



Referral of proposed action

Project title: Kanmantoo Copper Mine Pit Expansion

1 Summary of proposed action

1.1 Short description

Hillgrove Resources Limited (Hillgrove) operates the Kanmantoo Copper Mine in South Australia. Hillgrove plan to increase the mine pit size by expanding the pit and Integrated Waste Landform (IWL) area, and therefore extending the disturbance footprint by 59.9 ha, comprising 12.75 ha of remnant native vegetation and 47.15 ha of non-native areas.

The remnant native vegetation that will be cleared includes the following ecological communities:

- *Environment Protection and Biodiversity Conservation Act 1999* (Cwth) (EPBC Act) listed *Peppermint Box (Eucalyptus odorata) Grassy Woodland of South Australia* (Class B) which is classified as critically endangered. The project will clear approximately 3.23 ha of this ecological community.
- Peppermint Box grassy woodland (Class C - degraded). The project will clear approximately 1.18 ha of this ecological community.
- 0.79 ha of unclassified Peppermint Box grassy woodland will be impacted by the proposed expansion.
- *Iron-grass Natural Temperate Grassland* (Class C), which exists as small isolated and degraded patches that are considered too degraded to represent the ecological community will also be cleared, totalling 3.75 ha.
- 1.04 ha of unclassified Iron-grass Temperate Grassland will be impacted by the proposed expansion.

Additional patches of class B and Class C Peppermint Box grassy woodland are present within the mining lease but will not be impacted by the proposed expansion. Additional patches of Class B Iron-grass Natural Temperate Grassland (listed under the EPBC Act) are present within the mining lease, although will not be impacted by the proposed expansion.

1.2 **Latitude and longitude** Please refer to Attachment A and C for the location of the project mining lease, with main coordinates provided below, in UTM (WGS84) Zone 54H.

Easting	Northing	Boundary
317439.4	6116478.0	N_Central
318246.9	6116400.0	NE
318562.3	6115181.0	E_Central
317318.0	6116203.9	N_Central_2
318430.1	6114408.5	ESE
318130.8	6113962.7	ESE2
317865.5	6113832.3	SE
317033.9	6114597.8	S_Central
315947.7	6114997.1	SW
316644.4	6116517.4	NW

1.3	Locality and property description	<p>The Kanmantoo Copper Mine is located 1.5 km southwest of Kanmantoo, 4 km northwest of Callington, and 44 km east of Adelaide in the southern Mount Lofty Ranges of South Australia (Attachment A). It has been operating since 2011. The southern extent of the Kanmantoo township has nine individual occupied properties, located within about 1 km of the mining lease (ML) boundary and represents the closest sensitive receptors to the project.</p> <p>The ML area has been historically impacted by the components of historical mining operations in particular the old pit, old waste rock dump and old tailings dam. Legacy issues associated with the previous mining operations include acid rock drainage (ARD) from waste rock, tailings and pit walls and the high visual impact of the mine components. The landscape is rural, with a dominance of agricultural land and smaller areas of remnant native vegetation, and is characterised by undulating ridges with steep slopes punctuated by low-lying valleys and creek lines. The long history of farming, grazing and previous mining operations in the region has resulted in the clearing of large areas of native vegetation for crops, pasture and planted vegetation. As a result, remnant native vegetation is generally restricted to areas that have not been used for agricultural activities.</p>
1.4	Size of the development footprint or work area (hectares)	The footprint of the mine pit and IWL expansion covers an area of 59.90 ha from that currently developed, and remains within the approved mining lease area.
1.5	Street address of the site	Éclair Mine Road (cnr Back Callington Road), Kanmantoo SA 5252
1.6	Lot description	<p>The mine footprint and associated infrastructure are located within a 436-ha area, which is covered by Mining Lease 6345.</p> <p>The underlying tenure of the ML area comprises three freehold land titles (Paringa station, old integrated landfill and Paringa smelter block) that are held by Hillgrove's wholly owned subsidiary, Kanmantoo Properties Pty Limited.</p>

1.7	Local Government Area and Council contact (if known)	The Kanmantoo Copper Mine lies within the Mount Barker District Council, in South Australia.	
1.8	Time frame	<ul style="list-style-type: none"> Hillgrove propose to commence the expansion immediately following obtaining of approval from both state and Australian Government regulators, within 2013. 	
1.9	Alternatives to proposed action	X	No
			Yes, you must also complete section 2.2
1.10	Alternative time frames etc	X	No – refer to Section 1.8
			Yes, you must also complete Section 2.3. For each alternative, location, time frame, or activity identified, you must also complete details in Sections 1.2-1.9, 2.4-2.7 and 3.3 (where relevant).
1.11	State assessment		No
		X	Yes, you must also complete Section 2.5
1.12	Component of larger action		
		X	Yes, you must also complete Section 2.7
1.13	Related actions/proposals	X	No
			Yes, provide details:
1.14	Australian Government funding	X	No
			Yes, provide details:
1.15	Great Barrier Reef Marine Park	X	No
	Is the proposed action inside the Great Barrier Reef Marine Park?		Yes, you must also complete Section 3.1 (h), 3.2 (e)

2 Detailed description of proposed action

2.1 Description of proposed action

Hillgrove have been operating the Kanmantoo Copper Mine since 2011. Prior to this, the mine was operated from 1971 before closing in 1976 and was owned by a consortium comprising EZ Industries Limited, North Broken Hill Limited and South Broken Hill Limited.

An original EPBC referral (reference 2007/3314) for re-development and operation of the Kanmantoo Copper Mine by Hillgrove was approved by the Minister for the Environment and Water Resources in March 2007. The original referral covered the open pit(s), waste rock storage facility, tailing facility and associated infrastructure, and did not include areas within the footprint of the proposed expansion of the mine pit and IWL. The original referral was deemed not a controlled action and, as such, did not require assessment and approval by the Minister before it could proceed. Note that the two threatened ecological communities present within the mining lease had been nominated but were yet to be listed under the EPBC Act at the time of the decision.

