone 8 – moderate/good_poor: 5
Condition description	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. 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.
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 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.
Justification of evidence used to identify the PCT	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. 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.
Status	Commonwealth EPBC Act: not listed NSW BC Act: not listed

Table 4.6 Vegetation zone 8 description

Vegetation Zone 8 – Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion (PCT 951)	
Estimate of percent cleared value of PCT across its distribution	80%

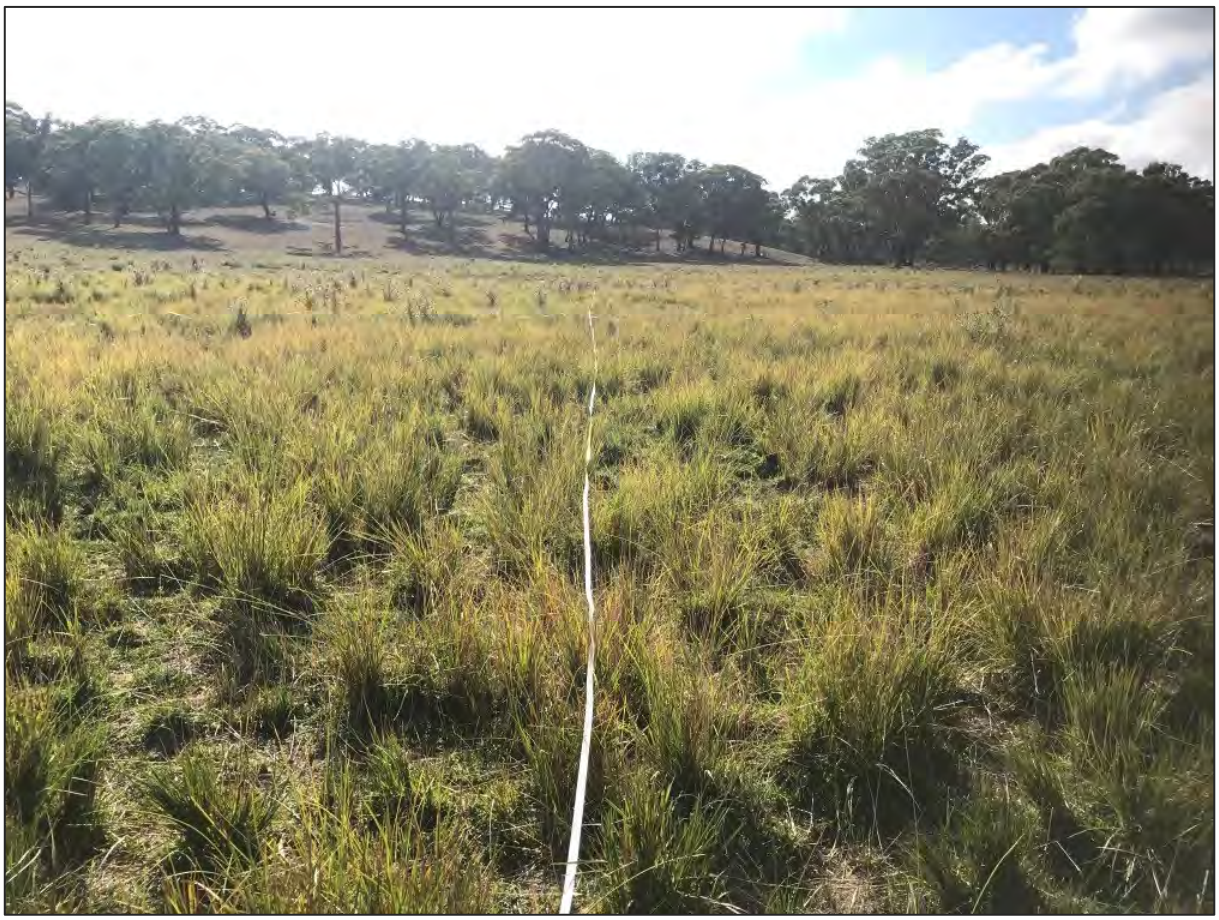
Photograph 4.3 Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion (moderate/good_poor - plot ID 103_WL_2_E).

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 mine development project area and the proposed disturbance footprint (Figure 4.1). Table 4.7 provides a description of the vegetation zone attributed to this PCT.

Table 4.7 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**
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 (*Carex appressa*), one exotic grass, Tall Fescue (*Festuca arundinacea*), and one exotic forb, White Clover (*Trifolium repens*). 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 (*Cirsium vulgare*), Harding Grass (*Phalaris aquatica*), Flatweed (*Hypochaeris radicata*), Prickly Lettuce (*Lactuca serriola*) and Common Dandelion (*Taraxicum officinale*). Two native forbs are also common within this remaining area, being Swamp Dock (*Rumex brownii*) and Common Rush (*Juncus usitatus*).
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 *Leptospermum* 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 mine development 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 986.79 ha patch of grassland within the disturbance footprint (Figure 4.1). Open grasslands were in a highly disturbed state, 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 4.8 provides a description of open grassland, and the three vegetation zones used to determine whether offsets were required for this area.

Table 4.8 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
Extent within disturbance footprint	**986.79 ha** 986.79 (PCT 1330 low) 986.79 (PCT 727 low) 986.79 (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 Burrclover, 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 ins 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 mine development 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 4.9. The site value score is based on the transect data which is compared with benchmark values for each vegetation type.

Table 4.9 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	2.84	71.88
			Medium	35.54	61.98
			Poor	10.40	52.08
951	Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion (LA164)	Mod-Good	Poor	32.73	46
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	18.96	58.85
			Poor	24.65	58.85
			Other	0.76	44.27
727	Open grassland	Low	–	986.79	7.81
951		Low	–	986.79	12.00
1330		Low	–	986.79	9.38

Site value scores for wooded vegetation varied between 16.67 and 71.88. 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 mine development 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 mine development 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 2014) 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	*Varanus rosenbergi*	No	The mine development project area does not support termite mounds of areas of outcropping rock suitable for Rosenberg's Goanna.
Land containing a forb-rich grassy ground layer	Small Purple-pea	*Swainsonia recta*	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	*Litoria booroolongensis*	Yes	The mine development 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 mine development 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 (OEH 2014), 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
Little Lorikeet *Glossopsitta pusilla*	PCT1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion (LA276)	3.0[1]
Swift Parrot *Lathamus discolor*	PCT1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion (LA276)	1.3

Notes: 1. To account for PCT 1330 not being able to be aligned with White Box Yellow Box Blakely's Red Gum Woodland CEEC in the BioBanking Calculator, and therefore deriving an EEC multiplier of 3.0, the threatened species offset multiplier for the Little Lorikeet 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 2014). An initial assessment was undertaken, in accordance with Section 6.5 of the FBA (OEH 2014) 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			
Eucalyptus aggregata	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.
Eucalyptus canobolensis	Silver-Leaf Candlebark	No	Known only from Mt Canobolas near Orange. Mine development project area is outside species range.
Eucalyptus saxicola	Mt Canobolas Box	No	This taxon is no longer considered by the Scientific Committee to represent a taxon separate from *Eucalyptus bridgesiana*, 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.
Leucochrysum albicans subsp. *tricolor*	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 mine development project area. Presence cannot be discounted. Potential to occur in all vegetation zones not in low condition.

Table 5.3 Candidate threatened species assessment

Scientific name	Common Name	Candidate species	Rationale
Swainsona recta	Small Purple-pea	Yes	Species occurs in a variety of woodlands, including Box Gum Woodland, generally with an understorey dominated by Kangaroo Grass (*Themeda triandra*), Poa tussocks (*Poa* spp.) and Spear-grasses (*Austrostipa* 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			
Anthochaera phrygia	Regent Honeyeater	Yes	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 mine development project area. There are records from near Bathurst; however, the mine development project area does not present breeding habitat or habitat critical to the survival of the species. The species may forage in the mine development project area as a vagrant species. The species is considered vagrant within the mine development project area. Targeted surveys were undertaken for this species as a precaution.
Cercartetus nanus	Eastern Pygmy-possum	Yes	Found in a broad range of habitats, usually with a complex midstorey. The habitat in the mine development project area is considered marginal and the mine development project area is outside of the species range, with no recent records within proximity to the mine development 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.
Litoria booroolongensis	Booroolong Frog	No	The mine development project area does not support permanent streams, with all waterways declining to disconnected ponds during low flow. Further, waterways within the mine development project area do not support cobble banks or other rock substrate along stream margins that would provide breeding habitat for this species. The mine development project area does not provide suitable habitat for this species.
Petaurus norfolcensis	Squirrel Glider	Yes	The mine development project area supports forests and woodlands dominated by Box species, although a shrubby or *Acacia* 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.
Phascolarctos cinereus	Koala	Yes	The Koala occurs in a wide variety of forests and woodlands. The Koala occurs in a wide variety of forests and woodlands. Five species listed under Koala SEPP as feed trees in the central and southern koala management area, namely Apple Box, Broad-leaved Peppermint, Bundy, Yellow Box and Ribbon Gum are present in PCT 727, 951 and 1330. There are records in proximity to the mine development project area. There are records in proximity to the mine development 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 mine development project area determined, in accordance with Section 6.6 of the FBA (OEH 2014). 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)

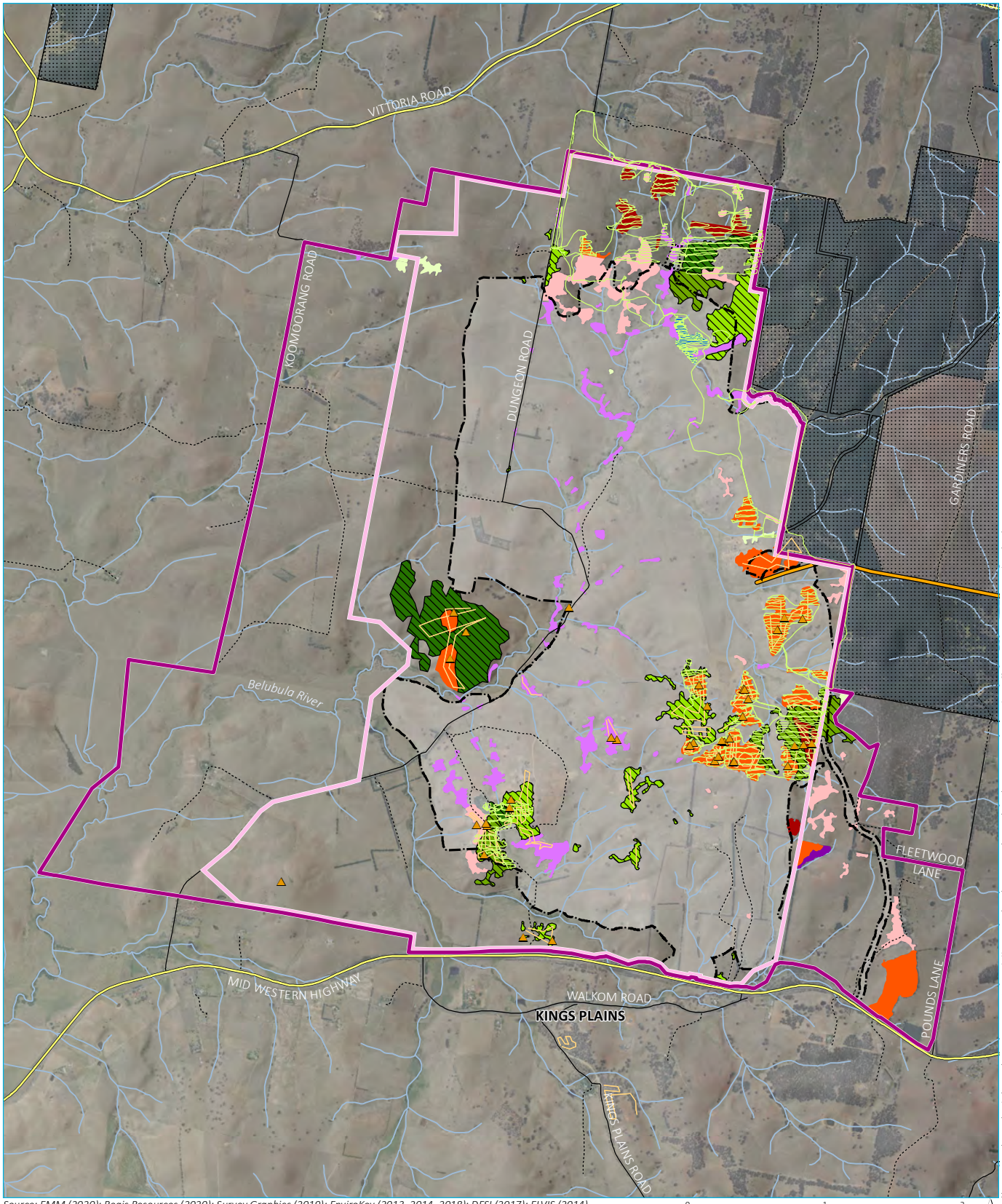
Further targeted flora surveys were conducted in February – March 2019 in accordance with OEH *Guide to surveying threatened plants* (OEH 2016) using transects spaced at 10 m intervals (Figure 5.1). These surveys primarily targeted the Hoary Sunray, as surveys occurred outside the survey period of September 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 provided correspondence to BCD on 11 February 2019 seeking confirmation 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 listed PCTs. However, they noted that no transects were conducted in the northernmost part of the mine 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). It was noted this area contains suitable habitat for the Silky Swainson-pea. BCD advised that the exclusion of species within this PCT will need to be fully justified in the BAR. In this regard, and to address the feedback provided by BCD, targeted surveys of Silky Swainson-pea were conducted in PCT 766 on 10 September 2019. The area was traversed via thirty-three transects spaced ten metres apart (Figure 5.1).



Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); EnviroKey (2013, 2014, 2018); DFSI (2017); ELVIS (2014)

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KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Additional (post-closure) disturbance footprint
- Pipeline

Existing environment
- Major road
- Minor 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

PCT 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)

PCT 766 | Carex sedgeland of the slopes and tablelands
- Moderate/Good (Poor)

PCT 951 | Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion
- Moderate/Good (Medium)
- Moderate/Good (Poor)

PCT 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
Amendment report – biodiversity assessment report
Figure 5.1

REGIS RESOURCES LTD

EMM creating opportunities

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 assessments, bird surveys (Regent Honeyeater) including diurnal surveys (Gang-gang Cockatoo and White-bellied Sea-eagle), funnel traps (small terrestrial fauna), Elliot trapping (Eastern Pygmy-possum and Squirrel Glider), echolocation call recording (or Anabat, for Microchiropteran bats), camera trapping (Eastern Pygmy-possum), call playback (Masked Owl, Barking Owl, Squirrel Glider, Bush Stone Curlew and Koala), nocturnal searches and spotlighting (Squirrel Glider and Koala), reptile searches and tile-grid surveys (Pink-tailed Worm Lizard), frog searches (herpetological surveys), track and scat searches (Koala) (EnviroKey 2017). General surveys were also completed including rapid assessments of riparian condition (RARC) and platypus surveys.

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. Survey methods using included cameras, Elliott trapping, Koala SAT surveys and nocturnal transects.

A targeted survey was also completed for the Powerful Owl (*Ninox strenua*) over three days and three nights between 27 and 29 August 2019. Diurnal surveys to identify suitable hollows were conducted by meandering searches in PCT's 727 and 951, which are considered suitable to support breeding habitat for the species. Hollows identified during diurnal surveys were also surveyed after dark using call playback.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	48.78
PCT 951 moderate/good – poor	32.73
PCT 1330 moderate/good – high, medium, other and poor	45.84

Bird survey methods and survey effort have been developed in accordance with DEC (2004) and DEWHA (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 mine development 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 mine development project area and locality.

Table 5.5 Methods and survey effort – diurnal birds

Method	Survey description	Survey effort
Area searches	• 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.	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. A total of 143 bird surveys were undertaken by EnviroKey (2017) equating to an estimated 47.7 hours of bird surveys.

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	38.38
	PCT 1330 moderate/good – high and medium	20.43

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	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): • 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.	DEC (2004) specifies one site per 50 ha stratification unit with replication of effort for every additional 100 ha. 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. EnviroKey completed three trap sites in PCT 727 and one trap site in PCT 1330, equating to 400 trap nights.
Remote cameras	Remote camera surveys were undertaken in accordance with the following guidelines: • Two cameras placed at least 100 m apart. • 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.	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. 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. 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.

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	48.78
PCT 951 moderate/good – poor	32.73
PCT 1330 moderate/good – high, medium, other and poor	45.84

Methods and survey effort have been developed in accordance with Phillips and Callaghan (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)	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: • 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.	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). Based on the above stratification units, this would equate to 4 survey sites (one in PCTs 951 and 1330 and two in PCT 727). 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.
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. • 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.	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) completed on two nights (6 transects total). 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.
Spot Assessment Technique (SAT) (Koala)	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 • 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).	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. Twenty-four SAT surveys were completed across the mine development project area.

iv Other fauna surveys

A number of additional surveys were completed within the mine development project area during the biodiversity assessment conducted by EnviroKey. Although not strictly required under the FBA (OEH 2014), 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 mine development 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 mine development 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 mine development 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 at across the mine development 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 mine development 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.

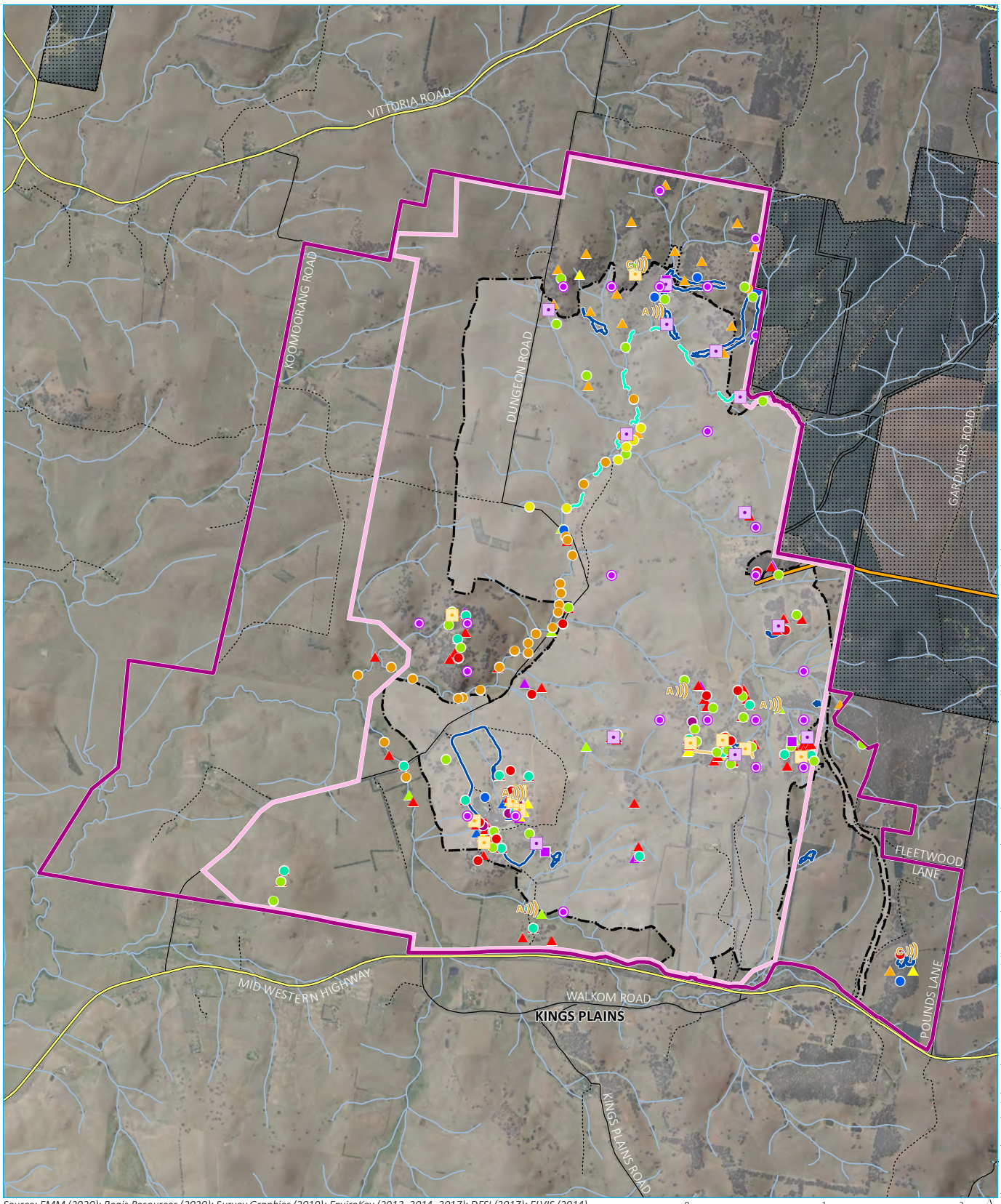
Further reptile searches were undertaken utilising roof tiles specifically targeting Little Whip Snake (*Parasuta flagellum*), but roof tiles are also known to detect the presence of Pink-tailed Worm-lizard. The tiles were set out in a 25 metre × 25 metre grid with a tile located every five metres and 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 (2020); Regis Resources (2020); Survey Graphics (2019); EnviroKey (2013, 2014, 2017); DFSI (2017); ELVIS (2014)

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KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Additional (post-closure) disturbance footprint
- Pipeline

Existing environment
- Major road
- Minor 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 (23)
- Frog survey (8)
- Funnel trap (5)
- Habitat assessment (10)
- Nocturnal survey (19)
- Platypus assessment (25)
- RARC (6)
- Reptile survey (37)
- Scat and sign (19)
- Spotlight survey (7)
- Tile grid survey (10)
- Elliott trap (EnviroKey, 2013)
- RARC (EnviroKey, 2017)

Fauna survey effort

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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 2014). 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.

5.4 Targeted survey results

5.4.1 Targeted flora surveys

No threatened flora species were recorded during targeted surveys within the mine development 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

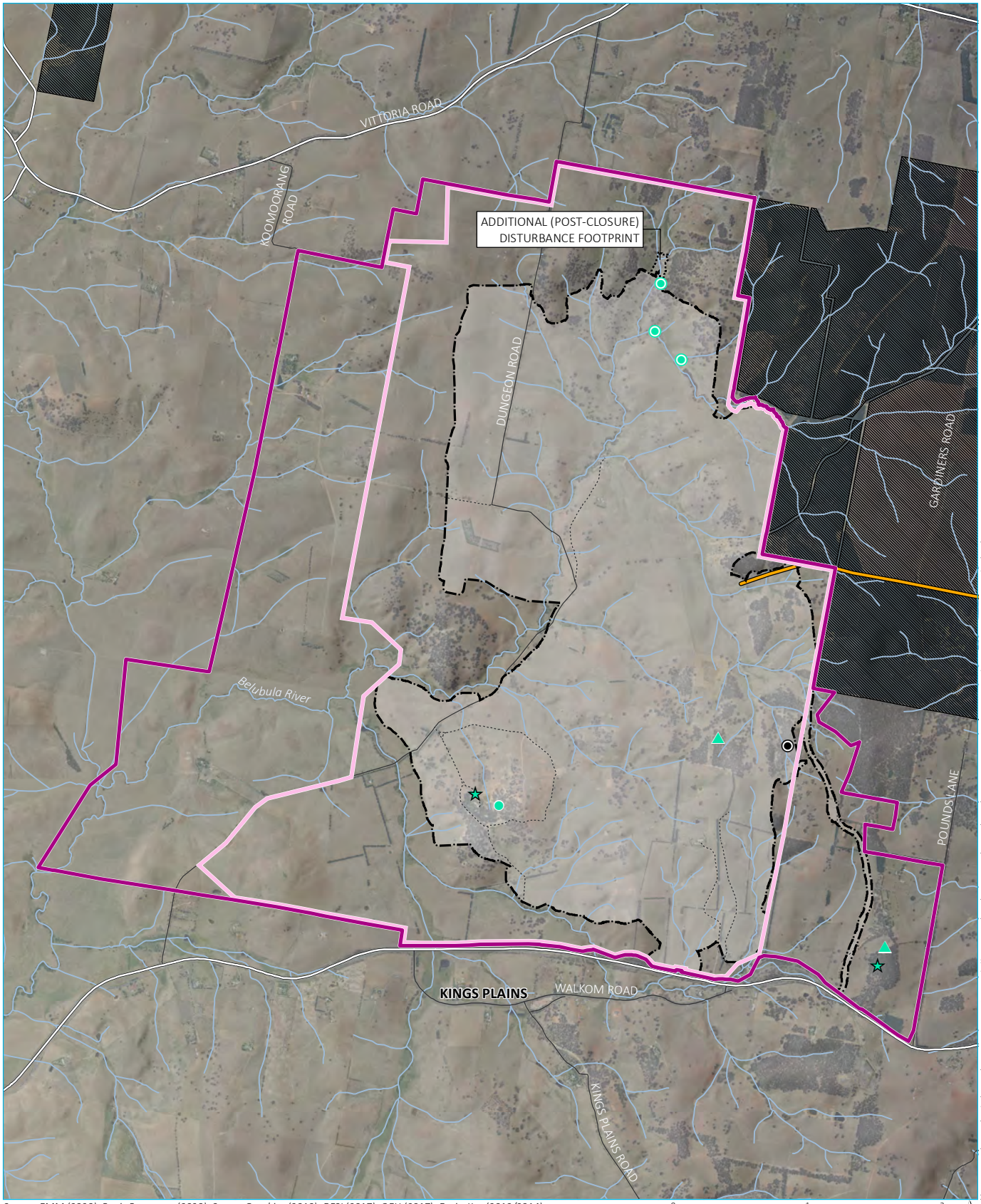
Two threatened fauna species credit species were recorded in the mine development project area (Figure 5.3):

- Squirrel Glider; and
- Koala.

There were eight records of Squirrel Glider within the mine development 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 mine development project area, and impacts to these PCTs were used to generate the species polygon.

A single Koala was recorded in the east of the mine development 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 mine development 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 mine development project area and are considered to have a low likelihood of occurrence with the disturbance footprint following targeted surveys.



Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); OEH (2017); EnviroKey (2013/2014)

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KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Additional (post-closure) disturbance footprint
- Pipeline

Existing environment
- Major road
- Minor road
- Vehicular track
- Watercourse/drainage line
- Vittoria State Forest

Threatened fauna species (EMM, 2019)
- Squirrel Glider (3)
- Koala (1)

Threatened fauna species (EnviroKey)

May 2013 sightings
- Squirrel Glider (3)

November 2013 sightings
- Squirrel Glider (4)

March 2014 sightings
- Squirrel Glider (2)

Threatened fauna species credit species recorded in the mine development project area

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Figure 5.3

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6 Groundwater dependent ecosystems

6.1 Background

An assessment was completed in the EIS, in conjunction with EMM's groundwater specialists, to identify terrestrial ecosystems which potentially utilise and/or are reliant on groundwater in the mine development 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 mine development project area.

The numerical groundwater model development for the EIS (Appendix K of the EIS) has been updated to assess the potential impacts of the amended project. The results are provided in full in the McPhillamys Gold Project Groundwater Assessment Addendum, which forms Appendix H of the Amendment Report. This chapter provides an updated assessment of potential impacts on groundwater dependent ecosystems using the updated numerical groundwater model.

6.2 Method

6.2.1 Study area

The study area for the groundwater dependent ecosystem (GDE) assessment comprises the areas assessed on Figure 6.1. This chapter assesses potential impacts of groundwater drawdown on terrestrial GDEs, comprising terrestrial native vegetation and groundwater-dependent wetlands and/or estuarine/near shore ecosystems.

6.2.2 Spatial data review

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.

6.2.3 Groundwater model

EMM developed a numerical groundwater model to assess the potential change to the groundwater flow system because of the project. A detailed explanation of the model development and calibration is provided in the Groundwater Assessment report (Appendix K of the EIS), with detailed explanation of predictions for the amended project provided in the Groundwater Assessment Addendum report (Appendix H of the Amendment Report). The groundwater model includes simulation of the open cut mine development and a highly conservative simulation of tailings placement. It should be noted at the purpose of the groundwater model is not to estimate the potential seepage from the TSF under design operation nor the effectiveness of the TSF seepage management system, as this has been conducted by ATC Williams (2019 and 2020).

6.2.4 Groundwater interaction assessment

Predicted depth to groundwater was derived from the groundwater model for the mine development project area (refer to Appendix H of the Amendment Report) 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 mine development 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 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 GDEs', requiring further investigation to understand their level of groundwater dependence (or otherwise). Ecosystems identified with potential for reliance on groundwater are identified in Section 6.2.5.

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, if 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.

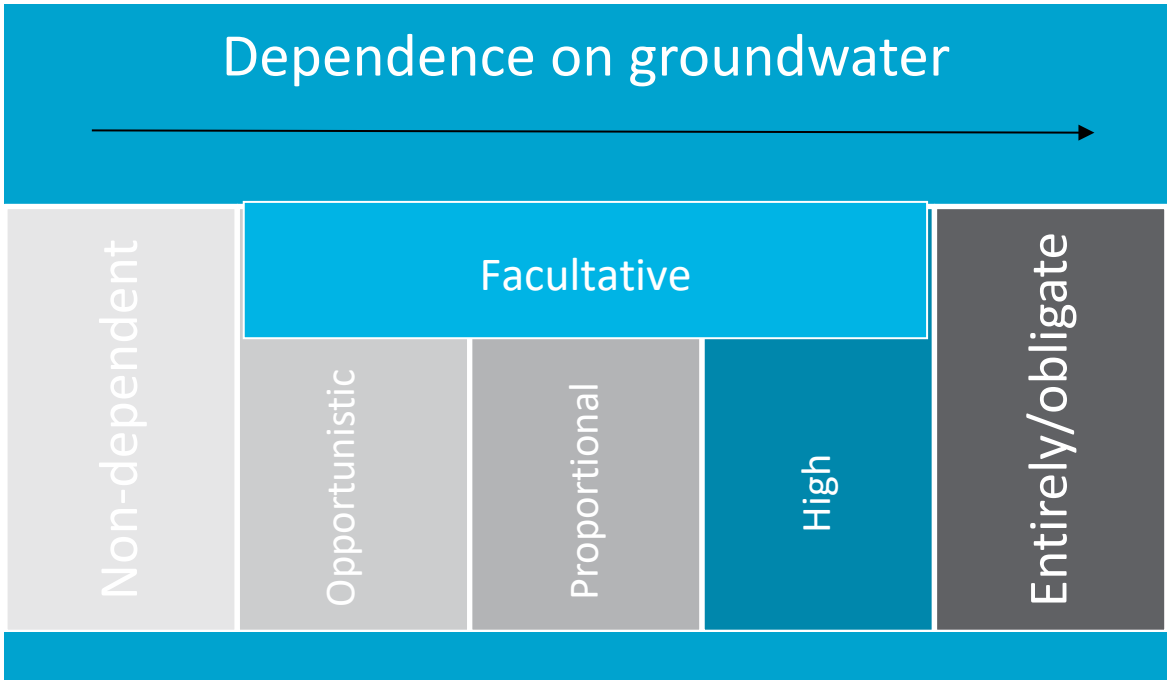


Plate 6.1 GDE categories

6.2.5 GDE identification

The proportion of each PCT with shallow groundwater access vs the proportion with no access was assessed. The proportion was combined with the level of groundwater interaction to determine the level of groundwater dependence, in accordance with the criteria in Table 6.1.

Table 6.1 Groundwater dependence categories

Dependence and risk	Proportion of PCT accessing groundwater		
	0-25% of PCT has access to shallow groundwater	**25-75% of PCT has access to shallow groundwater**	**75-100% of PCT has access to shallow groundwater**
Groundwater dependence	Non-dependent	Facultative/opportunistic GDE	Obligate/entirely-dependent GDE
Risk of impact	Low	Moderate	High

The water sharing plan for the NSW Murray-Darling Basin Fractured Rock Groundwater Sources 2020 specifies 119 high priority GDEs within the Lachlan Fold Belt Murray-Darling Basin Groundwater Source. These include 65 high priority springs/wetlands and 54 karst environments.

6.2.6 Risk assessment

Ecosystems were classified in accordance with the risk matrix in Table 6.2, following Serov et al (2012).

Table 6.2 GDE risk assessment matrix

Category	Risk category		
	1 Low	**2 Moderate**	**3 High**
1 High ecological value	A	B	C
2 Moderate ecological value	D	E	F
3 Low ecological value	G	H	I

Table 6.3 defines the ecosystems that fall within each category in Table 6.2.

Table 6.3 Ecological value definitions

1 High ecological value	2 Moderate ecological value	3 Low ecological value
GDEs where only slight changes in groundwater quantity and quality would result in their loss (ie obligate GDEs)	GDEs where a moderate change in groundwater availability would change their distribution, composition or condition	A highly modified GDE
GDEs located in a state or federal reserve system (eg National Park)	GDEs that provide ecological services to other ecosystems including rivers, wetlands and estuaries	A GDE that would involve a large cost to rehabilitate, in a catchment containing other GDEs in moderate to good condition
GDEs in relatively unaltered and good condition	GDEs in moderate to good condition	-

Table 6.3 Ecological value definitions

1 High ecological value	2 Moderate ecological value	3 Low ecological value
GDEs that are habitat for critically endangered or endangered species and/or communities listed under the BC Act, FM Act and/or EPBC Act.	GDEs that are habitat for vulnerable species and/or communities listed under the BC Act, FM Act and/or EPBC Act.	-
-	GDEs that can respond to changes in water availability and/or quality	-
-	GDEs that only play a minor role in ecosystem functioning (ie at the end of a dry season or during extreme drought)	-

6.3 Results

The GDE Atlas (BOM 2013) does not show any terrestrial GDEs as occurring in the mine development project area. No high priority GDEs are identified in the water sharing plan for NSW Murray-Darling Basin Fractured Rock Groundwater Sources 2020.

The groundwater dependence, ecological values and risks are assessed for each GDE in Table 6.4.

Table 6.4 Ecological values of and risks to GDEs

PCT	Proportion accessing shallow groundwater	Groundwater dependence	Risk of impact	Ecological value	Risk category
727	0-25%	Non-dependent	Low	Moderate (contains vulnerable species habitats)	H
951	25-75%	Facultative/opportunistic GDE	Moderate	Moderate (contains vulnerable species habitats)	E
1330	25-75%	Facultative/opportunistic GDE	Moderate	High (contains CEEC)	B

Although terrestrial GDEs are not predicted to occur in the mine development project area, parts of PCT 951 and 1330 overlie areas of predicted shallow groundwater from 0 to 20 mbgl, and would likely range from having a very high (ie 0-2 m) to very low (5 – 20 mbgl) interaction with groundwater (Figure 6.1). Opportunistic GDEs are mainly located north and south-west of the TSF, with smaller patches south and south-east of the TSF (Figure 6.1). All other PCTs are 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, except for times of prolonged drought. The locality was in extended drought but has experienced heavy rainfall in early 2020. Where soil moisture cannot fulfil the opportunistic GDE's water requirements they would be supplemented by groundwater.

PCT 727 is classified as non-dependent as 0-25% of its occurrence within the study area has access to groundwater (9%).

6.3.1 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 951 and 1330, 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 mine development project area (refer Groundwater Assessment Addendum, Appendix H of the Amendment Report). As mentioned above, simulation of the TSF is simulated in the groundwater model using a highly conservative approach (the simulation of the TSF in the groundwater model is more comparable to a lined water storage dam rather than a tailings dam). 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. Under this unlikely scenario, this predicted change in depth to groundwater 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 shows the predicted changes in the extent of groundwater accessibility between the existing and end of mine conditions for PCTs 951 and 1330, which are deemed to have a facultative and opportunistic dependence on groundwater.

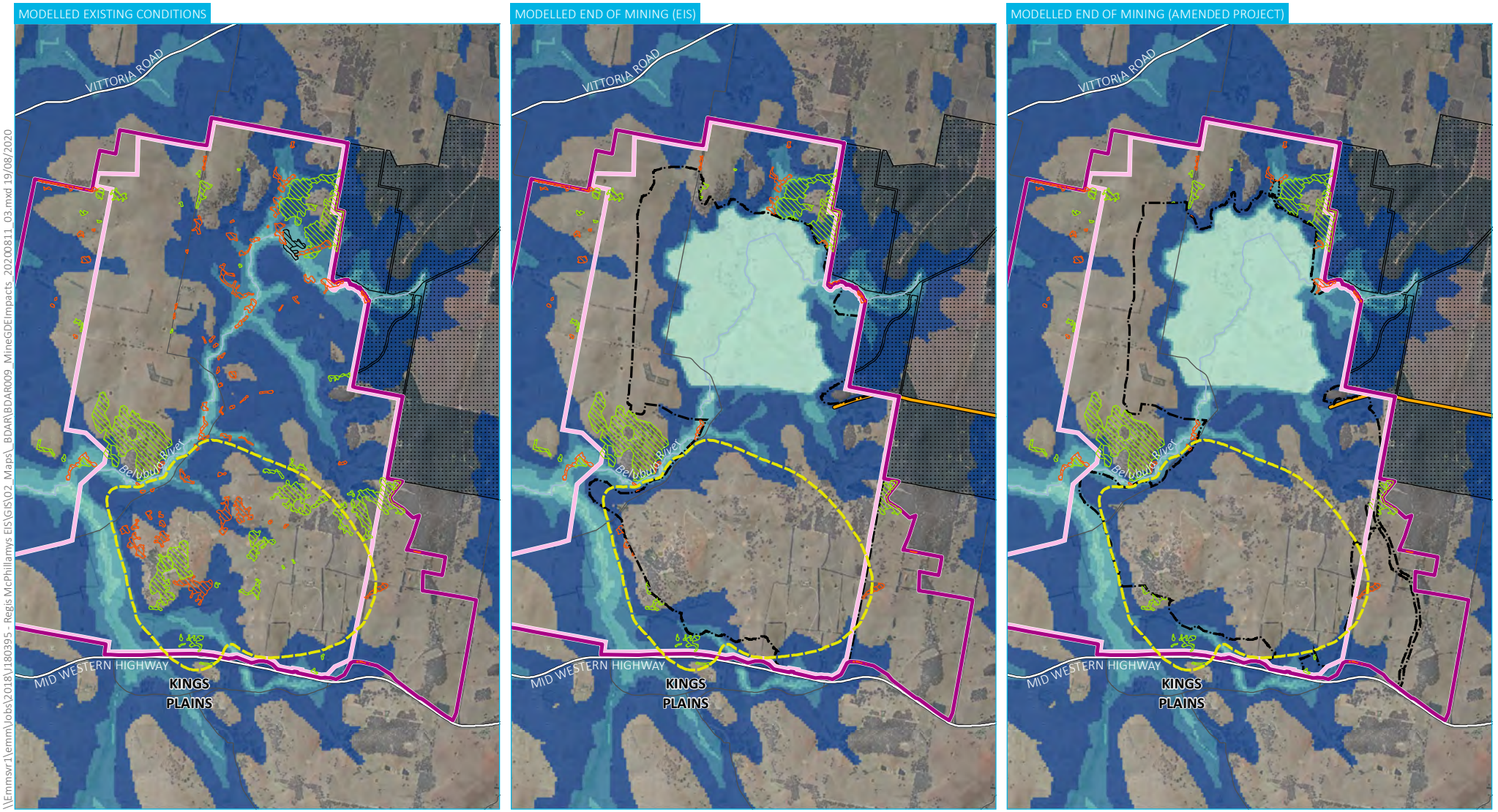
The project is predicted to result in no change to a minor increase in the extent of groundwater access for PCTs with a higher level of dependence on groundwater (ie moderate to very high groundwater interaction, or 0+ to 2 mbgl) by the end of mining and 100 years following mining (Table 6.5). This is likely to range from no impact on opportunistic GDEs in areas where no change is predicted, to a minor beneficial impact through a predicted increase to the extent of groundwater access during drought conditions under the highly conservative simulation of the TSF (eg an additional 0.69 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 (0.15 ha). Given this minor reduction in the extent of groundwater access and the very low interaction and dependence on groundwater (ie between 5 – 20 mbgl), water stress is not predicted to occur.