Work on the redevelopment and infrastructure commenced in 2010 and was completed in 2011. Mining commenced in 2011. To realise additional resources available at depth, expansion of the mine is proposed to include the following:

- Increased capacity and subsequent footprint expansion of the tailings storage facility and integrated waste storage facility.
- Increased pit areas to access previously undefined mineral deposits
- Increased pit depth and footprint, to maintain slope stability.

Attachment D presents the proposed and existing footprint of disturbance which represents an additional 59.90 ha of disturbance. This comprises 12.75 ha of native vegetation with the remainder comprising abandoned cropping land and non-native dominated areas.

The mining methods and infrastructure originally planned and approved under the original EPBC referral have not changed significantly. Table 1 summarises the original planned mine infrastructure components and methods, and highlights any changes to be considered under this referral.

Table 1 Summary of mine infrastructure and methods of the original EPBC referral, and the proposed changes to be assessed under this referral

Mine Infrastructure Component/ Method	Description of Component Approved Under the Original EPBC Referral (Ref 2007/3314) (Approved 30 March 2007)	Proposed Mine Pit Expansion Action For Assessment)
Mine Pit(s) and associated areas	<ul style="list-style-type: none"> • Open pit with potential to develop other satellite pits (44.34 ha). 	<ul style="list-style-type: none"> • Expansion of the open pit footprint to access resources at lower elevations, maintaining required pit wall stability. These areas were previously identified as potential satellite pits. Additional footprint of 23.65 ha.
Mining Method	<ul style="list-style-type: none"> • Open cut using standard drill, blast, load and haul techniques. 	<ul style="list-style-type: none"> • No change.
Mining Rate	<ul style="list-style-type: none"> • Total open pit rate of 2 Mt/a. 	<ul style="list-style-type: none"> • No change.
Ore Processing	<ul style="list-style-type: none"> • Conventional crushing, grinding and flotation to produce a copper concentrate (containing some gold). 	<ul style="list-style-type: none"> • No change.

Mine Infrastructure Component/ Method	Description of Component Approved Under the Original EPBC Referral (Ref 2007/3314) (Approved 30 March 2007)	Proposed Mine Pit Expansion Action For Assessment)
Processing Plant Operations	<ul style="list-style-type: none"> Designed to be operational 365 days per year, 24 hours per day. 	<ul style="list-style-type: none"> No change.
Ore Transport	<ul style="list-style-type: none"> Road transport to port for export to offshore copper smelters. 	<ul style="list-style-type: none"> No change.
Processing Operations	<ul style="list-style-type: none"> Primary crushing, coarse ore storage and reclaim, grinding and classification, copper flotation, concentrate thickening, filtration, storage and dispatch, tailings thickening and disposal to a tailings storage facility, reagent mixing, storage and distribution. 	<ul style="list-style-type: none"> No change.
Site Access Road	<ul style="list-style-type: none"> Utilises the southern section of Mine Road, which farther south becomes Eclair Mine Road. The route then follows the Back Callington Road east towards Callington and onto the South Eastern Freeway. 	<ul style="list-style-type: none"> No change.
Water Supply	<ul style="list-style-type: none"> Water supply pipeline. 	<ul style="list-style-type: none"> No change.
Power Supply	<ul style="list-style-type: none"> Power transmission line from the existing Kanmantoo substation. 	<ul style="list-style-type: none"> No change.
Tailings Storage	<ul style="list-style-type: none"> TSF located to the northwest of the pit Footprint of approximately 50 ha. Constructed using the Integrated Landform method. Tailings from the processing plant will be produced at a rate of approximately 1.9 Mt/a. Staged embankment construction. 	<ul style="list-style-type: none"> Footprint increase of 36.3 ha, including a section of patch 14, <i>E. odorata</i> Class B grassy woodland, as shown in Attachment D.
Tailings	<ul style="list-style-type: none"> Tailings thickened to minimise the volume of water discharged into the TSF. Water management designed to minimise the area and duration of ponding of water on the surface of the TSF to minimise potential attraction of migratory wetlands birds. 	<ul style="list-style-type: none"> No change.
Waste Rock Stockpile	<ul style="list-style-type: none"> Waste rock stockpile (WRS) to be located to the west of the open pit. WRS footprint approximately 100 ha (incorporating the TSF). Developed as a lift and an extension to the existing stockpile developed during the last mining phase in the 1970's. Located to the west of the open pit. 	<ul style="list-style-type: none"> Reduction of 5.47 ha of the waste rock storage area footprint by increasing storage height.
Life of Mine	2010-2016	2010-2019
Total volume of ore mined (Mt)	12 Mt	21 Mt

Mine Infrastructure Component/ Method	Description of Component Approved Under the Original EPBC Referral (Ref 2007/3314) (Approved 30 March 2007)	Proposed Mine Pit Expansion Action For Assessment)
Workforce	Around 150 people during operations and over 200 during construction	Around 150 people during operations
Hours of operation	Continuous, 24 hours per day, 365 days per year	Continuous, 24 hours per day, 365 days per year
Mining Lease area	436 ha	Unchanged
Native Vegetation Clearance	14.6 ha (when adjusted for previously unconsolidated areas pre 2011 disturbance including roadways, hardstanding etc.)	Additional 12.75 ha

2.2 Alternatives to taking the proposed action

Expansion of the pit is required to access deeper resources and to comply with safety requirements for pit wall stability.

There is no alternative location for the proposed expansion of the mine pit.

Although a secondary separate pit has been considered, this would increase the disturbance footprint significantly, and would require additional clearance of listed communities.

The only alternative is to not undertake the expansion of the mine pit. This will reduce the resource available to Hillgrove and result in a reduced life of mine, with a subsequent reduction in the socio-economic benefits of the project.

2.3 Alternative locations, time frames or activities that form part of the referred action

The location of the project is constrained by the location of the ore body and the existing infrastructure. Therefore, there are no feasible alternative locations, timeframes or activities for the referred action.

2.4 Context, planning framework and state/local government requirements

State Government

Mining Act 1971 (SA)

To comply with requirements under the *Mining Act 1971 (SA)* and the SA Department of Manufacturing, Innovation, Trade, Resources and Energy (DMITRE) guidelines, to expand the mine pit, Hillgrove have completed licensing requirements for the existing operations, with negotiations currently underway in regards to the proposed expansion. This comprises the development and subsequent revision of a Program for Environmental Protection and Rehabilitation (PEPR) which is assessed and approved by DMITRE.