Accordingly, no negative groundwater access impacts are expected to occur for GDEs.

Table 6.5 Changes in access to shallow groundwater

Depth to groundwater (mbgl)	PCT 1330 (ha)				PCT 951 (ha)			
	Existing	End of mine	100 years	Change	Existing	End of mine	100 years	Change
0+ (very high interaction)	0.00	0.00	0.00	0.00	0.08	0.08	0.08	0.00
0 - 0.5 (high interaction)	0.22	0.22	0.22	0.00	2.42	2.42	2.42	0.01
0.5 - 2 (moderate interaction)	0.54	1.22	1.22	0.69	1.63	1.99	1.95	0.32
2 - 5 (low interaction)	2.65	2.73	2.94	0.29	0.90	0.66	1.14	0.24
5 - 20 (very low interaction)	20.25	20.56	22.07	1.83	2.82	2.70	2.66	-0.15



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KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Additional (post-closure) disturbance footprint
- Pipeline

- Predicted 1 m drawdown extent (100 years after mine end)

Depth to groundwater
- 0 m
- 0 - 0.5 m
- 0.5 - 2 m
- 2 - 5 m
- 5 - 20 m

Existing environment
- Major road
- Minor road
- Named watercourse
- Vittoria State Forest

Plant community types
- PCT 766 | Carex sedgeland of the slopes and tablelands
- PCT 951 | Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion
- PCT 1330 | Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

Potential impacts on groundwater availability for terrestrial vegetation

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Figure 6.1

Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); ELVIS (2014)

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ii Groundwater quality

The Groundwater Assessment (Appendix K of the EIS) and Groundwater Assessment Addendum (Appendix H of the Amendment Report) identified the potential for groundwater quality changes because of:

- seepage from the TSF to the watertable and the Belubula River;
- seepage from stockpiles to the watertable; and
- seepage from water storage ponds to the watertable.

Potential impacts related to the last three hazard items have been assessed in the Groundwater Assessment (Appendix K of the EIS) and assessed to present minimal to no impacts on the water environment from a water quality perspective. The potential impacts of seepage from the TSF was also assessed in the Groundwater Assessment (Appendix K of the EIS), however as the TSF schedule has been adjusted for the amended project, this assessment has been revisited and is included in Groundwater Assessment Addendum (Appendix H of the Amendment Report).

a Multi-barrier approach to tailings seepage management

As reported in the EIS (Appendix K and ATC Williams 2020Table 8.6, 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 and contain all water during large rainfall events (no spill risk).

Regis has adopted several leading practices to produce a mine design that avoids and minimises impacts to water assets, which includes a multi-barrier approach as part of the design of the TSF. The multi-barrier approach is presented graphically on Plate 6.2.

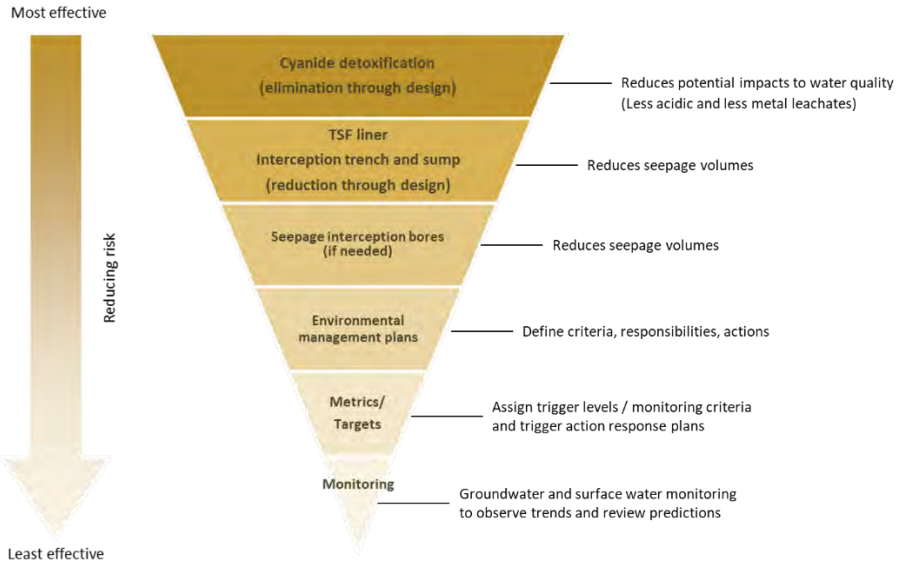


Plate 6.2 TSF multi-barrier approach

To reduce seepage volumes and rates, the TSF seepage management is proposed to comprise:

- The TSF floor will be lined using a combination of a low permeability clay liner and imported liner system. The clay liner will be constructed to a minimum 1 m thick within the existing drainage areas and a minimum 300 mm thick in areas with in-situ clay that have a permeability less than 10-9 m/sec.
- A low permeability core zone will be included as part of construction of the embankment and a deepened cut-off key extending to basement.
- A seepage interception trench located downstream of the cut-off key for the recovery of seepage and dewatering of the tailings mass.
- A downstream TSF runoff dam to intercept surface contact water from incident rainfall.
- Monitoring bores downstream to monitor groundwater quality and levels and, if required, the use of pump back bores.
- Construction of the TSF decant 770 m away from the main embankment.

b Potential TSF seepage

TSF design and assessment of the effectiveness of the TSF seepage management measures has been conducted by ATC Williams (2019 and 2020). As presented in the Groundwater Assessment (Appendix K of the EIS) and Groundwater Assessment Addendum (Appendix H of the Amendment Report), the purpose of the groundwater model is limited to assessing the potential impacts of the TSF on the groundwater flow system under an unlikely but deliberately conservative scenario (to assess potential seepage), and the purpose is not to provide an accurate estimate of TSF seepage rates. The groundwater model does not simulate the TSF embankment, cut-off key, tailings material or tailings deposition. The simulation of the TSF in the groundwater model is more comparable to a lined water storage dam rather than a tailings dam. The key difference between a lined water dam and TSF is that a TSF will consist of solid particles (eg ground and broken rock) and fluid, at a water content of around 20-30% and will therefore contain much less water than a water dam, which has 100% water content. The water held within the pore spaces between the tailings particles will drain slowly, driven by changing hydraulic pressures, the size of the tailings particles and pore space between the particles. The simulation of the TSF in the numerical groundwater model is therefore deliberately conservative.

The groundwater model predicts mounding of the watertable during and post -mining operations. The results of groundwater modelling (EIS base case and amended project) demonstrate that under a highly conservative scenario, with limited mitigation measures in place, seepage from the TSF is predicted to slowly migrate south-west and south of the TSF. Seepage from the TSF is predicted to remain within the saprock zone, flowing in a horizontal direction.

TSF seepage is very slow (moving at a rate of approximately 50 m in 100 years) with the majority of seepage being directed to the final pit void, and by the time the residual seepage migrates through the ground towards the Belubula River, the characteristics of the seepage water will have concentrations of aluminium, salinity (as EC), sulphate, selenium, cyanide and cobalt:

- below or within the range of water quality concentrations currently measured in groundwater, the Belubula River and its tributaries;
- below ANZECC (2000) livestock drinking water guideline values; and
- below ANZECC (2000) 95% protection level for freshwater aquatic ecosystem guideline values.

Table 6.6 Concentrations in groundwater following mixing with TSF seepage

Parameter	Calculated concentration following mixing		Current groundwater concentration range [1]	Current surface water concentration range [2]
	EIS base case	Amended project scenario		
Aluminium (mg/L)	0.03	0.02	<0.01-140	0.01-1.2
Electrical conductivity, EC (µS/cm)	931	843	499-4,817	377-1,040
Total Cyanide (mg/L)	0.057	0.039	<0.004	<0.004
Weak Acid Dissociable Cyanide (mg/L)	0.04	0.024	<0.004	<0.004
Cobalt (mg/L)	9.4	6.3	<0.001-0.31	<0.004
Selenium (mg/L)	0.006	0.004	<0.001-0.01	0.001-0.01
Sulphate (mg/L)	213	157	7-3,000	1-190

Notes: 1. Water quality measured from samples collected from bores monitoring groundwater in the Anson Formation.

2. Water quality measured from samples collected from WED4061A (27 samples), which is a Belubula River monitoring location in the TSF area.

The opportunistic vegetation users (PCT 1330, 1101 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 potential seepage predicted 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, the groundwater model conservatively predicts 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.

As outlined in the Groundwater Assessment Addendum (Appendix H of the Amendment Report), the groundwater model will be upgraded over time and with additional baseline data and data from active mining. In order to further assess potential impacts of the TSF from a hydrogeochemical perspective as part of future improvements, Regis will consider revision of the how the tailings placement is simulated to refine seepage estimates and include a geochemical assessment to refine estimates of leachate concentrations.

6.4 Required mitigation

As negative impacts on groundwater access are not predicted, mitigation is not required. Impacts on water quality will be managed in accordance with the TSF seepage management system (Section 6.3.1ii).

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 developments 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 (mine development only;
  - 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;
  - removal of hollow-bearing trees;
  - increased noise, vibration and dust levels resulting in disturbance of fauna species, and consequent abandonment of habitat, or changes in behaviour (including breeding behaviour); and
  - lighting for night works, resulting in disturbance to fauna species and changes in occupancy or behaviour.

Wherever possible, direct impacts have been avoided and/or minimised through the design of the mine disturbance footprint. 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 framework (Section 7.5).

7.2 Comparison of predicted EIS impacts with amended project

Impacts on biodiversity have changed for the mine development, primarily relating to a change in the mine disturbance footprint. Table 7.1 compares the PCT predicted impacts as presented in the EIS with the amended project. Overall, the amended project will reduce impacts on PCTs by 1.97 ha.

Table 7.1 Comparison of mine development PCT impacts

Plant community type/species credit species	Residual impact - EIS (ha)	Residual impact - Amended project (ha)	Change
727 - Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion – Moderate/Good (High)	4.75	2.84	-1.91
727 - Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion – Moderate/Good (Medium)	34.55	35.54	0.99
727 - Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion – Moderate/Good (Poor)	14.25	10.40	-3.85
951 - Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion – Moderate/Good (Poor)	31.55	32.73	1.18
766 - Carex sedgeland of the slopes and tablelands – Moderate/Good (Poor)	3.04	3.04	0.00
1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion– Moderate/Good (High)	1.47	1.47	0.00
1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion – Moderate/Good (Medium)	17.03	18.96	1.93
1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion – Moderate/Good (Other)	0.76	0.76	0.00
1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion – Moderate/Good (Poor)	24.96	24.65	-0.31
Total	**132.36**	**130.39**	**-1.97**

Table 7.1 compares the species impacts as presented in the EIS with the amended project. As the method of Koala habitat mapping has changed with the introduction of Koala Habitat Protection SEPP, the direct residual impacts of the EIS and amended project are provided for the Koala in Table 7.2, using both methods for calculating Koala habitat, comprising:

- Koala habitat as presented in the EIS, calculated based on SEPP 44 and the feed tree species for the central and southern tablelands koala management area in the Koala Recovery Plan (DECC 2008); and
- Koala habitat as presented in this BDAR, calculated based on the feed tree species for the central and southern tablelands koala management area in Koala Habitat Protection SEPP.

Accordingly, the amended project would increase direct Koala impacts by 2.8 ha using the Koala species polygon as presented in the EIS and increase by 1.89 ha using the Koala species polygon as presented in this BDAR.

In the EIS, direct impacts on the Squirrel Glider were 129.32 ha. The amended project would reduce direct Squirrel Glider impacts by 1.97 ha to 127.35 ha.

Table 7.2 Comparison of mine development species impacts

Candidate species	Residual impact - EIS (ha)	Residual impact - Amended project (ha)	Change
Koala - SEPP 44 and Koala recovery plan mapping method presented in EIS	75.77	78.57	2.80
Koala - SEPP (Koala Habitat Protection) 2019) mapping method presented in this BDAR	115.06	116.95	1.89
Squirrel Glider	129.32	127.35	-1.97

7.3 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 mine development 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 mine development project area. The mining lease application area was reduced to avoid potential biophysical strategic agricultural land (BSAL) in the western portion of the mine development 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 the majority of White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grasslands CEEC in High condition apart from a small area (1.47 ha) in the direct footprint of the open cut mine and tailings dam;
- minimisation of impacts to PCT 1330_Medium condition wherever feasible; and
- 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).

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 the then 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 mine development 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 20.43 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 mine development during the PEA, EIS and current mine development and demonstrates how the design has evolved to avoid and or minimise impacts on threatened biodiversity. Table 6.6 summarises the avoidance and minimisation measures already incorporated into the mine development's design and the additional measures to minimise the potential for unacceptable mine development-related impacts on biodiversity.

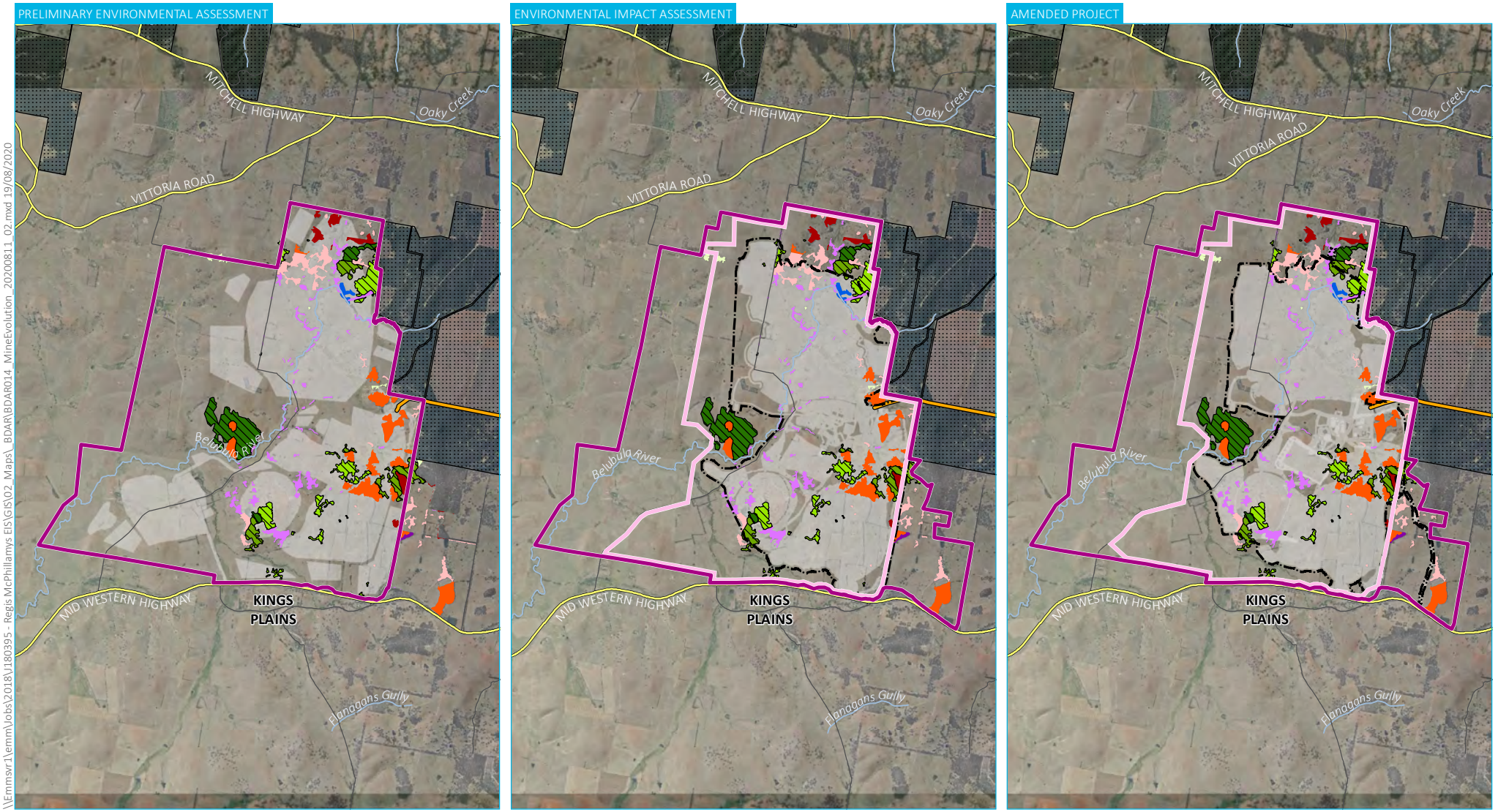
Table 7.3 details the avoidance and minimisation measures already incorporated into the mine development's design and the additional measures to minimise the potential for unacceptable impacts on biodiversity

Table 7.3 Impact avoidance and minimisation strategy – mine and pipeline development

Impact	Action	Intended outcome	Timing	Responsibility
Reduction in habitat critical to the survival of Box Gum Woodland	Avoid majority of impacts on high condition Box Gum Woodland and minimise impacts on moderate condition areas through careful mine design	High-quality Box Gum Woodland impacts mainly avoided, impacts on moderate condition minimised (completed)	Design	Client
Reduction in habitat critical to the survival of Koala	Shift location of tailings storage facility into cleared land and minimise footprint such that Koala corridors along the Belubula River are retained	Retention of Koala habitat prioritised, minimise impact on habitat resulting from project (completed)	Design	Client
Impacts on threatened species and ecological communities	Place access roads and other infrastructure in cleared land	Impacts on threatened species and communities minimised (completed)	Design	Client
	Retain native vegetation and habitats where not required for mine infrastructure	Retention of native vegetation and threatened species habitats	Prior to and during clearing operations	Environmental manager
	Retain and protect the area of native vegetation and Koala habitat north of the waste emplacement area	Retention of native vegetation and Koala habitat	During mining	Environmental manager
	Identify the limit of approved disturbance areas on the ground through the use of suitable visible markers and ensure that all ground disturbing activities are only undertaken within approved areas	Minimise impacts on threatened species and communities	Prior to and during clearing operations	Environmental manager, Project ecologist
	Carefully remove vegetation in such a way that avoids damage to surrounding vegetation	Minimise impacts on threatened species and communities	Prior to and during clearing operations	Environmental manager, Project ecologist

Table 7.3 Impact avoidance and minimisation strategy – mine and pipeline development

Impact	Action	Intended outcome	Timing	Responsibility
	Undertake a pre-clearing inspection to identify and, where practicable, remove nesting or roosting fauna	Minimise impacts on threatened species and communities	Prior to and during clearing operations	Environmental manager, Project ecologist
	Develop specific procedures for Koala pre-clearing inspections and safe relocation outside the clearing area	Prevent injury and mortality of Koalas during clearing operations by relocating into adjacent retained habitat	Prior to and during clearing operations	Environmental manager, Project ecologist
	Undertake a revegetation project targeted at Koalas	Increase the connectivity of fragmented patches of Koala habitat within the mine project area, and outside the mine disturbance footprint	To be determined as part of BMP development	Environmental manager, Project ecologist
	Undertake a staged clearing of native vegetation and fauna habitat to minimise impacts to native fauna species	Allow fauna to gradually self-relocate outside of project footprint	During clearing operations	Environmental manager, Project ecologist
	Stockpile vegetation onsite for use during rehabilitation operations, where practicable. Larger vegetation may be retained whole for use in rehabilitation operations on site	Retain important structural habitat features in the mine project area for use in rehabilitation and/or at offset site	During clearing operations	Environmental manager, Project ecologist
	implement a weed and pathogen monitoring program	Monitor weed impacts to retained vegetation outside the mine disturbance footprint, but within the mine project area to target weed control efforts	Prior to and during clearing operations and mine operation	Environmental Manager, weed contractor
	Undertake weed management and pest control programs in consultation with surrounding landholders, based on the results of the weed and pathogen monitoring program	Maintain or improve condition of retained native vegetation	Prior to and during clearing operations and mine operation	Environmental Manager, weed contractor
	Undertake progressive rehabilitation	Retain native vegetation and fauna habitats for as long as possible	In stages as the mine progresses	Environmental Manager, rehabilitation consultant and restoration ecologist



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KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Additional (post-closure) disturbance footprint
- Pipeline

Project general arrangement
- Design lines
- Design polygons

Existing environment
- Major road
- Minor road
- Named watercourse
- Vittoria State Forest

Box Gum Woodland TEC (EMM, 2019)

Plant community types

PCT 727 | Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion
- High
- Medium
- Poor

PCT 766 | Carex sedgeland of the slopes and tablelands
- Poor

PCT 951 | Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion
- Medium
- Poor

PCT 1330 | Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
- High
- Medium
- Poor
- Other

Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); ELVIS (2014)

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Evolution of the mine development

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Figure 7.1

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The above avoidance, minimisation and mitigation measures were developed with consideration of recovery strategies and actions for Box Gum Woodland and the Koala and other threatened species that would be impacted by the mine. The National Recovery Plan for White Box Yellow Box Blakely's Red Gum Woodland (DECCW 2010a) 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.

A Koala revegetation project is proposed in areas of retained Koala habitat. The revegetation project will aim to reconnect fragmented patches of Koala habitat surrounding the mine and create links with larger areas of native vegetation to the north and east. The Koala revegetation project directly addresses the priority management action of re-connecting fragmented Koala populations.

7.4 Residual impacts

Following the implementation of design measures to avoid and minimise biodiversity impacts, the project will result in the residual impact of 130.39 ha of native vegetation clearing (127.35 ha of which comprises habitat for the species credit species, Squirrel Glider, and 116.95 ha of which comprises habitat for the species credit species, Koala). Table 7.4 provides the breakdown of clearing impacts on each PCT and its associated ecosystem credit species, and species credit species.

Table 7.4 Residual project impacts

Plant community type/species credit species	Associated ecosystem credit species (species with highest credit requirement)	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: N/A Species credit species: Squirrel Glider and Koala	2.84
727 - Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion – Moderate/Good (Medium)	Ecosystem credit species: N/A Species credit species: Squirrel Glider and Koala	35.54
727 - Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion – Moderate/Good (Poor)	Ecosystem credit species: N/A Species credit species: Squirrel Glider	10.40
951 - Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion – Moderate/Good (Poor)	Ecosystem credit species: N/A Species credit species: Squirrel Glider and Koala	32.73
766 - Carex sedgeland of the slopes and tablelands – Moderate/Good (Poor)	Ecosystem credit species: N/A Species credit species: N/A	3.04

Table 7.4 Residual project impacts

Plant community type/species credit species	Associated ecosystem credit species (species with highest credit requirement)	Residual impact (ha)
1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion– Moderate/Good (High)	Ecosystem credit species: Little Lorikeet Species credit species: Squirrel Glider and Koala	1.47
1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion – Moderate/Good (Medium)		18.96
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)		24.65
Total		**130.39[1]**

Notes: 1. Impacts will occur to 127.35 ha of habitat for the Squirrel Glider and 116.95 ha of habitat for the Koala.

7.5 Thresholds for assessment and offsetting

7.5.1 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 7.5 Impacts requiring further consideration

Feature	Description
Landscape features	The mine development project area does not support any estuarine areas, important wetlands, or state biodiversity links. The mine development project area does not support any important wetlands. The project will impact on a regional biodiversity link, being the buffer either side of a 5th order stream (eg. the Belubula River). 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. 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).

Table 7.5 Impacts requiring further consideration

Feature	Description
Native vegetation	PCT 1330 represents White Box Yellow Box Blakely's Red Gum Woodland listed as an CEEC under the BC Act. It was not identified in the SEARs and therefor does not require further consideration.
Species and populations	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.

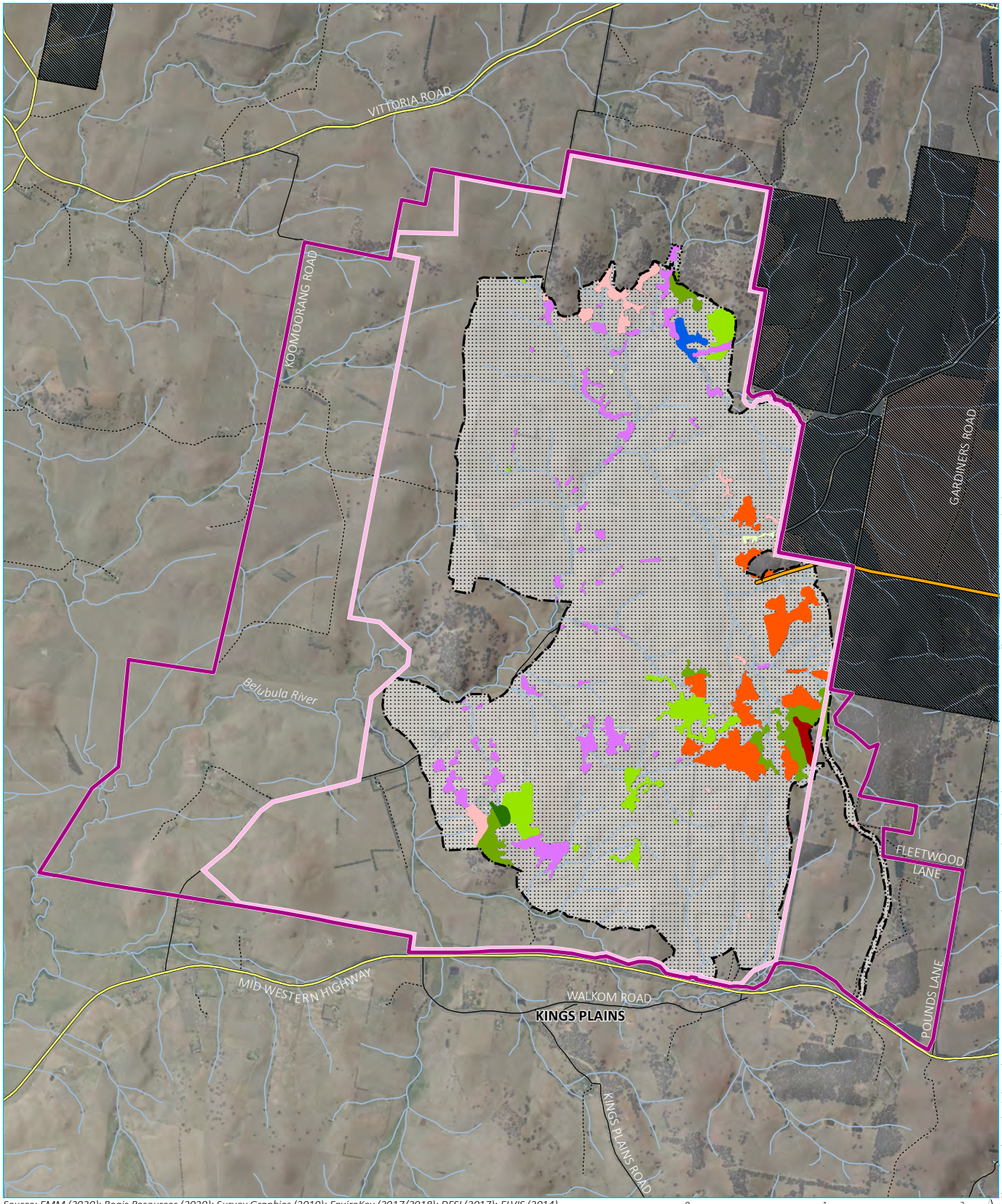
7.5.2 Impacts requiring offsets

The impacts requiring offsets are provided in Table 7.4. The areas of native vegetation requiring offset and species credit polygons are shown in Figure 7.2 and Figure 7.3, respectively.

7.5.3 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 986.79 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. It should be noted that the FBA calculator is stating that offsets are required for these vegetation zones. In line with Section 9.4.1 of the FBA (OEH 2014) these areas do not require further assessment or offsets.



Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); EnviroKey (2017/2018); DFSI (2017); ELVIS (2014)

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KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Additional (post-closure) disturbance footprint
- Pipeline

Existing environment
- Major road
- Minor road
- Vehicular track
- Watercourse/drainage line
- Vittoria State Forest

Areas not requiring offset (986.79 ha)

Plant community types

PCT 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)

PCT 766 | Carex sedgeland of the slopes and tablelands
- Moderate/Good (Poor)

PCT 951 | Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion
- Moderate/Good (Poor)

PCT 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

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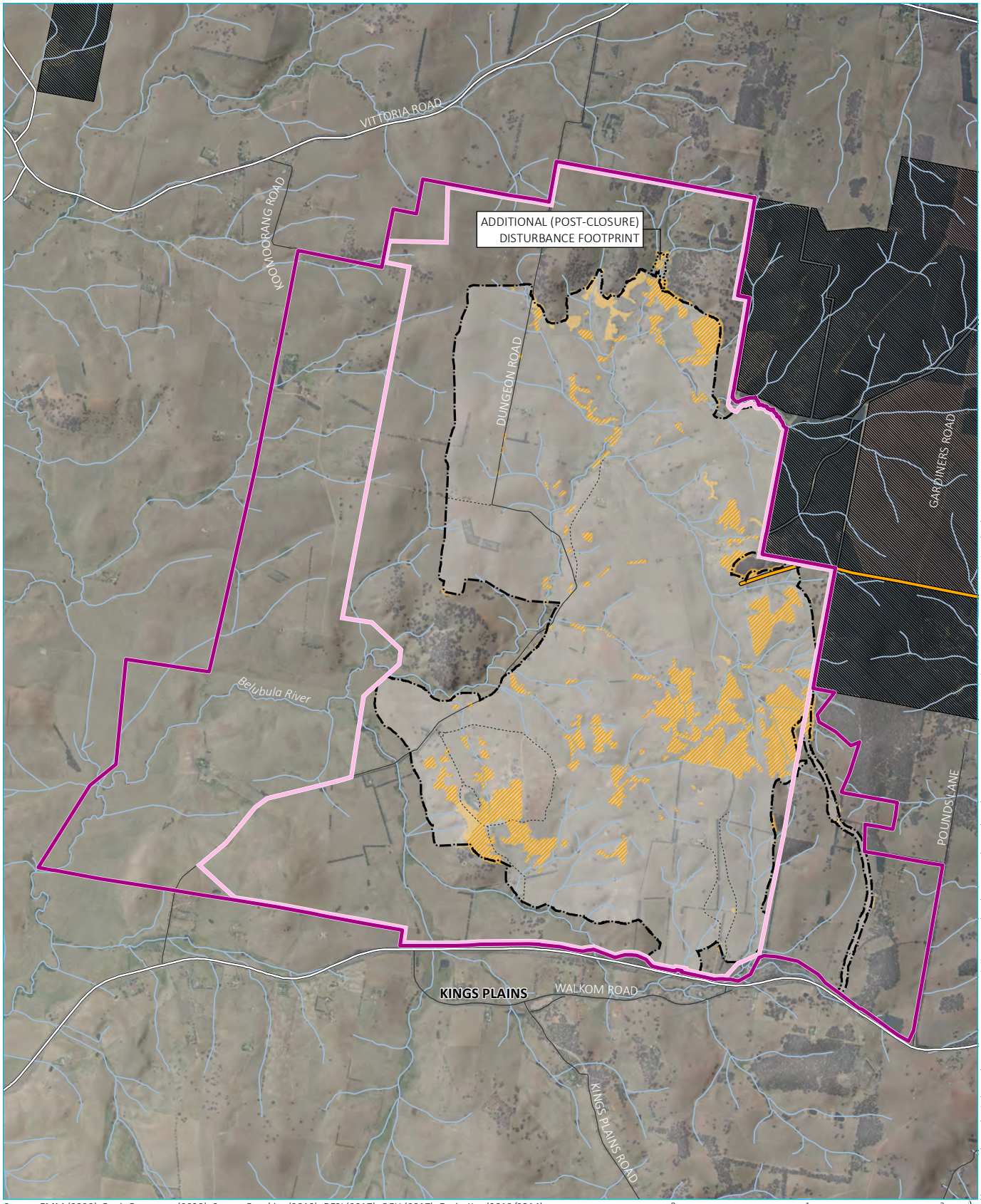
Figure 7.2



Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); OEH (2017); EnviroKey (2013/2014)

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KEY

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Additional (post-closure) disturbance footprint
- Pipeline

Existing environment

- Major road
- Minor road
- Vehicular track
- Watercourse/drainage line
- Vittoria State Forest
- Koala species polygon
- Squirrel Glider species polygon

Species credit polygons

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Figure 7.3

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7.6 Biodiversity credit report

The ecosystem credits required by the project are provided in Table 7.6 and species credits required are provided in Table 7.7.

These ecosystem and species credits have been provided for the amended project in accordance with the FBA, purposes of DAWE's assessment. However, it is intended that ecosystem and species credits requirements will be in accordance with the BAM, provided in the McPhillamys Gold Project Amendment Report – Biodiversity Development Assessment Report (BDAR), provided in Appendix M of the Amendment Report.

Table 7.6 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]	27
			Medium	18.96	58.85			947
			Other	0.76	44.27			30
			Poor	24.65	58.85			1231
727	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion (LA124)	Mod-Good	High	2.84	71.88	1	2.6	68
			Medium	35.54	61.98			757
			Poor	10.40	52.08			196
951	Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion (LA164)	Mod-Good	Poor	32.73	46	1	2.6	566
766	Carex sedgeland of the slopes and tablelands (LA130)	Mod-Good	Poor	3.04	31.16	1	1.4	41
1330	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion (LA276)	Low	-	986.79	9.38	0	0	0
727	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion (LA124)	Low	-	986.79	7.81	0	0	0
951	Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion (LA164)	Low	-	986.79	12	0	0	0
Total								**3,863**

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 Little Lorikeet was manually edited to 3 in the calculator to reflect the correct number of credits required for this PCT (as Little Lorikeet was associated with that PCT).

Table 7.7 Species credits required

Common name	Scientific name	TS offset multiplier	Credits required
Koala	*Phascolarctos cinereus*	2.6	3,041
Squirrel Glider	*Petaurus norfolcensis*	2.2	2,802

7.7 Biodiversity Offset Strategy

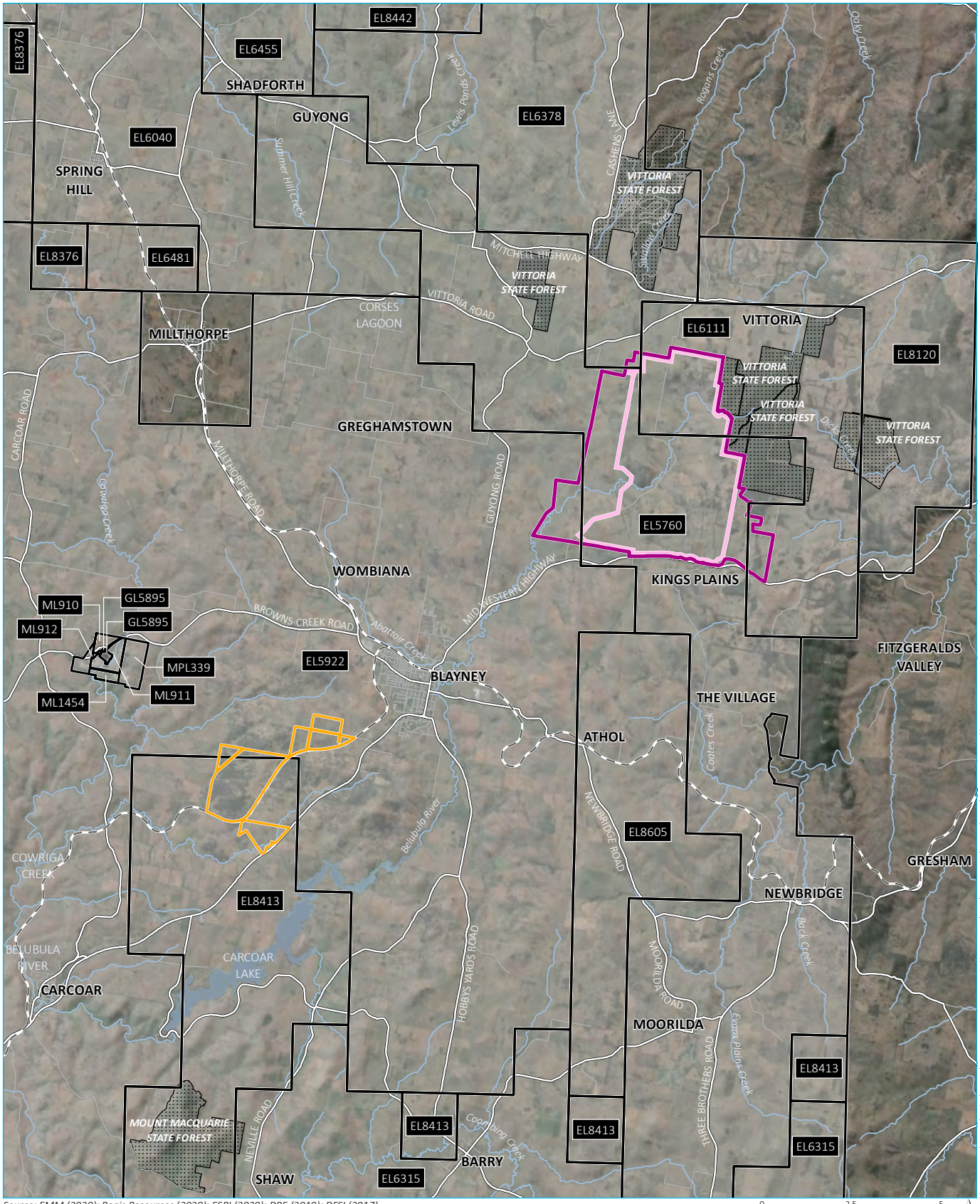
The proponent intends to meet the project's ecosystem and species credit requirements (Section 7.6) through one, or a combination of, the following:

- 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 proponent has purchased and conducted detailed studies to assess native PCTs and threatened species at a future stewardship site in Blayney (ie option 1, above). The property is approximately 388 ha and contains some of the required ecosystem and species credits (PCT 951, PCT 1330 and Koala). It is the proponent's intention to secure the property under a Biodiversity Stewardship Agreement with the Biodiversity Conservation Trust. 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 proponent will assess the residual ecosystem and species credits and secure these under one or a combination of options 1 to 3.