Native Vegetation Act 1991

Vegetation clearance associated with mining exploration activities has an exemption under the South Australian *Native Vegetation Act 1991* (Regulation 5(1)(zc)), and native vegetation may be cleared in accordance within the guidelines of the Act for approved exploration and mining projects. This includes native vegetation on land that is subject to a native vegetation heritage agreement. DMITRE (as the delegated authority with respect to mining operations) must be confident that a management plan has been developed to provide either a significant environmental benefit (SEB) on the site or within the same region of the state prior to authorising the clearance of any native vegetation for the project.

Environment Protection Act 1993

The *Environment Protection Act 1993* provides for the protection of the environment and is administered by the Environment Protection Authority (EPA). Under this Act, mining and mineral processing is a prescribed activity and requires an environmental authorisation in the form of a works approval and/or licence from the EPA to proceed. The project's PEPR provides necessary information to support environmental authorisations.

Planning Frameworks

The following state government planning frameworks apply to the region:

The policy document *No Species Loss: A Nature Conservation Strategy for South Australia 2007-2017*, defines planning strategies to protect the State's ecosystems, while recognising that some of the damage already caused may take hundreds of years to repair. Various state government departments are responsible for delivering the strategy, including DMITRE. A key recommendation of the strategy is that industry is assisted to strengthen and implement mutually beneficial biodiversity considerations into industry-based environmental management policies, operational practices, performance standards and codes of practice, and regional plans (e.g. with the agriculture, forestry, horticulture, fisheries, aquaculture, mining and tourism sectors) (DEH, 2007)

The Kanmantoo area lies at the edge of the boundaries of the *Regional Recovery Plan for Threatened Species and Ecological Communities of Adelaide and the Mount Lofty Ranges, South Australia* (Willson and Bignall, 2009). The regional recovery plan attempts to integrate regional scale of threat abatement activities for improved threatened species and ecological community recovery, with management actions derived from a series of species-based analyses (relating to threats, knowledge gaps and impediments to recovery). Nationally threatened flora species identified in the EPBC Protected Matters Report as potentially occurring at Kanmantoo and covered under the regionally recovery plan are: *Acacia menzeli* (Menzel's wattle), *Caladenia colorata* (coloured spider-orchid), *Euphrasia collina* ssp. *osbornii* (Osborn's eyebright), *Glycine latrobeana* (clover Glycine), *Olearia pannosa* ssp. *pannosa* (silver daisy bush), *Prasophyllum pallidum* (pale leek-orchid), and *Thelymitra cyanapicta* (blue top sun-orchid). Threatened fauna identified as potentially occurring at Kanmantoo, and covered by the regional recovery plan are: *Botaurus poiciloptilus* (Australasian bittern), *Cinclosoma punctatum anachoreta* (spotted quail-thrush), *Craterocephalus fluviatilis* (Murray hardyhead), and *Isodon obesulus obesulus* (southern brown bandicoot).

In addition to the regional recovery pilot, the area falls within the boundaries of DENR's *Biodiversity Plan for the South Australian Murray-Darling Basin* (DEH, 2001). The plan provides a strategic basis for prioritising biodiversity conservation decisions in the region, and provides information to assist effective and coordinated action by land managers to conserve biodiversity in the region. The Biodiversity Plan identifies the Kanmantoo Copper Mine area falling within the boundaries of the Eastern Mount Lofty Ranges Regional Ecological Area. The Biodiversity Plan recommendations for the conservation and management of biodiversity are centred around retaining, restoring, re-establishing and managing remnant native vegetation, threatened plant communities, with a focus on providing links and buffers between existing habitat (Kahrmanis *et al.*, 2001).

Local Government

No planning approval is required from Council for the mine pit expansion as DMITRE are the appointed state regulatory body whom assess and approve new mines and amendments. A number of stakeholders, including local government are consulted through DMITRE, as required.

2.5 Environmental impact assessments under Commonwealth, state or territory legislation

The project's PEPR comprises a comprehensive environmental impact assessment which includes assessments under state legislation. The DMITRE are the state governing body for approvals and environmental management practices for the Kanmantoo Copper Mine.

A copy of the approved PEPR (and historical approvals documentation) is available for viewing via the DMITRE website at the following location:

http://www.minerals.dmitre.sa.gov.au/mines_and_developing_projects/approved_mines/kanmantoo

The original project was approved in 2009, with mining commencing in 2010. An approved Native Vegetation Management Plan has been in place for the project since construction and mining operations began. Studies are well advanced to finalise the proposed mine expansion, with a revised Program for Environmental Protection and Rehabilitation submitted as a draft to DMITRE.

A revised Native Vegetation Management Plan has recently been submitted to DMITRE for approval, which includes detailed mitigation activities to create a significant environmental benefit (SEB) in relation to the proposed mining operations. This document is provided as a draft attachment to this referral and includes detailed offset calculations for rehabilitation and planting activities for each community at the site, including Peppermint box, together with details of environmental management practices, such as weed and pest control.

2.6 Public consultation (including with Indigenous stakeholders)

Public consultation has been undertaken to discuss the proposed mine expansion. As outlined in the PEPR, Hillgrove is committed to a community consultation program that will continue through the life of the mine. Part of this program involves continuing the relationship that Hillgrove have established with the Kanmantoo-Callington community consultation committee (KCCCC). The KCCCC was established in January 2007 and is chaired by an independent chairperson and a representative from Hillgrove is present for each meeting.

The minutes of each meeting are posted on the Hillgrove Resources website. Hillgrove also issues a Kanmantoo Community Newsletter that is designed to keep the local community informed on project activities with updates on progress at the mine site and surrounds. The newsletter can be received by mail or email after registering at the Hillgrove Resources website. Current and past issues of the newsletter are also available on the Hillgrove Resources website.

2.7 A staged development or component of a larger project

The proposed referral is part of the current life of mine for the Kanmantoo Copper Mine and represents an expansion following confirmation of additional resources at greater depths of the active mine pits, following on-going exploration activities.