Source: EMM (2020); Regis Resources (2020); ESRI (2020); DPE (2019); DFSI (2017)

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KEY

- Potential stewardship site
- Mining/exploration titles

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)

Existing environment

- Rail line
- Major road
- Minor road
- Named watercourse
- Named waterbody
- State forest

Current exploration licences at potential stewardship site

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Figure 7.4

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8 Assessment against relevant biodiversity legislation

8.1 Environment Protection and Biodiversity Conservation Act 1999

This chapter provides an assessment of the amended project's impacts specific to species and communities listed under the EPBC Act. Protected matters are assessed separately for the mine developments as it was deemed that the mine development is a controlled action.

A likelihood of occurrence assessment is presented in Section 8.1.1.

8.1.1 Likelihood of occurrence

i Threatened ecological communities

Two PCTs were predicted to occur within the mine development project area by the Protected Matters Search Tool (PMST):

- White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland; and
- Natural Temperate Grassland of the South Eastern Highlands.

Table 8.1 assesses the likelihood of these TECs occurring within the mine development project area. White Box - Yellow Box - Blakely's Red Gum Grassy Woodland was recorded within the mine development project area. None of the PCTs recorded are consistent with the other TECs predicted to occur, and these TECs are not considered further.

One TEC listed under the EPBC Act, White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grasslands CEEC, was recorded within the mine development project area. Impacts to this TEC are discussed further in Section 8.1.2.

Table 8.1 Likelihood of occurrence for listed ecological communities

Ecological community	EPBC Act Status	Habitat requirements	Likelihood of occurrence
			Mine development
White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grasslands	CE	Characterised by a species-rich understorey of native tussock grasses, herbs and scattered shrubs, and the dominance, or prior dominance, of White Box, Yellow Box or Blakely's Red Gum trees. Tree-cover is generally discontinuous and consists of widely spaced trees of medium height in which the canopies are clearly separated.	**Recorded.** Up to 20.43 ha directly impacted. Further assessment of this ecological community is provided in Section 8.1.2.
Natural Temperate Grassland of the South Eastern Highlands	CE	Characterised by a dominance of native perennial tussock grasses, the tallest stratum of which is typically up to 1.0 m in height, when present. There is usually a second, lower stratum of shorter perennial and annual grasses and forbs growing between the taller tussocks. The major dominant or co-dominant grass species are: Kangaroo grass, Snowgrass, River Tussock Grass, Kneed Speargrass (*Austrostipa bigeniculata*), Corkscrew Speargrass, Red grass, various Wallaby grass species (*Rytidosperma* spp.), Blowngrass (*Lachnagrostis filiformis*) and Wild Sorghum (*Sorghum leiocladum*).	Negligible. Does not occur – this community is not consistent with any of the PCTs identified during the field surveys.
Temperate Highland Peat Swamps of the Sydney Basin Bioregion	E	Temporary or permanent swamps occurring on sandstone in the temperate highlands region in NSW (DEH, 2005) from around 600–1100 m above sea level. The wetter parts of the swamps are occupied by sphagnum bogs and fens, while sedge and shrub associations occur in the drier parts (TSSC, 2005). Can occur as hanging swamps on valley sides and swamps along watercourses.	Negligible. Does not occur – this community is not consistent with any of the PCTs identified during the field surveys.
Upland Basalt Forests of the Sydney Basin Bioregion	E	Tall, open eucalypt forest occurring on basalt soils and substrates, between 650 and 1050 m elevation. Contains a mix of eucalypts, most commonly Brown Barrel (*Eucalyptus fastigata*), and Narrow-leaved Peppermint (*E. radiata* subsp. *radiata*). Can also contain Messmate Stringybark (*E. obliqua*), River Peppermint (*E. elata*), White-topped Box (*E. quadrangulata*), Ironbark Peppermint (*E. smithii*), Blue Mountains Ash (*E. oreades*), Blaxland Stringybark (*E. blaxlandii*), Mountain Grey Gum (*E. cypellocarpa*), Swamp Gum (*E. ovata*) and River Peppermint (*E. piperita*).	Negligible. Does not occur – this community is not consistent with any of the PCTs identified during the field surveys.

ii Threatened species

The PMST and/or BioBanking Credit Calculator (BBCC) predicted that 30 species listed under the EPBC Act could occur within the mine development project area. An additional species, *Acacia meiantha* was also assessed as it was predicted by the Biodiversity Assessment Method Calculator (BAMC) in the McPhillamys Gold Project Amendment Report BDAR (Appendix M of the Amendment Report). The likelihood of occurrence for these species is assessed in Table 8.2.

Table 8.2 Likelihood of occurrence for threatened species

Scientific Name	EPBC Status	Source	Likelihood of occurrence
Plants			
Acacia meiantha	E	BAMC	Low. Not predicted by PMST but is a predicted candidate species under the BAM. Further information on the expert assessment is provided at Appendix B. Information on microhabitats from the expert report (Premise Australia 2020) completed for the pipeline were used to assess habitat for the species which was determined to be absent (Appendix E in Appendix M of the Amendment Report).
Euphrasia arguta	CE	PMST	Low. Unlikely to occur. Elevations in the mine development project area exceed 900 m, while this species occurs up to 700 m asl.
Austral Toadflax (*Thesium australe)*	V	PMST	Low. Kangaroo Grass, which the species requires to occur, was rarely to uncommonly recorded in the mine development project area.
Basalt Peppercress (*Lepidium hyssopifolium*)	V	PMST	Low. Known only from three populations in Bathurst, Bungendore and Crookwell. The mine development project area is outside the species known and predicted habitat range.
Black Gum *(Eucalyptus aggregata)*	V	PMST, BBCC	Absent. Not recorded during targeted surveys.
Hoary Sunray, Grassland Paper-daisy (*Leucochrysum albicans* var. *tricolor)*	E	PMST, BBCC	Low. The species was considered during the assessment for the project, with targeted surveys undertaken for this species. The species was not recorded within the mine development project area.
Silver-leaf Candlebark (*Eucalyptus canobolensis*)	E	BBCC	Low. Known only from Mt Canobolas near Orange. Mine development project area is outside species range.
Silver-leaved Mountain Gum, Silver-leaved Gum (*Eucalyptus pulverulenta)*	V	PMST, BBCC	Low. Potential to occur in PCT 727 and 1330 due to presence of associated species comprise Brittle Gum, Red Stringybark, Broad-leaved Peppermint and Apple Box. However, targeted surveys in accordance with NSW Guide to Surveying Threatened Plants (OEH 2016) did not record the species.
Small Purple Pea *(Swainsona recta)*	E	PMST, BBCC	Absent. Targeted surveys failed to detect the species.

Table 8.2 Likelihood of occurrence for threatened species

Scientific Name	EPBC Status	Source	Likelihood of occurrence
Birds			
Australian Painted-Snipe (*Rostratula australis*)	E	PMST	Low. Unlikely to occur given the absence of preferred foraging habitats including swamps and marshes.
Curlew Sandpiper (*Calidris ferruginea*)	CE	PMST	Low. Unlikely to occur as suitable foraging habitat (intertidal mudflats, swamps, lakes, lagoons) are absent.
Eastern Curlew (*Numenius madagascariensis*)	CE	PMST	Negligible. Unlikely to occur given the absence of required foraging habitat types (ie mudflats, mangroves, coastal lakes).
Grey Falcon (*Falco hypoleucos*)	V	PMST	Negligible. Unlikely to occur given the absence of required habitat types (shrubland, grassland and wooded watercourses of arid and semi-arid regions).
Malleefowl (*Leipoa ocellata*)	V	PMST	Negligible. Unlikely to occur due to the absence of required habitat types.
Painted Honeyeater (*Grantiella picta*)	V	PMST	Low. Targeted surveys conducted in accordance with Commonwealth guidelines did not record the species. In addition, trees did not contain mistletoes (ie potential foraging habitat).
Regent Honeyeater (*Anthochaera phrygia*)	CE	PMST, BBCC	Low. Targeted surveys conducted in accordance with Commonwealth guidelines did not record the species. In addition, tree removal (ie potential foraging habitat) will be limited to saplings.
Superb Parrot (*Polytelis swainsonii*)	V	PMST	**Moderate.** The species was recorded by Envirokey south of the mine development project area, on Kings Plain, and is known to occur in the local area. Potential for the species to forage within the mine development project area. Breeding unlikely to occur in the locality, as the species breeds in the Riverina. Further assessment is provided in Section 8.1.2iii.
Swift Parrot (*Lathamus discolor*)	CE	PMST, BBCC	Low. Targeted surveys conducted in accordance with Commonwealth guidelines did not record the species.

Table 8.2 Likelihood of occurrence for threatened species

Scientific Name	EPBC Status	Source	Likelihood of occurrence
White-throated Needletail (*Hirundapus caudacutus*)	V	PMST	Low. Unlikely to use habitats onsite as native vegetation is heavily fragmented.
Fish			
Murray Cod (*Maccullochella peelii*)	V	PMST	Low. Aquatic habitats within the mine development project area do not provide suitable habitat for this species.
Macquarie Perch (*Macquaria australasica*)	E	PMST	Low. Aquatic habitats within the mine development project area do not provide suitable habitat for this species.
Frogs			
Booroolong Frog (*Litoria booroolongensis*)	E	PMST, BBCC	Low. The Belubula River within the mine development project area does not provide suitable breeding habitat for this species.
Yellow-spotted Tree Frog (*Litoria castanea*)	E	PMST, BBCC	Low. Require large permanent ponds or slow flowing streams with plenty of emergent vegetation such as bulrushes. The only extant population known is in Yass.
Mammals			
Large-eared Pied Bat (*Chalinolobus dwyeri*)	V	PMST	Low. Unlikely to occur as the mine development project area does not contain and is not proximal to suitable roosting habitat (cliffs).
Spotted-tail Quoll (SE mainland population) (*Dasyurus maculatus maculatus*)	E	PMST	Low. Unlikely to occur as the species has not been recorded in the former Lachlan CMA area in which the mine development project area is located.
Greater Glider (*Petaurus volans*)	V	PMST	Low . Unlikely to occur given the highly degraded nature and open structure of tall moist eucalypt forest.
Koala (NSW, QLD and ACT) (*Phascolarctos cinereus*)	V	PMST, BBCC	**Recorded.** The species was recorded within the mine development project area. Assessment provided in Section 8.1.2.

Table 8.2 Likelihood of occurrence for threatened species

Scientific Name	EPBC Status	Source	Likelihood of occurrence
Grey-headed Flying-fox (*Pteropus poliocephalus*)	V	PMST	Low. Unlikely to occur as there are no roosting camps that intersect the pipeline corridor.
Reptiles			
Pink-tailed Worm Lizard (*Aprasia parapulchella*)	V	PMST	Low. Targeted surveys did not record the species.
Striped Legless Lizard (*Delma impar*)	V	PMST	Low. Unlikely as the species is not known to occur in the region.
Insects			
Golden Sun Moth (*Synemon plana*)	CE	PMST	Negligible. Preferred habitat for this species (ie natural grasslands) are absent from the mine development project area.

Notes: PMST – Protected Matters Search Tool Results, BBCC – BioBanking Credit Calculator, BAMC – Biodiversity Assessment Method Calculator.

The Koala was recorded in the mine development project area, while the Superb Parrot was recorded to the south. These species are discussed further in Section 8.1.2.

iii Migratory species

Fourteen species listed as migratory under the EPBC Act were predicted to occur in the project application area based on database searches undertaken. Table 7.3 provides an assessment of the likelihood of these species utilising habitat within the mine development area.

Two species listed as migratory under the EPBC Act (Rainbow Bee-eater and Latham's Snipe) were recorded as being present in mine development project area. These species are discussed further below.

Table 8.3 Likelihood of occurrence for migratory species

Scientific name	EPBC Status	Source	Potential presence – mine development
Australian Painted-snipe (*Rostratula australis*)	E, Ma	PMST	Low. Unlikely to occur given the absence of preferred foraging habitats including swamps and marshes.
Black-faced Monarch (*Monarcha melanopsis*)	Ma, Mi	PMST	-
Common Sandpiper (*Actitis hypoleucos*)	Ma	PMST	Negligible. Unlikely to occur as wetlands are absent from the mine development project area.
Curlew Sandpiper (*Calidris ferruginea*)	CE, Mi	PMST	Negligible. Unlikely to occur as suitable foraging habitat (intertidal mudflats, swamps, lakes, lagoons) are absent.
Eastern Curlew (*Numenius madagascariensis*)	CE, Ma, Mi	PMST	Negligible. Unlikely to occur given the absence of required foraging habitat types (i.e. mudflats, mangroves, coastal lakes).
Fork-tailed Swift (*Apus pacificus*)	Ma, Mi	PMST	Low. Recorded by EMM in Feb 2019. Unlikely to use habitats onsite as the species is almost exclusively aerial.
Latham's Snipe (*Gallinago hardwickii*)	Ma, Mi	PMST	**Recorded.** Observed in the mine development project area by EnviroKey (one record). Further assessment of this migratory species is provided below.
Pectoral Sandpiper (*Calidris melanotos*)	Ma, Mi	PMST	Negligible. Unlikely to occur as wetlands are absent from the mine development project area.
Rainbow Bee-eater (*Merops ornatus*)	Mi	PMST	**Recorded.** Observed in the mine development project area by EnviroKey (one record). Further assessment of this migratory species is provided below.
Rufous Fantail (*Rhipidura rufifrons*)	Ma, Mi, B	PMST	Low. Unlikely to occur as moist, dense forests are absent from the mine development project area.
Satin Flycatcher (*Myiagra cyanoleuca*)	Ma, Mi, B	PMST	Low. Unlikely to occur as tall wet sclerophyll forests and rainforests are absent from the mine development project area.
Sharp-tailed Sandpiper (*Calidris acuminata*)	Ma, Mi, B C, J, R	PMST	Negligible. Unlikely to occur as wetlands are absent from the mine development project area.

Table 8.3 Likelihood of occurrence for migratory species

Scientific name	EPBC Status	Source	Potential presence – mine development
White-throated Needletail (*Hirundapus caudacutus*)	Ma, Mi, C, J, R, V	PMST	Low. May occur overhead only. Unlikely to use habitats onsite as native vegetation is heavily fragmented
Yellow Wagtail (*Motacilla flava*)	Mig (EPBC Act)	PMST	Low. Unlikely as well watered open grasslands and wetlands are absent from the mine development project area.

8.1.2 Significant impact assessment

White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland and the Koala were recorded within the mine development project area, while the Superb Parrot was considered a moderate likelihood of occurrence following targeted surveys. Two species (the Rainbow Bee-eater and Latham's Snipe) listed under the migratory provisions of the EPBC Act were also recorded within the mine development project area.

Impacts to this TEC, two threatened species and two migratory species are assessed below.

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

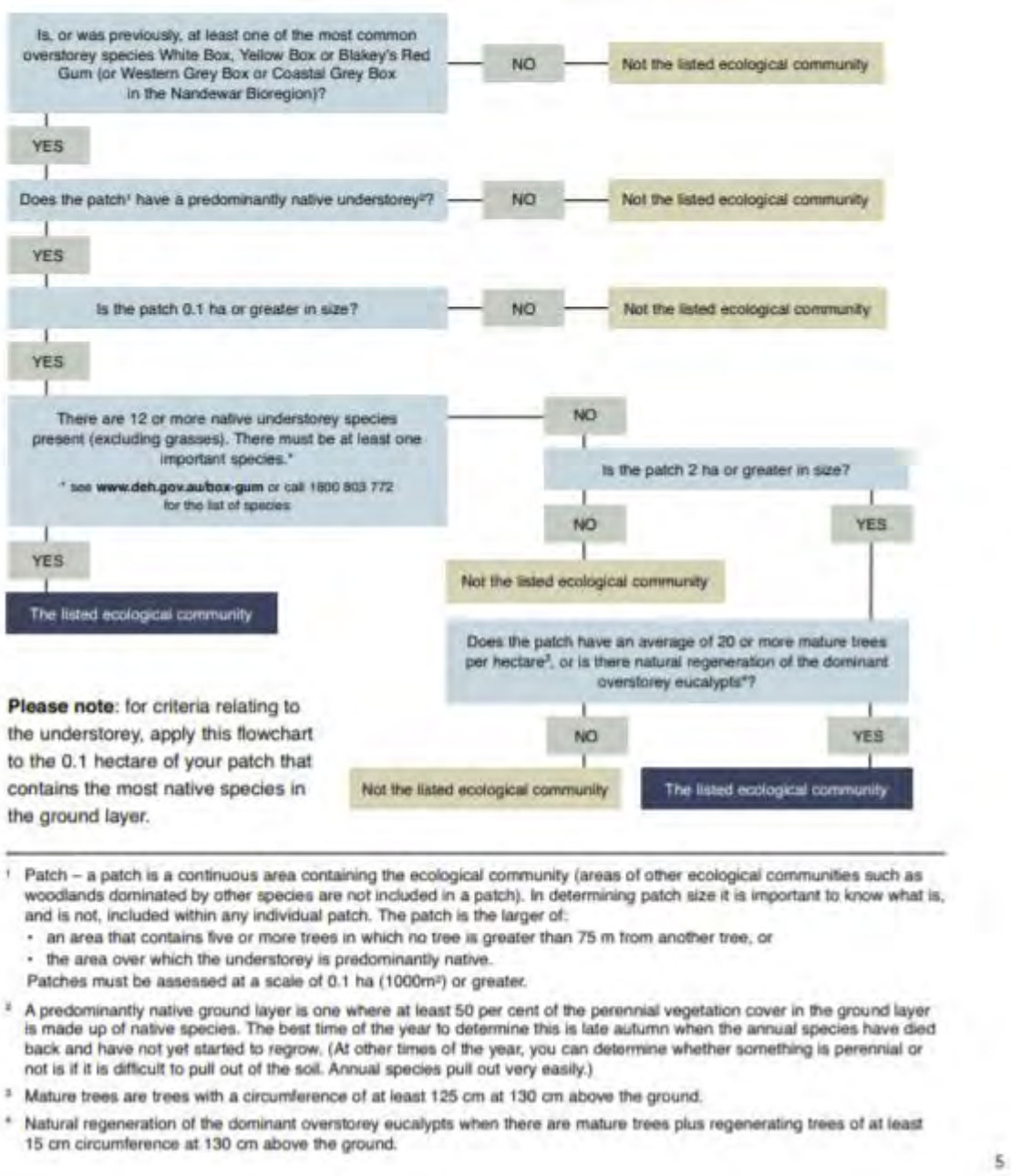
The Commonwealth Listing Advice for the critically endangered White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland (TSSC 2006) provides a general description of the community and describes its current status. White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and 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 (*Eucalptus albens*), Yellow Box and/or Blakely's Red Gum 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 (DECCW 2010a) 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 7.1).

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



[1] Patch – a patch is a continuous area containing the ecological community (areas of other ecological communities such as woodlands dominated by other species are not included in a patch). In determining patch size it is important to know what is, and is not, included within any individual patch. The patch is the larger of:
- an area that contains five or more trees in which no tree is greater than 75 m from another tree, or
- the area over which the understorey is predominantly native.

Patches must be assessed at a scale of 0.1 ha (1000m²) or greater.

[2] A predominantly native ground layer is one where at least 50 per cent of the perennial vegetation cover in the ground layer is made up of native species. The best time of the year to determine this is late autumn when the annual species have died back and have not yet started to regrow. (At other times of the year, you can determine whether something is perennial or not is if it is difficult to pull out of the soil. Annual species pull out very easily.)

[3] Mature trees are trees with a circumference of at least 125 cm at 130 cm above the ground.

[4] Natural regeneration of the dominant overstorey eucalypts when there are mature trees plus regenerating trees of at least 15 cm circumference at 130 cm above the ground.

5

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

Assessments of significance for White Box-Yellow Box – Blakely's Red Gum Woodland and Derived Native Grassland relevant to the mine development is provided in the following sections.

Approximately 20.43 ha of the EPBC Act listed community will be impacted by the mine development. Table 8.4 provides an assessment of significance for the removal of 20.43 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 8.4 Assessment of significance for White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the mine development project area

Criteria	Discussion
Conservation status	Critically endangered
1. Reduce the extent of an ecological community	Approximately 20.43 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 mine development project area, using plant community type mapping for the central tablelands (OEH 2018). Within a 5 km buffer of the mine development 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. PCT 1330 has been identified as representing Box Gum Woodland in the mine development project area. Accordingly, the project would result in a reduction of 1.8% 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). 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 0.008% 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.
2. Fragment or increase fragmentation	The listed community is highly fragmented within and surrounding the mine development project area, and the vegetation within the mine lease represents the western edge of a tract of relatively contiguous, albeit fragmented, vegetation. Largely cleared land is located west and south. Several patches of the community will be removed from the mine disturbance footprint, further fragmenting some patches located to the west from areas of retained vegetation to the east and north. Accordingly, the project will increase the degree of fragmentation of the community.
3. Adversely affect critical habitat	A national recovery plan has been developed (DECCW 2010a) 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. Approximately 20.43 ha of vegetation in the mine 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 1.8%.
4. Modify or destroy abiotic factors necessary for survival	Abiotic factors including soil and surface hydrology will be modified in the mine development project area, and therefore represents a permanent impact. The listed community occurs directly north and south-west of the mine disturbance footprint, within the mine development project area. An assessment of changes to groundwater availability and quality that these retained patches would use opportunistically was conducted. 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 20.43 ha of habitat for the listed community within the mine disturbance footprint. Retained areas of the listed community outside the mine disturbance footprint 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 mine disturbance footprint, but within the mine development project area. The condition of these areas is likely to improve in quality with this management.

Table 8.4 Assessment of significance for White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the mine development project area

Criteria	Discussion
6. Cause a substantial reduction in quality or integrity	The project will remove all areas of this community within the mine disturbance footprint; consequently, there will be no residual risk within the mine development project area. Areas outside of the mine development 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 mine disturbance footprint, but within the mine development project area.
7. Interfere with recovery	A national recovery plan has been developed (DECCW 2010a), with the objective to promote the recovery and minimise the risk of extinction of the ecological community through: • 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. The clearance of up to 20.43 ha of the CEEC will directly contravene Point 1, by reducing the extent of the listed community. Section 7.3details avoidance measures implemented by Regis into the project design to minimise impacts on this community. Detailed design has avoided and minimised impacts to areas of high condition White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grasslands within the mine development project area, apart from a small area (1.47 ha) 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. Management of retained areas of the community on the site will assist in protecting areas of good condition habitat to be retained There is no approved Conservation Advice for this ecological community.
Conclusion	The project is likely to result in a significant impact on the listed community as 20.43 ha of habitat critical to its survival will be removed. Impacts to the 20.43 ha of the community removed by the project are known, predictable and irreversible.

ii 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 mine development 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 koala management area, Apple Box and Yellow Box (PCT 1330). Approximately 116.95 ha of Koala habitat occurs in the disturbance footprint.

An assessment has been completed for the mine development 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) (Commonwealth of Australia 2014) in Table 8.5.

Table 8.5 Koala habitat assessment tool (Commonwealth of Australia 2014) for the in the mine development project area

Attribute	Score	Data source	Habitat assessment
Koala occurrence	+2 (high)	Desktop	The NSW Atlas of Wildlife identifies one recent record (1986), east of the mine development 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 central and southern tablelands KMA were mapped for the mine development project area. Scat searches were completed in the mine development project area using the Spot Assessment Technique (Phillips and Callaghan 2011). No scats were found. Nocturnal spotlighting was also completed, and no Koalas were recorded during this activity. However, a single Koala was found resting in an Apple Box during the day.
Vegetation structure and composition	+2 (high)	Desktop	The project is in the central and southern tablelands KMA. High regional use species identified by SEPP (Koala Habitat Protection) 2019 in the mine development project area comprise Manna Gum, Brittle Gum, Blakely's Red Gum, Apple Box and Yellow Box.
		On ground	On-ground surveys confirmed that the mine development project area contains Koala habitat, comprising the food tree species listed above.
Habitat connectivity	0 (low)	Desktop	Koala habitat in the mine development project area is highly fragmented. In addition, Koala habitat in the mine development project area does not connect to any large patches of habitat outside the mine development 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 Koala observed in the mine development project area appeared to be healthy, with no signs of Chlamydia (eg dry bottom). A high 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 mine development 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 mine development project area represents habitat critical to the survival of the Koala, in accordance with the referral guidelines (ie score greater than five).

Table 8.6 provides an assessment of significance for the removal of up to 116.95 ha of potential Koala habitat, in accordance with the assessment criteria for vulnerable species (DoE 2013).

Table 8.6 Assessment of significance for the Koala for the mine development project area

Criteria	Discussion
1. long-term decrease of an important population	The Koala referral guideline (Commonwealth of Australia 2014) does not identify any important populations of the species. A single Koala was opportunistically identified in the mine development project area during surveys, while targeted searches, including SAT assessments and spotlighting, did not record the species. There is only one NSW Atlas of Wildlife record of the species (from 1986), east of the mine development project area. Koala habitat is highly fragmented in the mine development project area and region but contains small, patchy woodland remnants in an agricultural setting. Considering the above, Koalas are likely to occur in low densities in the mine development 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 mine development project area.
3. fragment an important population	An important population of the Koala does not occur in the mine development project area.
4. adversely affect critical habitat	Following the precautionary principle, all woodland in the mine development project area was identified in the EPBC referral as representing habitat critical to the survival of the Koala. This habitat would be permanently removed from the disturbance footprint, and therefore critical habitat would be adversely affected. SEPP (Koala Habitat Protection) 2019 identifies 39 feed trees that occur in the Central and Southern Tablelands KMA, five of which occur in the mine development project area. These areas have been used to define Koala habitat in the mine development project area. Section 7.3 details avoidance measures implemented by Regis into the project design to minimise impacts on habitat for this species. Management of retained areas of species habitat on the site (see Section 7.3) will assist in protecting areas of habitat to be retained.
5. disrupt the breeding cycle of an important population	An important population of the Koala does not occur in the mine development project area.
6. decrease availability or quality of habitat	The project would decrease habitat availability in the mine development project area by approximately 116.95 ha, while areas outside the mine disturbance footprint would be retained. 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. 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. 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 mine development project area.

Table 8.6 Assessment of significance for the Koala for the mine development project area

Criteria	Discussion
7. result in invasive species	Domestic dogs (*Canis familiaris*) 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	Koalas are susceptible to Chlamydia, a sexually transmitted disease. The single Koala observed in the mine development project area during surveys appeared to be in good health and free of the signs of Chlamydia. In general, disease outbreaks occur when animals are stressed. As Koala density in the mine development project area is low, the potential for a disease outbreak is also considered to be low.
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 mine development project area will address a priority management measure for the Koala outlined in the species conservation advice (TSSC 2012).
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 116.95 ha of critical habitat removed by the project are known, predictable and irreversible.

iii Superb Parrot

The Commonwealth Conservation Advice for the Superb Parrot (EPBC Act – vulnerable) (TSSC 2016a) 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, roadkill, 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, Grey Box (*E. microcarpa*), White Box and Red Box (*E. polyanthemos*). Of the species described above, Blakely's Red Gum and Apple Box occur in the project application area and surrounds. However, the project application 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 application 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). Potential habitat within the mine development comprises areas of PCT 1330_high and 1330_medium.

Table 8.7 provides an assessment of significance for the removal of up to 20.43 ha of potential Superb Parrot habitat, in accordance with the assessment criteria for vulnerable species (DoE 2013).

Table 8.7 Assessment of significance for the Superb Parrot for the mine development project area

Criteria	Discussion
1. Long-term decrease of an important population	Important populations have not been defined in the recovery plan for the Superb 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	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. As the project application area does not fall within the species breeding range, it does not represent habitat critical to the survival of the species. Section 7.3 details avoidance measures implemented by Regis into the project design to minimise impacts on habitat for this species. Management of retained areas of species habitat on the site (see Section 7.3) will assist in protecting areas of habitat to be retained.
5. Disrupt breeding cycle	The project application 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 20.43 ha of potential foraging habitat for the Superb Parrot in the mine development. The project application 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 this 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.

Table 8.7 Assessment of significance for the Superb Parrot for the mine development project area

Criteria	Discussion
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 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.

iv Latham's Snipe

Latham's Snipe is listed as a migratory species under the EPBC Act. It was recorded directly adjacent to the mine development project area in November 2013.

Latham's Snipe 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 mine development 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 application area.

An assessment of significance (Table 8.8) was prepared for Latham's Snipe in relation to the project, in accordance with the assessment criteria for migratory species (DoE 2013).

Table 8.8 Assessment of significance for Latham's Snipe in the mine development project area

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 *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 individual was recorded adjacent to the mine development project area. Therefore, the project application 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 application area will be developed during preparation of the Biodiversity Management Plan. As a ground-dwelling bird, Latham's Snipe are vulnerable to predation from the introduced Red Fox (*Vulpes vulpes*). 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 application 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: • the area does not contain important habitat for the species; and • an ecologically significant proportion of the population will not be disrupted.

v Rainbow Bee-eater

Rainbow Bee-eater is listed as a migratory species under the EPBC Act. A single Rainbow Bee-eater was recorded in the mine development project area. The Rainbow Bee-eater is widely distributed throughout Australia and eastern Indonesia, including Bali, the Lesser Sundas and Sulawesi, and east to Papua New Guinea, the Bismarck Archipelago and, rarely, the Solomon Islands. It is a vagrant visitor to locations further north including Palau, south-western Micronesia, Saipan, the northern Mariana Islands, and Miyako Island and the southern Ryuku Islands in Japan. The majority of the global population breeds in Australia (including on Rottnest Island and islands in the south-west Torres Strait). Breeding has also been recorded in eastern Papua New Guinea (around Port Moresby and the Ramu Valley) and may possibly occur in the Lesser Sundas.

The Rainbow Bee-eater occurs mainly in open forests and woodlands, shrublands, and in various cleared or semi-cleared habitats, including farmland and areas of human habitation. It usually occurs in open, cleared or lightly-timbered areas that are often, but not always, located in close proximity to permanent water. It also occurs in inland and coastal sand dune systems, and in mangroves in northern Australia, and has been recorded in various other habitat types including heathland, sedgeland, vine forest and vine thicket, and on beaches. The Rainbow Bee-eater occurs in open woodlands and shrublands, including mallee, and in open forests that are usually dominated by eucalypts. It also occurs in grasslands and, especially in arid or semi-arid areas, in riparian, floodplain or wetland vegetation assemblages (DoEE 2019).

An assessment of significance is provided for this species in Table 8.9.

Table 8.9 Assessment of significance for Rainbow Bee-eater in the mine development project area

Criteria	Discussion
1. Substantially modify important habitat	The Rainbow Bee-eater is a widely distributed and common migratory species. No important habitats have been identified for the species, and it occurs widely in a range of open forests and woodlands, and cleared habitats. The mine development project area is unlikely to meet the criteria for important habitat as defined in DoE (2013).
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 mine development project area will be developed during the EIS.
3. Disrupt lifecycle of ecologically significant proportion of population	The species was not observed regularly in the mine development project area, and the mine development project area is unlikely to support an ecologically significant proportion of the Rainbow Bee-eater.
Conclusion	The project will not result in a significant impact on the Rainbow Bee-eater as: • 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 State Environmental Planning Policy (Koala Habitat Protection) 2019

Although the Koala Habitat Protection SEPP does not apply to the development (Section 2.2.2), feed tree species from the relevant koala management area have been used to inform the delineation of Koala habitat for the mine development. The 39 listed feed tree species for the central and southern tablelands Koala management area (KMA) were also considered when completing Koala habitat mapping for the mine developments. Of these 39 species, *A review of Koala tree use across NSW* (OEH 2018b) states that there is evidence of widespread use of Brittle Gum, Manna Gum, Broad-leaved Peppermint, Red Stringybark, Inland Scribbly Gum and Snow Gum.

Table 8.10 provides the list of feed tree species relevant to the KMA and determines which species are present in the mine development and their associated PCTs. It also identifies presence of the widely used species, which in combination with vegetated corridors, have been used for the purposes of defining 'important koala habitat' for the Koala species polygons in accordance with the BAM.

Table 8.10 Koala feed tree species for the central and southern tablelands KMA

Scientific name	Common name(s)	Present in mine development footprint?	Associated vegetation zones where the species is dominant/co-dominant
Eucalyptus agglomerata	Blue-leaved Stringybark	Absent	-
Eucalyptus albens	White Box	Absent	-
Eucalyptus amplifolia	Cabbage Gum	Absent	-
Eucalyptus blakelyi	Blakely's Red Gum	Mine development Pipeline development	1330_High, 1330_Moderate, 1330_Poor, 1330_Other 277_Intact, 277_Moderate

Table 8.10 Koala feed tree species for the central and southern tablelands KMA

Scientific name	Common name(s)	Present in mine development footprint?	Associated vegetation zones where the species is dominant/co-dominant
Eucalyptus bosistoana	Coast Grey Box	Absent	-
Eucalyptus bridgesiana	Apple Box	Mine development Pipeline development	1330_High, 1330_Moderate, 1330_Poor, 1330_Other 727_High, 727_Moderate, 727_Intact ,1330_Intact, 727_Intact, 277_Intact, 1093_Fragments, 1093_Intact
Eucalyptus camaldulensis	River Red Gum	Absent	-
Eucalyptus conica	Fuzzy Box	Absent	-
Eucalyptus cypellocarpa	Monkey Gum	Absent	-
*Eucalyptus dalrympleana^*	Mountain Gum	Pipeline development	1197_Intact
Eucalyptus dealbata	Tumbledown Red Gum	Absent	-
*Eucalyptus dives^*	Broad-leaved Peppermint	Mine development Pipeline development	727_High, 727_Medium 727_Intact, 727_Moderate, 1093_Fragments, 1093_Intact
Eucalyptus elata	River Peppermint	Absent	-
Eucalyptus eugenioides	Narrow-leaved Stringybark	Absent	-
Eucalyptus fibrosa	Broad-leaved Red Ironbark	Absent	-
Eucalyptus globoidea	White Stringybark	Absent	-
Eucalyptus goniocalyx	Bundy	Mine development Pipeline development	727_High, 727_Moderate 727_Intact, 277_Intact, 277_Moderate, 1093_Intact
*Eucalyptus macrorhyncha^*	Red Stringybark	Pipeline development	727_Intact, 1093_Intact, 1093_Fragments, 277_Intact
Eucalyptus maidenii	Maiden's Blue Gum	Absent	-
*Eucalyptus mannifera^*	Brittle Gum	Pipeline development	727_Intact, 1093_Fragment, 1093_Intact
Eucalyptus melliodora	Yellow Box	Mine development Pipeline development	1330_High, 1330_Moderate, 1330_Poor, 1330_Other 727_High, 727_Moderate 1330_Intact, 277_Intact, 277_Moderate

Table 8.10 Koala feed tree species for the central and southern tablelands KMA

Scientific name	Common name(s)	Present in mine development footprint?	Associated vegetation zones where the species is dominant/co-dominant
Eucalyptus microcarpa	Western Grey Box	Absent	-
Eucalyptus nortonii	Large-flowered Bundy	Absent	-
Eucalyptus obliqua	Messmate	Absent	-
Eucalyptus oblonga	Stringybark	Absent	-
Eucalyptus paniculata	Grey Ironbark	Absent	-
*Eucalyptus pauciflora^*	White Sally, Snow Gum	Pipeline development	1191_Intact, 1197_Intact
Eucalyptus piperita	Sydney Peppermint	Absent	-
Eucalyptus polyanthemos	Red Box	Absent	-
Eucalyptus punctata	Grey Gum	Absent	-
Eucalyptus quadrangulata	White-topped Box	Absent	-
Eucalyptus radiata	Narrow leaved Peppermint	Absent	-
*Eucalyptus rossii^*	Inland Scribbly Gum	Pipeline development	1191_Intact, 1197_Intact
Eucalyptus rubida	Candlebark		
Eucalyptus sclerophylla	Hard-leaved Scribbly Gum	Absent	-
Eucalyptus sideroxylon	Mugga Ironbark	Absent	-
Eucalyptus sieberi	Silvertop Ash	Absent	-
Eucalyptus tereticornis	Forest Red Gum	Absent	-
Eucalyptus viminalis	Ribbon Gum	Mine development Pipeline development	951_poor 1191_Fragments

8.3 Biosecurity Act 2015

One priority weed of the central tablelands was recorded in the mine development 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 (OEH 2014), 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.