3 Description of environment & likely impacts

3.1 Matters of national environmental significance

3.1 (a) World Heritage Properties

Description

The EPBC Protected Matters search did not identify any world heritage properties within or close to the mine pit expansion area.

Nature and extent of likely impact

Not applicable.

3.1 (b) National Heritage Places

Description

The EPBC Protected Matters search did not identify any national heritage places within or close to the mine pit expansion area.

Nature and extent of likely impact

Not applicable.

3.1 (c) Wetlands of International Importance (declared Ramsar wetlands)

Description

The EPBC Protected Matters search identified the Coorong and Lakes Alexandrina and Albert wetland of international significance occurring within the Kanmantoo Copper Mine downstream catchment.

The Coorong, Lake Alexandrina and Lake Albert lie approximately 30-50 km south of Kanmantoo. Drainage from the mine lease area reports eventually to the Bremer River, either via Dawesley Creek and Mount Barker Creek or via an unnamed ephemeral stream. The Bremer River has distinct annual high (winter and spring) and low (summer) flows, and runs south for about 40 km through Hartley and Langhorne Creek before discharging to Lake Alexandrina. Please refer to information presented in Section 3.3b for further information.

Nature and extent of likely impact

Extensive monitoring has been undertaken by Hillgrove Resources and government bodies to identify any potential influences of the Kanmantoo Copper mine on receiving waters. This monitoring has not identified significant adverse impacts upon downstream watercourses, which is reported to DMITRE through annual compliance reporting for the Kanmantoo Copper Mine. No adverse impacts have been identified from current mining activities upon the ecological character of Lake Alexandrina or the Coorong Ramsar Wetland.

The proposed action is not anticipated to increase the volume of water or sediment able to be mobilised from the site. Consideration of the significant impact criteria for wetlands of international importance (DEWHA, 2009) are discussed below:

An action is likely to have a significant impact on the ecological character of a declared Ramsar wetland if there is a real chance or possibility that it will result in:

- Areas of the wetland being destroyed or substantially modified. *Not relevant in the context of the proposed action.*
- A substantial and measurable change in the hydrological regime of the wetland, for example, a substantial change to the volume, timing, duration and frequency of ground and surface water flows to and within the wetland. *All mine affected water is recycled through an onsite processing plant, with no water discharged to the environment. As the proposed action represents an extension to the mine life, this is not anticipated to result in*

additional volumes of ground and surface water flows from the site in relation to current activities. Current monitoring is demonstrating that the Kanmantoo Copper Mine is not impacting upon the Coorong wetland of international importance.

- The habitat or lifecycle of native species, including invertebrate fauna and fish species, dependent upon the wetland being seriously affected. *Current monitoring is demonstrating that the Kanmantoo Copper Mine is not resulting in discharges to groundwater and surface waters which will significantly affect downstream watercourse, which ultimately includes the Coorong wetland of international importance. The proposed expansion is not anticipated to result in a significant impact to current surface and groundwater quality and quantity.*
- A substantial and measurable change in the water quality of the wetland – for example, a substantial change in the level of salinity, pollutants, or nutrients in the wetland, or water temperature which may adversely impact on biodiversity, ecological integrity, social amenity or human health. *Current monitoring is demonstrating that the Kanmantoo Copper Mine is not resulting in adverse impacts to downstream catchments resulting in discharges from the Kanmantoo Copper mine. The proposed expansion is not anticipated to result in a significant impact to current surface and groundwater quality and quantity.*
- An invasive species that is harmful to the ecological character of the wetland being established (or an existing invasive species being spread) in the wetland. *The proposed action is not anticipated to alter conditions which may benefit invasive species or lead to the release of an invasive species which has the potential to impact the Coorong wetland of international importance.*

3.1 (d) Listed threatened species and ecological communities

Peppermint Box Grassy Woodland of South Australia and Iron-grass Natural Temperate grassland of South Australia

The EPBC Protected Matters search identified threatened ecological communities as occurring within proximity to the mine pit expansion area. Table 2 shows details of the EPBC listed communities identified from the Protected Matters search. Field surveys, literature searches and additional assessments did not identify any other listed communities that may be present in the area.

Table 2 EPBC Act threatened ecological communities potentially occurring within the mine pit expansion area

Community Name	Likelihood of Occurrence	Occurrence Comments
Peppermint Box (<i>Eucalyptus odorata</i>) Grassy Woodland of South Australia Critically Endangered	Confirmed presence of Class B	<i>Eucalyptus odorata</i> woodlands have been recorded within the expansion area. The community meets the criteria of community condition class B with additional areas which do not meet the criteria, assessed as Class C.
Iron-grass Natural Temperate Grassland of South Australia	No Class A or B present.	No areas of Class A or B Iron-grass Natural Temperate Grassland of South Australia are present within the proposed expansion footprint. Only degraded patches of Iron-grass Natural Temperate Grassland of South Australia (Class C) are present within the proposed expansion footprint.

Eucalyptus odorata grassy woodland and *Lomandra effusa* grassland are plant associations that only occur in South Australia (DEH 2005a, 2005b). They are largely restricted to the Lofty Block region although they extend partially into adjoining bioregions including the Murray Darling Depression and the Flinders and Olary Ranges (Robertson 1998). Small remnants of *E. odorata* grassy woodland also occur on the southern Eyre Peninsula.

An EPBC Act policy statement has been prepared for Peppermint Box (*Eucalyptus odorata*) grassy woodland of South Australia and Iron grass Natural Temperate Grassland of South Australia (Department of the Environment and Water Resources, 2007). This community was listed after the Kanmantoo Copper Project was approved for construction and operation, in accordance with the projects Mining and Rehabilitation Plan (now Program for Environmental Protection and Rehabilitation (Coffey, 2011)).

A study was commissioned by Hillgrove Resources to ascertain the importance of Peppermint box grassy woodland and iron-grass natural temperate grassland communities within the Kanmantoo Copper Project's mining lease against its context in the broader Kanmantoo area (Ecological Associates, 2007). It is not considered likely that a significant reduction in Peppermint box grassy woodland would have occurred since this survey was undertaken, however, some clearance may have taken place. The Ecological Associated study comprised desktop and ground truthing of a study region defined as the area of the eastern Mount Lofty Ranges that includes the following catchments that drain into the River Murray; Bremer, Reedy Creek, Salt Creek, Preamimma Creek, Rocky Gully Creek, Bees Knees, Long Gully, Milendella Creek and Saunders Creek. With the exception of the Bees Knees catchment, all these catchments have mapped remnants of *E. odorata* woodland or forest and *Lomandra* spp. grassland.

This study identified *Eucalyptus odorata* woodland to be of restricted distribution in the Kanmantoo area, including the catchments of the Bremer River to Saunders Creek. Most remnant patches are small and isolated, are grazed by sheep and have an understorey dominated by introduced grasses. The largest remnants occur in the Kanmantoo area between the Princes Highway and the Back Callington Road, west of Mine Road. This includes the remnants within the Kanmantoo Copper mine area. The extent of Peppermint box grassy woodland which meets the criteria of the EPBC Act policy statement criteria is however unknown, as these guidelines, and listing of this community, was released after the survey and approval of the mine.

A targeted vegetation survey was undertaken in 2013 to classify the presence of any listed vegetation communities within the mining lease, with a focus upon areas proposed for expansion (Attachment E). The survey was primarily to determine whether remnant patches meet the criteria of the nationally threatened ecological communities (TEC) set out in the DEWHA document 'EPBC Act Policy Statement 3.7 Peppermint Box (*Eucalyptus odorata*) Grassy Woodland of South Australia and Iron-grass Natural Temperate Grassland of South Australia' (2007). This builds upon previous mapping of community boundaries as part of the original mine approval and impact assessment process.

Thirteen sites were assessed in the Peppermint box (*Eucalyptus odorata*) woodland remnants across the mine site, whilst four sites were assessed in the Iron-grass Grassland remnants. Seven Peppermint box (*Eucalyptus odorata*) woodland sites qualified as the TEC condition class B, whilst four qualified as condition class C which are regarded as degraded patches amenable to rehabilitation. Of the four Irongrass grassland sites assessed, two qualified as the TEC condition class B, and two qualified as condition class C which are regarded as degraded patches amenable to rehabilitation.

This information was used to calculate the area of Peppermint box (*Eucalyptus odorata*) woodland and Iron-grass grassland remnants impacted by the proposed expansion of the Kanmantoo Copper Mine. The additional expansion footprint would require the clearance of 3.23 ha of Class B Peppermint box grassy woodland. No Class A or B patches of Iron-grass listed community would be impacted by the proposed expansion. 1.18 ha Class C Peppermint box grassy woodland and 0.79 ha of unclassified Peppermint box woodland would also be cleared, together with 3.75 ha of Class C Iron-grass grassland 1.04 ha of unclassified Iron-grass grassland.

Proposed mitigation measures are discussed in Section 4, which include offset details to achieve a significant environmental benefit, together with rehabilitation of Class C Peppermint Box grassy woodlands within the mining lease. Planting of Peppermint box woodlands following closure are also proposed within the area of disturbance, which is discussed in Section 4.

Additional Ecological Investigations

Several ecological field surveys have been conducted at the Kanmantoo site. These include:

- 2004: Targeted survey for threatened flora species and weed species (Enesar, 2004).
- 2006 (Sept): Targeted survey for threatened flora species and weed species (Ecological Associates, 2006a)
- 2006 (Nov-Dec): Targeted surveys for EPBC nominated *Eucalyptus odorata* woodland and *Lomandra effusa* grassland (Ecological Associates, 2006b). The survey investigated the extent and condition of remnants, with a visual assessment of the size, cover and condition of the dominant overstorey species, the presence of native and introduced understorey species, the presence of other habitat components (logs, leaf litter, rocky outcrops). The management status of the remnant, patch size, and connectedness to other native vegetation was also noted.
- 2007 (Feb): Vegetation survey of the project site, assessment of potential impacts to flora from the project, identification of mitigation measures, recommendations for further investigations required (Ecological Associates, 2007a)
- 2007 (July): Targeted survey to identify the potential impacts on vegetation associated from the proposed road. The survey looked at route selection, and identified the vegetation types present (Ecological Associates, 2007b).
- 2007 (September): Targeted vegetation survey to identify total species diversity (repeating the February 2007 survey), and flag locations of state threatened orchids (for potential translocation if necessary) (Ecological Associates, 2007c).

Annual ecological monitoring has also been undertaken since 2006 and reported as part of the Mining and Rehabilitation Compliance Report (MARCR) submitted to DMITRE annually.

In 2006 a survey of *Eucalyptus odorata* woodland and *Lomandra effusa* grassland was undertaken (Ecological Associates, 2006b), noted that very few of the *Eucalyptus odorata* remnants support native understorey species, with native grass species such as *Austrodanthonia* and *Austrostipa* sparsely present and typically with a cover less than 10%. At the time of the survey, most patches were unfenced, and there was evidence of sheep using the remnants for shelter and degrading the understorey (Ecological Associates, 2006b).

A detailed vegetation survey, conducted in February 2007, identified 113 ha of native vegetation within the Kanmantoo site (Ecological Associates, 2007b). *Eucalyptus odorata* low woodland was the most extensive community. Other communities also identified included *Lomandra effusa* +/- *Helichrysum leucopsidium* open tussock grassland, patches of *Acacia pycnantha* low woodland, *Eucalyptus gracilis* +/- *Eucalyptus oleosa* open mallee, *Allocasuarina verticillata*, +/- *Callitris gracilis* +/- *Lomandra effusa* low woodland, *Eucalyptus leucoxydon* +/- *Lomandra effusa* open woodland, and *Callitris gracilis* low woodland. No national or state threatened species were recorded during the survey, despite the known presence of two state threatened orchids. Four regionally significant species were recorded. Condition of vegetation patches were recorded as a significant ecological benefit ratio (SEB ratio) as guidelines and listing of Peppermint box grassy woodlands and iron-grass natural temperate grasslands was not undertaken until after the survey. The 2013 survey updates this information by undertaking mapping in line with the EPBC Act Policy Guideline 3.7.