The mine development requires 3,863 ecosystem credits to compensate for impacts on native PCTs and ecosystem credit species. In addition to ecosystem credits, the project also requires 3,041 species credits for the Koala and 2,802 species credits for the Squirrel Glider. Regis will compensate for these residual impacts through the implementation of a biodiversity offset strategy.

The BAR has also considered impacts on species and ecological communities listed under the EPBC Act. The mine development 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 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.

As the 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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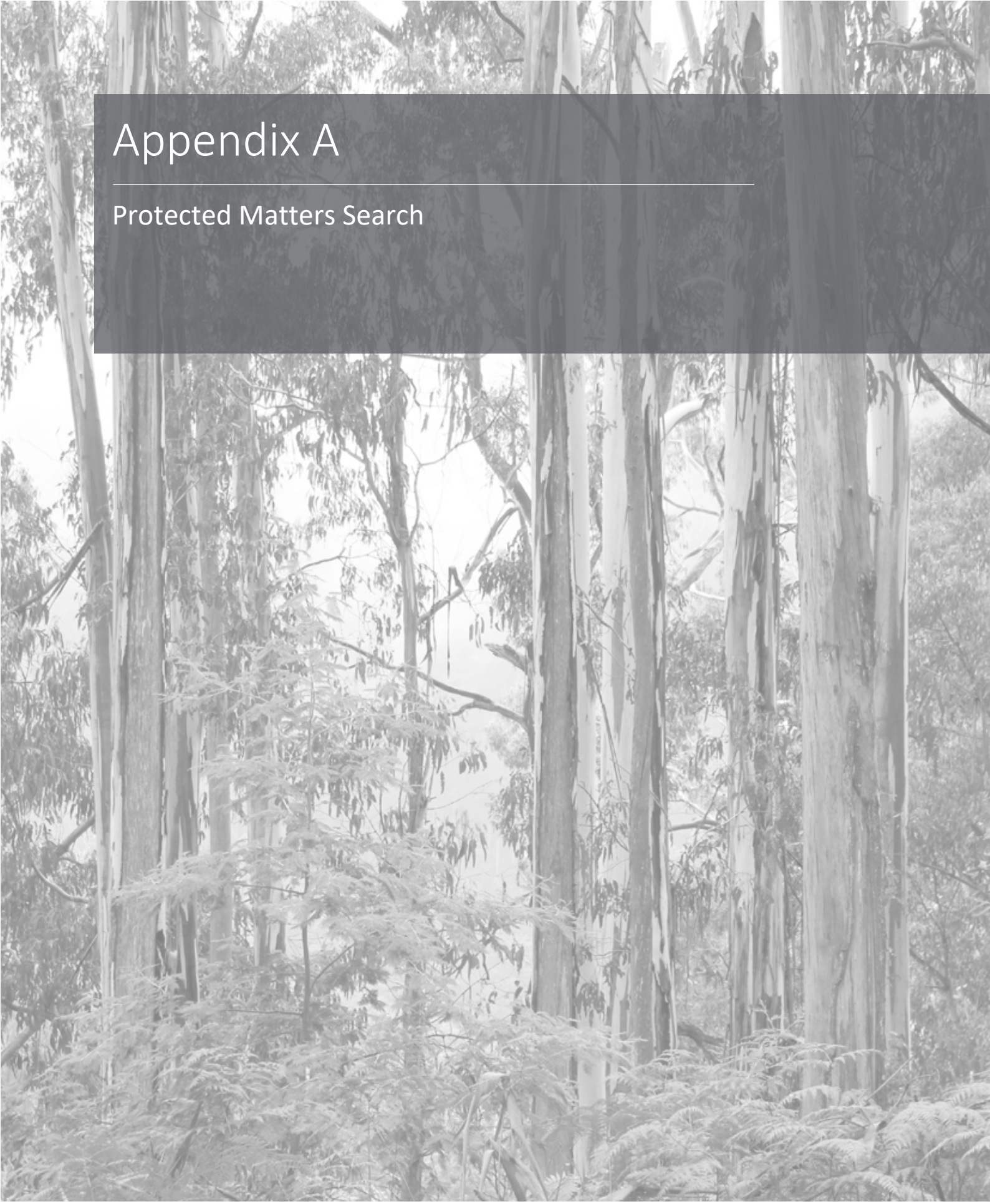

Appendix A

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.

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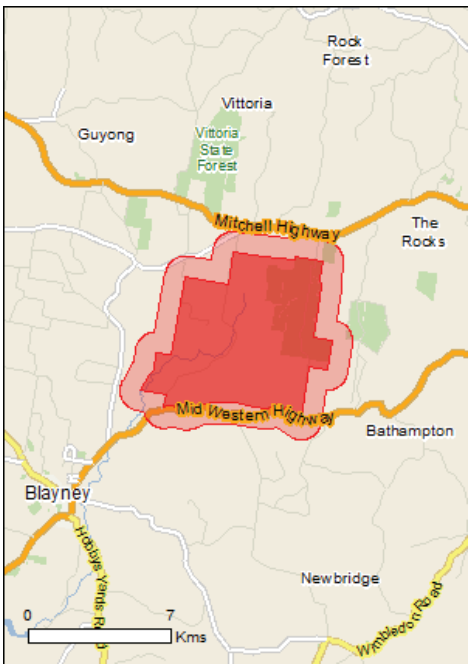

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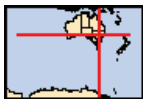

Summary

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:	29
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]

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]

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
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat likely 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

Name	Status	Type of Presence
		habitat known to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Fish		
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 likely to occur within area
Litoria castanea Yellow-spotted Tree Frog, Yellow-spotted Bell Frog [1848]	Critically Endangered	Species or species habitat likely to occur within area
Insects		
Synemon plana Golden Sun Moth [25234]	Critically Endangered	Species or species habitat may 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 likely to 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 subsp. tricolor Hoary Sunray, Grassland Paper-daisy [89104]	Endangered	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Swainsona recta Small Purple-pea, Mountain Swainson-pea, Small Purple Pea [7580]	Endangered	Species or species habitat may 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 likely to occur within area
Delma impar Striped Legless Lizard, Striped Snake-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]	Vulnerable	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 within area
Ardea ibis Cattle Egret [59542]		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
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		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]	Vulnerable	Species or species habitat likely to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	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]		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]	Critically Endangered	Species or species habitat may occur within

Name	Threatened	Type of Presence
		area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to 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		

Name	Status	Type of Presence
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
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

Name	Status	Type of Presence
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 149.36545,-33.44562 149.36538,-33.45164 149.36417,-33.45436 149.3646,-33.4661 149.36237,-33.47319 149.36126,-33.47448 149.36932,-33.48501 149.36727,-33.48379 149.35911,-33.50319 149.35576,-33.49925 149.34855,-33.49832 149.34521,-33.49939 149.34109,-33.49846 149.33568,-33.49725 149.32667,-33.49725 149.31997,-33.49775 149.31139,-33.49918 149.30727,-33.49954 149.30538,-33.49868 149.30195,-33.49832 149.298,-33.49896 149.29551,-33.49417 149.29637,-33.49259 149.28523,-33.48679 149.28918,-33.48522 149.29124,-33.4787 149.29193,-33.47921 149.29871,-33.45096 149.30506,-33.45375 149.32377,-33.44199 149.32606,-33.44493 149.35292,-33.44385 149.35318,-33.44557 149.36545

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.

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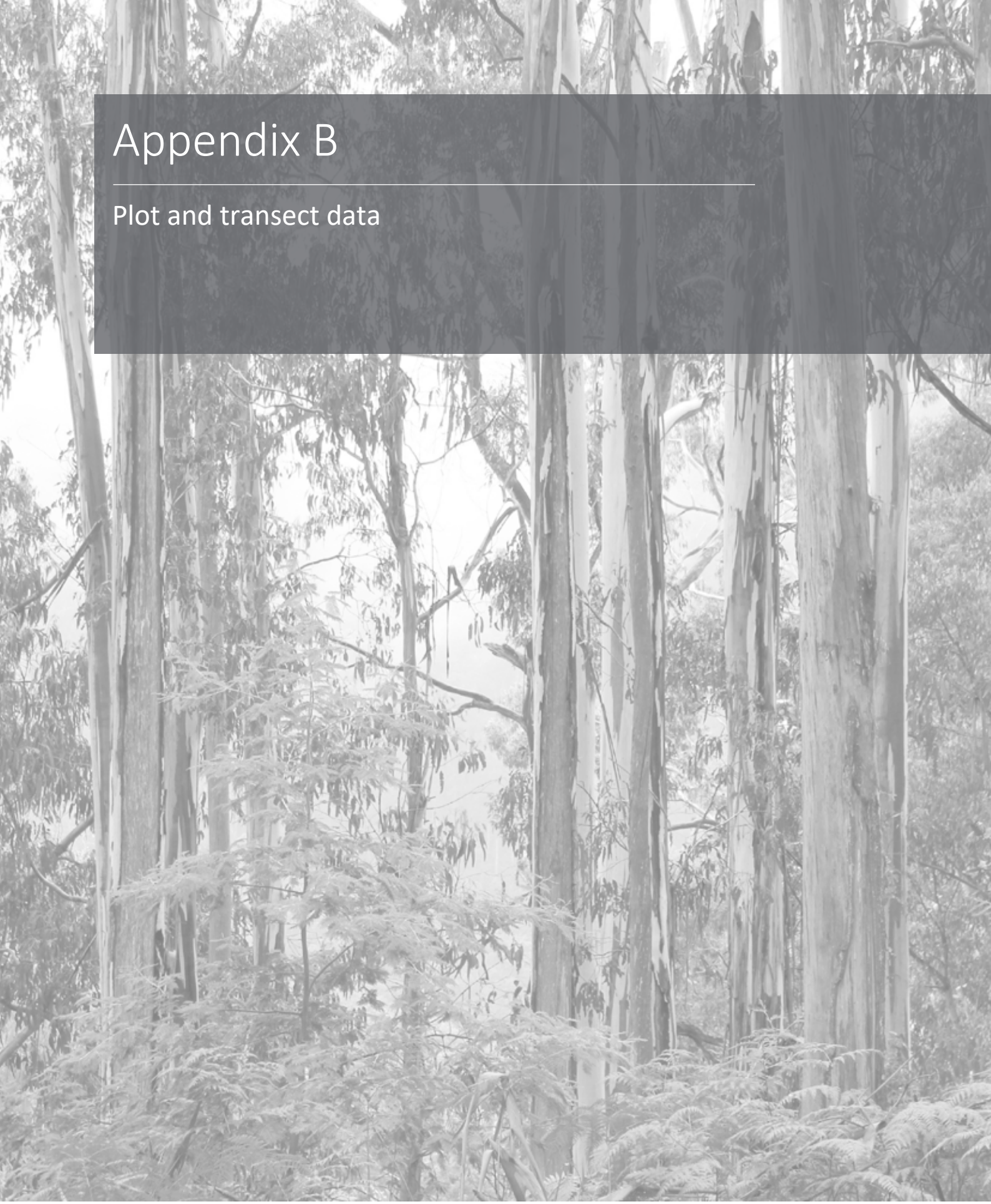


Appendix B

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

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
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
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

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
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
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

entered into 5123 PLOT 1 PCT 727

-This document has not been endorsed or approved by Office of Environment and Heritage or Muddy Boots Environmental Training-

400 m² plot: Sheet 1 of 1	Survey Name	Plot Identifier	Recorders
Date 12/3/19	McPhillamys	727/MG/Poor 1	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 tenuius	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	Dactylis glomeratus	E	0.1	3		
F	Einadia nutans	N	<0.1	1		
F	Desmodium varians	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 : JA80395	Proposal Name:	Zone ID:
Veg Type: 722 MG - POOR		
Coordinates: Start Transect Easting/Northing : -33.48843, 149.31964		
Coordinates: End Transect Easting/Northing : -33.88335, 149.319 294		

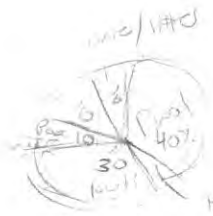
50 m Transect (every 5 m)	5	10	15	20	25	30	35	40	45	50	Avg (%)
Canopy Cover (% - see Specht)	40	15	20	0	10	60	40	15	5	55	0
Mid Storey Cover (shrubs > 1m)	—	—	—	—	—	—	—	—	—	—	0

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)	1			1	1		1	1	1	1				1	1	1	1			1	1					1		1				1	1	1			1														0
Exotic grasses																																																				0
Ground Cover (other)									1			1																								1								1		1		1				0
Exotic other																																																			0

Notes

Hollow-bearing trees - 1

Logs - 71



~~Ready to enter~~ Entered into 3123

Plot 2

-This document has not been endorsed or approved by Office of Environment and Heritage or Muddy Boots Environmental Training-

400 m² plot: Sheet 1 of 1	Survey Name	Plot Identifier	Recorders
Date 12/3/19	McPhillamys	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	Eucalyptus melliodora	N	40	2		
GG	Phalaris aquatica	E	40	40,000		
GG	Rytidosperma tenuius	N	30	30,000		
GG	Bromus sp. (dead)	E	<0.1	50		
FG	Einadia nutans	N	0.3	200		
GG	Bothriochloa macra	N	0.1	7		
FG	Desmodium varians	N	0.3	800		
FG	Chondrilla juncea	E	0.1	7		
GG	Carex sp. -(seed decomposed)	N	0.5	100		
GG	Poa sieberiana var. sieberiana	N	5	5,000		
FG	Cirsium vulgare	E	0.1	19		
FG	Oxalis perenens	N	<0.1	3		
GG	Anthosachne scaber	N	5	10,000		
FG	Hypochaeris radicata	E	0.1	9		
FG	Convolvulus angustissimus	N	<0.1	2		
GG	Dactylis glomeratus	E	<0.1	2		
FG	Modiola caroliniana	E	<0.1	2		
FG	Lactuca serriola	E	<0.1	1		
FG	Rumex sp -no seedhead	E	<0.1	1		
SG	Rosa rubiginosa	HTE	<0.1	1		
GG	Microlaena stipoides	N	<0.1	40		
FG	Dichondra species A	N	<0.1	5		
GG	Themeda triandra	N	<0.1	5		
GG	Cynosurus echinatus	E	<0.1	9		
GG	Juncus usitatus	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: J180395	Proposal Name:	Zone ID:
Veg Type: 654 MB 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 Specht)	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)																																																			0
Exotic shrubs (<1m)																																																				0
Ground Cover (grasses)				1	1			1					1	1			1			1	1	1	1		1					1	1	1	1		1				1	1		1	1			1			1	0
Exotic grasses	1	1	1	1	1							1		1	1	1		1	1	1								1														1			1	1			1	1		
Ground Cover (other)							1											1					1					1														1									0
Exotic other																																																			0

Notes

Hollow-bearing trees: 0
Logs: 39

Ready to enter
Entered into S123 PLOT 3 PCT 727

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400 m² plot: Sheet 1 of 1	Survey Name	Plot Identifier	Recorders
Date 12-03-2019	McPHILLAMYS	727-MEG-HIGH 3	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
T	EUCALYPTUS DIVES	N	30	20		
G	RYTIDOSPERMA PALLIDUM	N	20	150		
F	HIBBERTIA OBTUSIFOLIA	N	.2	5		
G	POA SIEBERIANA	N	5	50		
F	OXALIS PERRENANS	N	.1	1		
G	RYTIDOSPERMA TENUIUS	N	.3	50		
G	VULPIA BROMOIDES	E	.1	10		
T	EUCALYPTUS GONIOCALYX	N	25	10		
T	EUCALYPTUS MANNIFERA	N	.3	1		

	NATIVE RICHNESS	NATIVE COVER
TG	3	55.3
FG	2	0.3
GG	3	25.3

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 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, 149.34549		

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)																																																				0
Exotic shrubs (<1m)																																																				
Ground Cover (grasses)				1	1		1								1			1	1		1							1	1		1		1	1		1	1	1		1	1		1			1		1			0
Exotic grasses																																																			
Ground Cover (other)																																																			0
Exotic other																																																			0

Notes

Hollow-bearing trees – 1

Logs – 58

~~READ TO ENTER~~
ENTERED INTO S123

PCT 727-MG-ROR

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400 m² plot: Sheet 1 of 1	Survey Name	Plot Identifier	Recorders
Date: 13-03-2019	J180315	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 MELLIODORA	N	70	7		
TG	EUCALYPTUS BRIDGESIANA	N	5	1		
FG	CIRSIUM VULGARE	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	RYTIDOSPERMA TENUIUS	N	.1	10		
GG	ELEUSINE TRISTACHYA	E	.1	5		
GG	DACTYLIS GLOMERATUS	E	.2	20		
FG	POLYGONUM PLEBEIUM	N	.1	2		
FG	SINADIA NUTANS	N	.1	2		
FG	SOLANUM NIGRUM	E	.1	1		
	NATIVE RICHNESS	NATIVE COVER				
	TG - 2	- 75				
	FG - 2.2	- 0.2				
	GG - 1.1	- 0.1				
	HTE RICHNESS	NATIVE 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, ...

)4 4 13/3/19

Biobanking Plot Sheet - Transect

Proposal ID : 1190595	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)																																																				
Ground Cover (grasses)																																																			0
Exotic grasses				1																																														
Ground Cover (other)																																																			0
Exotic other																																																			0

Notes

Mostly background flora
Hollow bearing trees: 0
Logs: 1m

READY TO ENTER
ENTERED INTO SURVEY 123

-This document has not been endorsed or approved by Office of Environment and Heritage or Muddy Boots Environmental Training-

400 m² 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	CIRSIUM 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 SERRIOLA	E	.1	2		
FG	TARAXICUM OFFICINALE	E	.1	2		
GG	POACEAE INDETERMINATE	-	40	5000		
GG	JUNCUS USITATUS	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)																																																			
Ground Cover (grasses)																																																			0
Exotic grasses																																																			
Ground Cover (other)																																																			0
Exotic other																																																			0

Notes

READY TO ENTER.
ENTERED INTO S123 PCT 654

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400 m² plot: Sheet 1 of 1	Survey Name	Plot Identifier	Recorders
Date 13/03/19	J180315	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	.1	200		
GG	ANTHOSACHNE SCABER	N	.1	1000		
GG	MICROLAENA STIPOIDES	N	.8	1600		
GG	VULPIA SP	E	.2	1600		
GG	JUNCUS SP	N	.1	1		
GG	CAREX SP	N	.1	30		
FG	CHONDRILLA JUNCEA	E	.1	4		
GG	LOMANDRA FILIFORMIS	N	.1	2		
GG	PHALARIS AQUATICA	E	.1	3		
FG	POLYGONUM PLEBEIUM	N	.1	2		
GG	BROMUS CATHARTICUS	E	.1	400		
	NATIVE RICHNESS SUM NATIVE COVER					
	TG = 2 26					
	GG = 4 1.1					
	FG = 1 .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, 9, ..., 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 : VI80595	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)												1																																							0
Exotic grasses								1																																							1					
Ground Cover (other)																																																			0
Exotic other																																																			0

Notes

mostly litter & bare ground.
Hollows – 1
Logs – 42

READY TO ENTER ENTERED INTO SIS
PCT GSW

-This document has not been endorsed or approved by Office of Environment and Heritage or Muddy Boots Environmental Training-

400 m² 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 MELIODORA	N	22	1		
GG	RYTIDOSPERMA TENUIUS	N	8	2000		
FG	HYPOCHAERIS RADICATA	E	8	3000		
GG	MICROLAENA STIPOIDES	N	4	2000		
GG	EUCHITON SPHAERICUS	N	.1	10		
GG	ELEUSINE TRISTACHYA	E	.1	1		
GG	PHALARIS AQUATICA	E	1	60		
FG	RUBUS FRUTICOSA AGGREGATE	HTE	.1	1		

NATIVE RICHNESS	SUM OF NATIVE COVER
TG - 1	22
GG - 3	13
FG - 0	0

HTE RICHNESS	SUM OF HTE COVER
FG - 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

SGW + RP

PLOT 7

Biobanking Plot Sheet - Transect

Proposal ID: 1180395	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 Specht)	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)	1						1	1	1					1	1	1		1		1	1	1	1			1		1	1				1								1			1				1			1	0
Exotic grasses																																																				
Ground Cover (other)																																																			0
Exotic other																																																	1			0

Notes

MOSTLY BARE GROUND + LITTER.