The September 2007 survey identified 14 native species and 22 introduced species not previously recorded for the Kanmantoo project site, bringing the total species list 243. No nationally threatened species were recorded, however two species of state conservation significance, *Ptilotus erubescens* (hairy tails), and *Diuris behrii* (Behr's cowslip orchid) were recorded and flagged (Ecological Associates, 2007c).

Fauna surveys and assessments at Kanmantoo have included a desktop review in 2006 (Parsons Brinckerhoff, 2006), a fauna survey in February 2007 (Ecological Associates, 2007d) and a bird survey and spotlight survey in 2011 to detect the potential presence of state threatened brushtail possums (*Trichosurus vulpecula*) (EBS, 2011).

In addition to the studies completed, the following data sources and reports have contributed to understanding the listed species and ecological communities of the area within and surrounding the mining lease:

- EPBC Act Protected Matters search generating a Protected Matters Report of 5 km from the mine pit expansion area (Attachment B).
- Kanmantoo Copper Project: Native Vegetation Management Plan (Hillgrove, 2013) – currently under revision.
- Kanmantoo Copper Project: Program for Environment Protection and Rehabilitation (Coffey, 2011).

Listed Threatened Species

The EPBC Protected Matters search identified 20 threatened species as being potentially present within 5 km of the mine pit expansion area. The results of the EPBC Protected Matters database is based on proximity to the distribution of each species and is not based on known records.

Table 3 examines the likelihood of occurrence (unlikely, possible or confirmed) of these threatened species within the mine pit expansion area based on proximity to known records, results of the field surveys conducted, and habitat preferences of the species. For flora species, key aspects of the species ecology (including the size of the plants, and flowering times which typically assists identifying species) are also taken into consideration to identify the likelihood of the species being detected during the surveys. For fauna species, key aspects of the species ecology (including behaviour, activity and migratory patterns) were considered.

Table 3 EPBC Act threatened species identified as potentially occurring within the mine pit expansion area

Scientific Name (Common Name) and EPBC Act status	Likelihood of Occurrence Within Pit Expansion Area	Occurrence Comments
Flora		
<i>Hibbertia tenuis</i> Critically Endangered	Unlikely	There are no records of <i>Hibbertia tenuis</i> within 5 km of the mine pit expansion area, and the species was not detected during the field surveys conducted (Ecological Associates, 2007a). <i>Hibbertia tenuis</i> is known from a single location at Yundi approximately 40 km from Kanmantoo. Two other sub-populations that were known to occur within 10 km of the Yundi site are now thought extinct. Habitat for the species has been found in is typically wet peat bogs (DSEWPaC, 2012a). This type of habitat is not present within the mine pit expansion area. Given that the species was not detected during the surveys conducted within the Kanmantoo Copper Mine, there are no records in the wider 6 km area, and that the habitats the species is typically associated with are not present, it is unlikely <i>Hibbertia tenuis</i> occurs within the mine expansion area. This species has not been considered further.

<p><i>Thelymitra cyanapicta</i> (blue top sun-orchid)</p> <p>Critically Endangered</p>	<p>Unlikely</p>	<p>There are no records of <i>Thelymitra cyanapicta</i> within 5 km of the mine pit expansion area, and the species was not detected during the field surveys conducted.</p> <p><i>Thelymitra cyanapicta</i> is known from a single location near Kuinto approximately 30 km from Kanmantoo. Habitat the species has been found in is typically <i>Eucalyptus viminalis</i> and <i>Eucalyptus obliqua</i> open swampy woodland with a dense understorey of shrubs and sedges typically of low-lying seepages, creeks and swamps with wet sandy soils (DSEWPaC, 2012b). This type of habitat is not present within the mine pit expansion area.</p> <p>Given that the species was not detected during the surveys conducted within the Kanmantoo Copper Mine, there are no records in the wider 6 km area, and that the habitats the species is typically associated with are not present, it is unlikely <i>Thelymitra cyanapicta</i> occurs within the mine expansion area. This species has not been considered further.</p>
<p><i>Caladenia colorata</i> (small western spider-orchid)</p> <p>Endangered</p>	<p>Unlikely</p>	<p>This species was not detected during the field surveys conducted. No records of <i>Caladenia colorata</i> were identified in the search of the Biological database of South Australia (BDBSA) for records within 5 km of the mine, incorporating the pit expansion area (as identified in the 2007 report by Ecological Associates), however there are known populations in the area, including in areas surrounding Callington (DSEWPaC, 2012c) (approximately 4 km from the Kanmantoo Copper Mine). The species was not detected during the field surveys conducted.</p> <p><i>Caladenia colorata</i> occurs in sandy fertile soils, as well as rocky outcrops. The species is known to occur in <i>Eucalyptus leucoxyton</i> ssp. <i>leucoxyton</i>, <i>Eucalyptus fasciculosa</i> and <i>Callitris preissii</i> woodland with an understorey of <i>Acacia</i>, <i>Baeckea</i> and <i>Bursaria</i> shrubs, as well as communities of <i>Eucalyptus fasciculosa</i>, <i>Eucalyptus porosa</i> and <i>Callitris preissii</i> open woodland, <i>Eucalyptus diversifolia</i>, <i>Acacia pycnantha</i>, <i>Allocasuarina verticillata</i> and <i>Myoporum insulare</i> mallee woodland (DSEWPaC, 2012c). These communities are not present within the mine pit expansion area, or adjacent areas.</p> <p>Given that the species was not detected during the surveys conducted within the Kanmantoo Copper Mine, there are scarce records in the wider area, and that the habitats the species is typically associated with are not present, it is unlikely <i>Caladenia colorata</i> occurs within the mine expansion area. This species has not been considered further.</p>
<p><i>Caladenia tensa</i> (rigid spider-orchid)</p> <p>Endangered</p>	<p>Unlikely</p>	<p>This species was not detected during the field surveys conducted. No records of <i>Caladenia tensa</i> were identified in the search of the BDBSA for records within 5 km of the mine, incorporating the pit expansion area (as identified in the 2007 report by Ecological Associates, 2007a). However there are historic records (1936) in the nearby areas of Monarto South, approximately 7 km from the Kanmantoo Copper Mine (DENR, 2012a).</p> <p><i>Caladenia tensa</i> has been found growing on red-brown sandy loams on rises in <i>Eucalyptus leucoxyton</i> and <i>Callitris preissii</i> woodland, and more recently in habitats of heathy woodlands and mallee woodlands (DSEWPaC, 2012d). These communities are not present within the mine pit expansion area, or adjacent areas.</p> <p>Given that the species was not detected during the surveys conducted within the Kanmantoo Copper Mine, there are scarce records in the wider area, and that the habitats the species is typically associated with are not present, it is unlikely <i>Caladenia tensa</i> occurs within the mine expansion area. This species has not been considered further.</p>

<p><i>Euphrasia collina</i> subsp. <i>osbornii</i> (Osborn's eyebright) Endangered</p>	<p>Unlikely</p>	<p>There are no records of <i>Euphrasia collina</i> subsp. <i>osbornii</i> within 5 km of the mine pit expansion area, and the species was not detected during the field surveys conducted.</p> <p>There are 26 known populations of <i>Euphrasia collina</i> subsp. <i>osbornii</i>, 13 of which are within the Adelaide and Mount Lofty Ranges region. The species is generally found in open eucalypt woodland, as well as coastal cliffs and inland swamps. Vegetation associations include mallee woodlands of <i>Eucalyptus odorata</i> with <i>Allocasuarina verticillata</i>, <i>Eucalyptus leucoxyton</i> subsp. <i>pruinosa</i> and <i>Callitris preissii</i>, as well as mallee dominated communities (Moritz and Bickerton, 2010).</p> <p>Disturbance from the long history of mining at the site, and previous disturbance from stock for many years in the mallee and woodland areas suggest that conditions in the pit expansion area would be unsuitable to sustain a population of <i>Euphrasia collina</i> subsp. <i>osbornii</i>. The species is unlikely to occur within the mine lease area based on it not having been recorded during the surveys conducted to date, no known recent records in the wider area, and lack of suitable habitat</p>
<p><i>Thelymitra epipactoides</i> (metallic sun-orchid) Endangered</p>	<p>Unlikely</p>	<p>This species was not detected during the field surveys conducted. There are no records of <i>Thelymitra epipactoides</i> within 6 km of the mine pit expansion area. However there are records in the wider area, with the closest record, from 1989, being approximately 12 km to the south. The species was not detected during the field surveys conducted.</p> <p><i>Thelymitra epipactoides</i> is now considered extinct in the Southern Mount Lofty Ranges (Obst, 2005; Weber and Bates, 1986), however scattered individuals and populations still remain in the Murray Darling Basin, including the Murray Bridge area (~25 km to the west of Kanmantoo), as well as in the south east and Eyre Peninsula regions of South Australia, and Victoria (DSEWPac, 2012e).</p> <p>In the Murray Darling Basin region, <i>Thelymitra epipactoides</i> has been recorded in <i>Eucalyptus leucoxyton</i> ssp. <i>stephaniae</i> ± <i>Eucalyptus diversifolia</i> open woodland, <i>Callitris preissii</i>/<i>Allocasuarina verticillata</i> woodland, <i>Eucalyptus diversifolia</i> ± <i>Allocasuarina verticillata</i> ± <i>Acacia pycnantha</i> low woodland (Obst, 2005). These, or similar habitats are not present within the mine pit expansion area.</p> <p>Given that the species was not detected during the surveys conducted within the Kanmantoo Copper Mine, there are scarce records in the wider area, and that the habitats the species is typically associated with are not present, it is unlikely <i>Thelymitra epipactoides</i> occurs within the mine pit expansion area. This species has not been considered further.</p>

<p><i>Acacia menzели</i> (Menzel's wattle) Vulnerable</p>	<p>Unlikely</p>	<p><i>Acacia menzели</i> was not detected during the field surveys conducted within the Kanmantoo Copper Mine lease area. There are records of the species within 5 km of the expansion area, including just north of the Kanmantoo township. There is also a known population in the wider area, occurring in a band between Harrogate and Murray Bridge (DENR, 2012a). This population occurs within <i>Eucalyptus socialis</i> low open woodland and very low woodland, <i>Eucalyptus dumosa</i> tall sparse shrubland, <i>Eucalyptus porosa</i> low woodland, very low woodland and open woodland, <i>Eucalyptus odorata</i> low woodland and low open woodland, <i>Callitris preissii</i> open woodland and low open woodland, and <i>Eucalyptus odorata</i> associations with other eucalypts (Davies, 1992; DSEWPaC, 2012f). Similar habitats are present within the Kanmantoo Copper Mine lease area, and the mine pit expansion area.</p> <p><i>Acacia menzели</i> grows to two metres in height, and is easily distinguished from other <i>Acacia</i> species. Considering the extensive field surveys conducted at Kanmantoo, and the size of the plant, the likelihood of the species being detected if it is present within the Kanmantoo Copper Mine area is good to high. Considering the relatively small area of the mine pit expansion, which is in close proximity to areas frequently visited, it is considered unlikely <i>Acacia menzели</i> occurs within the mine pit expansion area.</p>
<p><i>Glycine latrobeana</i> (clover glycine) Vulnerable</p>	<p>Unlikely</p>	<p>This species was not detected during the field surveys conducted. There are no records of <i>Glycine latrobeana</i> within 5 km of the mine pit expansion area, and the species was not detected during the field surveys conducted. The closest records are at Mt Bold Reservoir, over 25 km to the east (DENR, 2012c).</p> <p>In the Mount Lofty Ranges, <i>Glycine latrobeana</i> has been recorded in <i>Eucalyptus viminalis</i> woodland and open woodland, and sometimes with <i>Eucalyptus leucoxylon</i>, with a mid-dense to very sparse understorey of heath and <i>Acacia</i> species (Davies, 1986; DSEWPaC, 2012g). These habitats are not present within the mine pit expansion area, or the wider Kanmantoo Copper Mine lease.</p> <p>Given that the species was not detected during the surveys conducted within the Kanmantoo Copper Mine, the lack of records in the wider area, and that the habitats the species is typically associated with are not present, it is unlikely <i>Glycine latrobeana</i> occurs within the mine pit expansion area. This species has not been considered further.</p>