Hollow Bearing trees — 0

Logs — 4

PLOT 8 PCT 654

Ready to entered into 5123

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400 m² plot: Sheet 1 of 1	Survey Name	Plot Identifier	Recorders
Date 14/3/17	McPhillamys	8	RP & SGL

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 melliodora	N	45	7		
G	Agrostis stolonifera	E	10	>10,000		
G	Microlaena stipoides	N	<0.1	15		
G	Holcus lanatus	E	2.5	43		
F	Desmodium varians ✓	N	0.1	9		
G	Rytidosperma tenuius	N	<0.1	10		
G	Lomandra filiformis	N	0.1	13		
F	Einadia nutans subsp. nutans	N	0.6	19		
G	Carex bichenoviana	N	0.3	50		
G	Poa sp -no seed head.	N	0.1	35		
G	Austrostipa sp.	N	<0.1	8		
S	Rubus fruticosus agg.	HTE	<0.1	4		
G	Rytidosperma racemosum	N	<0.1	3		
F	Dichondra repens	N	<0.1	1		
S	Acacia dealbata subsp. dealbata	N	<0.1	1		
F	Chondrilla juncea	E	<0.1	1		
	NATIVE RICHNESS NATIVE COVER					
	T = 1 = 45					
	F = 2 = 0.7					
	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, ...

SGW + 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 Specht)	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	%
Ground Cover (shrubs < 1m)																																																			0
Exotic shrubs (<1m)																																																				
Ground Cover (grasses)			1			1																						1																							1		0
Exotic grasses	1	1			1										1															1	1																	1	1			
Ground Cover (other)																					1				1																											0
Exotic other																																																			0

Notes

Hollow-bearing trees - 0

Logs - 0

~~Eucalyptus melliodora~~

READY TO ENTER
ENTERED INTO 3123

PLOT
PCT 727

-This document has not been endorsed or approved by Office of Environment and Heritage or Muddy Boots Environmental Training-

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 19/3/14	McPhillamys	9	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	Euca gomiocalyx	N	39	13		
T	Euca dives	N	18	6		
G	Vulpia sp	E	1	200		
G	Rytidosperma tenuius	N	6.3	1000		
G	Anthosachne scabra	N	<0.1	7		
G	Lolium perenne	E	<0.1	2		
G	Cynosurus echinatus	E	<0.1	1		
G	Lomandra filiformis (20=0.1)	N	0.4	127		
G	Poa sp - no seed head	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 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 9 1/3/19

Biobanking Plot Sheet - Transect

Proposal ID : J180395	**Proposal Name:**	**Zone ID:**
Veg Type: E. Goniocalyx & E. dives		
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)	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)																				1																															
Ground Cover (grasses)																																																			0
Exotic grasses																																																			
Ground Cover (other)																																									1										0
Exotic other																																								1											0

Notes

No mid storey

Very little groundlayer.

Hollow bearing trees – 5

Logs – 191

READY TO ENTER

PLOT 10 ENTERED INTO S123 PCT 054

-This document has not been endorsed or approved by Office of Environment and Heritage or Muddy Boots Environmental Training-

400 m² plot: Sheet 1 of 1	Survey Name	Plot Identifier	Recorders
Date 14/3/19	McPhillamys	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	Eucalyptus bridgesiana	N	10	2		
G	Chloris gayana	HTE	15	6000		
G	Rytidosperma carphoides	N	5	2000		
G	Lolium perenne	E	0.2	500		
F	Einadia nutans	N	0.1	1		
F	Hypochaeris radicata	E	0.1	2		
G	Ehrharta erecta	E	0.1	20		
G	Anthosachne scabra	N	0.1	1		
F	Poa labillardieri var. labillardieri	N	0.1	4		
G	Austrostipa scabra	N	0.1	3		
G	Rytidosperma tenuius	N	5	1900		
G	Phalaris aquatica	E	0.1	20		
G	Juncus usitatus	E	0.1	3		
	NATIVE RICHNESS	NATIVE COVER%				
	T – 1	10	HTE	15	6000	
	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 : J190395	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	
Mid Storey Cover (shrubs > 1m)	–	–	–	–	–	–	–	–	–	–	0
											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)																																																			0
Ground Cover (grasses)																																																			
Exotic grasses	1		1	1	1	1	1						1	1	1																				1																0
Ground Cover (other)																																																			
Exotic other																																																			0
																																																		0

Notes

Hollow-bearing trees – 1

Logs – 53

PCT 727

PLOT 11

-This document has not been endorsed or approved by Office of Environment and Heritage or Muddy Boots Environmental Training-

V80395

400 m² plot: Sheet 1 of 1	Survey Name	Plot Identifier	Recorders
Date 15/3/19	McPhillamys	11	RP & SN

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 goniocalyx	N	10	1		
Go	Rytidosperma - tenuiusc	N	7	4000		
G	Anthosachne scaber	N	1	4000		
G	Microlaena stipoides	N	1.5	800		
F	Chandnla juncea	E	<0.1	1		
F	Oxalis perrans	EN	<0.1	1		
G	Lomandra filiformis	N	<0.1	4		
G	Vulpia 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 sp.+ - Same as Lomandra sp.		<0.1	10		
S	Rubus fruticosa aggregate	HTE	<0.1	1		
F	Erodium sp.	N	<0.1	3		
F	Polygonum plebeium	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

J190395 15/3/19

Biobanking Plot Sheet - Transect

Proposal ID :	Proposal Name:	Zone ID:
Veg Type: E. Goniocalyx & dives		
Coordinates: Start Transect Easting/Northing :		
Coordinates: End Transect Easting/Northing :		

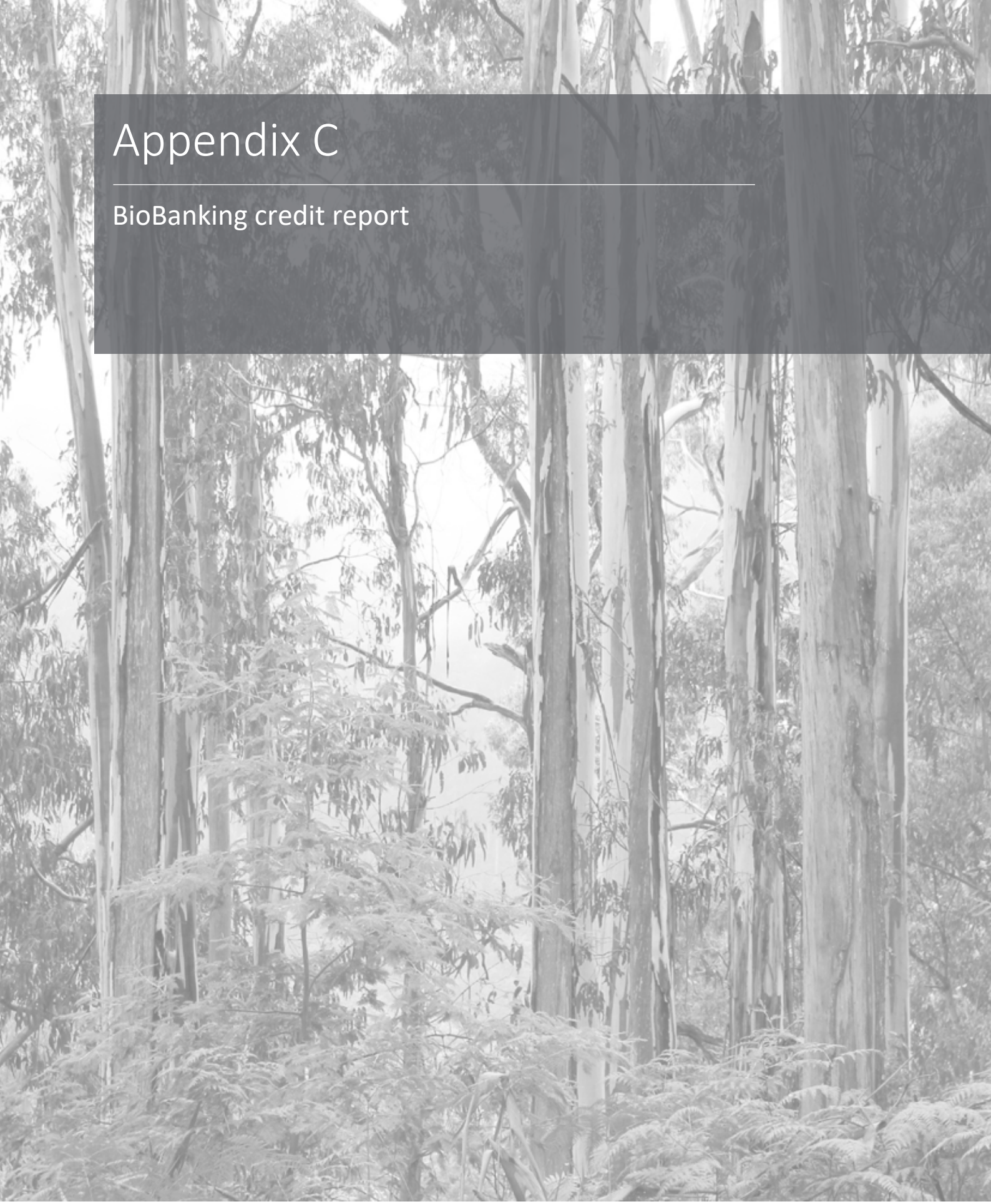
50 m Transect (every 5 m)	5	10	15	20	25	30	35	40	45	50	Avg (%)
Canopy Cover (% - see Specht)	15	15	5	5	20	15	10	20	40	40	
Mid Storey Cover (shrubs > 1m)	—	—	—	—	—	—	—	—	—	—	0
											0

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)																																																			0
Ground Cover (grasses)	1							1		1		1					1			1				1		1	1	1	1																							
Exotic grasses																																								1				1			1	1	1	0
Ground Cover (other)																																																		
Exotic other																																																		0
																																																	0

Notes

Hollow-bearing trees — 9

Logs — 142



Appendix C

BioBanking credit report

BioBanking Credit Calculator

Ecosystem credits

Proposal ID :	196/2020/5079D
Proposal name :	McPhillamys Gold Project EIS
Assessor name :	Katie Whiting
Assessor accreditation number :	196
Tool version :	v4.0
Report created :	25/08/2020 17:16

Assessment circle name	Landscape score	Vegetation zone name	Vegetation type name	Condition	Red flag status	Management zone name	Management zone area	Current site value	Future site value	Loss in site value	Credit required for bio diversity	Credit required for TS	TS with highest credit requirement	Average species loss	Species TG Value	Final credit requirement for management zone
1	23.20	LA276_Moderate/Good_High	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	Moderate/Good_High	No	1	1.47	16.67	0.00	16.67	0	27	Little Lorikeet	22.22	3.00	27
1	23.20	LA276_Moderate/Good_Medium	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	Moderate/Good_Medium	Yes	1	18.96	58.85	0.00	58.85	0	947	Little Lorikeet	33.33	3.00	947
1	23.20	LA276_Moderate/Good_Poor	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	Moderate/Good_Poor	Yes	1	24.65	58.85	0.00	58.85	0	1,231	Little Lorikeet	33.33	3.00	1,231
1	23.20	LA276_Moderate/Good_Other	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	Moderate/Good_Other	Yes	1	0.76	44.27	0.00	44.27	0	30	Little Lorikeet	33.33	3.00	30
1	23.20	LA124_Moderate/Good_High	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion	Moderate/Good_High	No	1	2.84	71.88	0.00	71.88	0	0		0.00	0.00	68
1	23.20	LA124_Moderate/Good_Medium	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion	Moderate/Good_Medium	No	1	35.54	61.98	0.00	61.98	0	0		0.00	0.00	757
1	23.20	LA124_Moderate/Good_Poor	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion	Moderate/Good_Poor	No	1	10.40	52.08	0.00	52.08	0	0		0.00	0.00	196
1	23.20	LA164_Moderate/Good_Poor	Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion	Moderate/Good_Poor	Yes	1	32.73	46.00	0.00	46.00	0	0		0.00	0.00	566

Assessment circle name	Landscape score	Vegetation zone name	Vegetation type name	Condition	Red flag status	Management zone name	Management zone area	Current site value	Future site value	Loss in site value	Credit required for bio diversity	Credit required for TS	TS with highest credit requirement	Average species loss	Species TG Value	Final credit requirement for management zone
1	23.20	LA130_Moderate/Good_Poor	Carex sedgeland of the slopes and tablelands	Moderate/Good_Poor	No	1	3.04	31.16	0.00	31.16	0	0		0.00	0.00	41
1	23.20	LA276_Low	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	Low	No	1	986.79	9.38	0.00	9.38	0	0		0.00	0.00	8,037
1	23.20	LA124_Low	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion	Low	No	1	986.79	7.81	0.00	7.81	0	0		0.00	0.00	7,650
1	23.20	LA164_Low	Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion	Low	No	1	986.79	12.00	0.00	12.00	0	0		0.00	0.00	8,684

BioBanking Credit Calculator

Species credits

Proposal ID :	196/2020/5079D
Proposal name :	McPhillamys Gold Project EIS
Assessor name :	Katie Whiting
Assessor accreditation number :	196
Tool version :	v4.0
Report created :	25/08/2020 17:16

Scientific name	Common name	Species TG value	Identified population?	Can Id. popn. be offset?	Area / number of loss	Negligible loss	Red flag status	Number of credits
Petaurus norfolcensis	Squirrel Glider	2.20	No		127.35	9,999,999.00	No	2,802
Phascolarctos cinereus	Koala	2.60	No		116.95	9,999,999.00	No	3,041

BioBanking credit report

This report identifies the number and type of credits required at a DEVELOPMENT SITE.

Date of report: 25/08/2020 Time: 5:17:37PM Calculator version: v4.0

Development details

Proposal ID:	196/2020/5079D
Proposal name:	McPhillamys Gold Project EIS
Proposal address:	294 Dungeon Rd Kings Plain NSW 2799
Proponent name:	Regis Resources
Proponent address:	Level 2/512 Hay St Subiaco WA 6008
Proponent phone:	08 9442 2200
Assessor name:	Katie Whiting
Assessor address:	SUITE 1 20 CHANDOS ST St Leonards NSW 2065
Assessor phone:	02 9493 9500
Assessor accreditation:	196

Improving or maintaining biodiversity

An application for a red flag determination is required for the following red flag areas

Red flag	Reason
Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	Vegetation type being > 70% cleared; or it contains an endangered ecological community;
Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	Vegetation type being > 70% cleared; or it contains an endangered ecological community;
Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	Vegetation type being > 70% cleared; or it contains an endangered ecological community;
Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion	Vegetation type being > 70% cleared; or it contains an endangered ecological community;
Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion	Vegetation type being > 70% cleared; or it contains an endangered ecological community;
Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion	Vegetation type being > 70% cleared; or it contains an endangered ecological community;
Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion	Vegetation type being > 70% cleared; or it contains an endangered ecological community;
Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion	Vegetation type being > 70% cleared; or it contains an endangered ecological community;

The application for a red flag determination should address the criteria set out in the BioBanking Assessment Methodology. Please note that a biobanking statement cannot be issued unless the determination is approved.

Additional information required for approval:

☐ Change to percent cleared for a vegetation type/s

☐ Use of local benchmark

- [ ] Change negligible loss
- [ ] Expert report...
- [x] Request for additional gain in site value
- [ ] Predicted threatened species not on site
- [ ] Change threatened species response to gain (Tg value)

Little Lorikeet	Glossopsitta pusilla

Ecosystem credits summary

Plant Community type	Area (ha)	Credits required	Red flag
Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion	1,035.57	8,670.15	No
Carex sedgeland of the slopes and tablelands	3.04	41.31	No
Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion	986.79	8,683.75	No
Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion	32.73	566.23	Yes
Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	988.26	8,064.40	No
Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	44.37	2,208.00	Yes
Total	3,090.76	28,234	

Credit profiles

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

Number of ecosystem credits created 8,684

IBRA sub-region Orange - Lachlan

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

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

Number of ecosystem credits created 566

IBRA sub-region Orange - Lachlan

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

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

Number of ecosystem credits created 8,037

IBRA sub-region Orange - Lachlan

Offset options - vegetation types	Offset options - CMA 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)	Orange - Lachlan and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

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

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

Number of ecosystem credits created	2,235
IBRA sub-region	Orange - Lachlan

Offset options - vegetation types	Offset options - CMA sub-regions
Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion, (LA276) 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)	Orange - Lachlan and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

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

Number of ecosystem credits created	7,650
IBRA sub-region	Orange - Lachlan

Offset options - vegetation types	Offset options - CMA sub-regions
Apple Box - Broad-leaved Peppermint dry open forest of the South Eastern Highlands Bioregion, (LA101) Apple Box - Yellow Box - Argyle Apple dry open forest of the South Eastern Highlands Bioregion and NSW South Western Slopes Bioregion, (LA102) Blakely's Red Gum - Red Stringybark open forest on slopes and hills of the western slopes, (LA117) Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion, (LA124) Broad-leaved Peppermint - Mountain Gum dry open forest of the Central Tablelands area of the South Eastern Highlands Bioregion, (LA125) Mugga Ironbark - Red Stringybark - Long-leaved Box dry grass forest of the NSW South Western Slopes Bioregion, (LA167) Red Box - Tumbledown Gum - Red Stringybark - Long-leaved Box dry woodland, upper NSW South Western Slopes Bioregion, (LA251) Inland Scribbly Gum - Red Stringybark open forest on hills composed of silicous substrates in the mid-Murrumbidgee and upper Lachlan catchments mainly in the western South Eastern Highlands Bioregion, (LA242) Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in	Orange - Lachlan and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion, (LA234) 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)	

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

Number of ecosystem credits created	1,020
IBRA sub-region	Orange - Lachlan

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

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

Number of ecosystem credits created	41
IBRA sub-region	Orange - Lachlan

Offset options - vegetation types	Offset options - CMA 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

Species credits summary

Common name	Scientific name	Extent of impact Ha or individuals	Number of species credits created
Koala	Phascolarctos cinereus	116.95	3,041
Squirrel Glider	Petaurus norfolcensis	127.35	2,802