<p><i>Olearia pannosa</i> subsp. <i>pannosa</i> (silver daisy-bush) Vulnerable</p>	<p>Unlikely</p>	<p>This species was not detected during the field surveys conducted. There are records of <i>Olearia pannosa</i> subsp. <i>pannosa</i> within 5 km of the expansion area, with the closest being approximately 6 km to the south. There are also scattered records in the wider area, approximately 10 – 15 km from the mine pit expansion area. The species was not recorded within the Kanmantoo Copper Mine lease area during the surveys conducted.</p> <p><i>Olearia pannosa</i> subsp. <i>pannosa</i> is endemic to South Australia, occurring in the south east, Eyre Peninsula, Yorke Peninsula, and around Adelaide. In the Mount Lofty Ranges, the species distributed along the eastern boundary. The Monarto area (including Kanmantoo) appears to be the species' northern extent along this boundary (Willson and Bignall, 2009). Within the Mount Lofty Ranges, broad habitats of <i>Olearia pannosa</i> subsp. <i>pannosa</i> include mallee, shrubland, and grassy woodlands. Vegetation associations the species have been noted in include <i>Eucalyptus dumosa</i> open woodland over <i>Melaleuca lanceolata</i>, <i>Bursaria spinosa</i> and <i>Lomandra effusa</i>, <i>Eucalyptus fasciculosa</i>, <i>Acacia acinacea</i>, <i>Xanthorrhoea semiplana</i> and <i>Bursaria spinosa</i> woodland, and <i>Eucalyptus fasciculosa</i>, <i>Eucalyptus socialis</i> low woodland (Willson and Bignall, 2009).</p> <p><i>Olearia pannosa</i> subsp. <i>pannosa</i> grows to 1.5 metres in height, and is easily distinguished from other <i>Olearia</i> species. Considering the extensive field surveys conducted at Kanmantoo, and the size of the plant, the likelihood of the species being detected if it is present within the Kanmantoo Copper Mine area is good to high. Considering the relatively small area of the mine pit expansion, which is in close proximity to areas frequently visited, it is considered unlikely <i>Olearia pannosa</i> subsp. <i>pannosa</i> occurs within the mine pit expansion area.</p>
<p><i>Prasophyllum pallidum</i> (pale leek-orchid) Vulnerable</p>	<p>Unlikely</p>	<p>There are no records of <i>Prasophyllum pallidum</i> within 5 km of the mine pit expansion area, and the species was not detected during the field surveys conducted.</p> <p>No BDBSA records within 5 km of the expansion area. The species prefers more fertile soils in higher rainfall areas than the mine lease. Pale leek-orchid are unlikely to occur based on it not having been recorded during the surveys conducted to date, no known recent records in the wider area, and lack of suitable habitat.</p>
<p>Fauna</p>		
<p><i>Cinclosoma punctatum anachoreta</i> (spotted quail-thrush, Mt Lofty Ranges)</p>	<p>Unlikely</p>	<p>There are no records of <i>Cinclosoma punctatum anachoreta</i> within 5 km of the mine pit expansion area, and the species was not detected during the field surveys conducted (Ecological Associates, 2007b).</p> <p>Lack of recent records suggests the species is extinct. In the past, the species has been recorded in sclerophylla woodlands dominated by <i>Eucalyptus fasciculosa</i> and <i>Eucalyptus odorata</i> with sparse understorey, as well as heathlands. <i>Cinclosoma punctatum anachoreta</i> are unlikely to occur within the expansion area based on lack of suitable habitat and no known recent records in the wider area.</p>

<p><i>Botaurus poiciloptilus</i> (Australasian bittern) Endangered</p>	<p>Unlikely</p>	<p>There are no records of <i>Botaurus poiciloptilus</i> within 5 km of the mine pit expansion area, and the species was not detected during the field surveys conducted.</p> <p>The Australasian bittern has not been recorded within the mine pit expansion area, or the mine area. The species occurs in shallow vegetated freshwater or brackish swamps. Vegetation consisting of reeds is required for breeding. As a consequence of the species camouflage and behaviour, there is little information on the feeding and breeding aspects of its ecology. The species has been recorded in the River Murray corridor, which offers complex habitats more suited to the species needs than the mine pit expansion area, and the current operational mine and infrastructure. Australasian bittern are unlikely to occur within the mine lease area based on lack of suitable habitat and no known recent records in the wider area.</p>
<p><i>Calyptorhynchus lathami halmaturinus</i> (glossy black-cockatoo) Endangered</p>	<p>Unlikely</p>	<p>There are no records of <i>Calyptorhynchus lathami halmaturinus</i> within 5 km of the mine pit expansion area, and the species was not detected during the field surveys conducted.</p> <p>Glossy black-cockatoos have not been recorded within the mine pit expansion area, or the mine area. The species has declined, and is only currently known to occur on Kangaroo Island. The species typically prefers forest, open forests and coastal woodlands, in high altitude areas. Glossy black-cockatoo are unlikely to occur within the mine lease area based on lack of suitable habitat and no known recent records in the wider area.</p>
<p><i>Isodon obesulus obesulus</i> (southern brown bandicoot) Endangered</p>	<p>Unlikely</p>	<p>There are no records of <i>Isodon obesulus obesulus</i> within 5 km of the mine pit expansion area, and the species was not detected during the field surveys conducted.</p> <p>Southern brown bandicoots have not been recorded within the mine pit expansion area, or the mine area. The species is found in the Adelaide Hills, with the closest known population to the mine pit expansion area over 35 km away. The species typically inhabits eucalypt forests and woodlands with heath understoreys. Vegetation communities inhabited include <i>Eucalyptus obliqua</i>, <i>Eucalyptus fasciculosa</i>, <i>Leptospermum continentale</i>, <i>Leptospermum myrsinoides</i>, and <i>Banksia marginata</i>. Dense shrub understoreys, with at least 50% groundcover are preferred. Southern brown bandicoots are unlikely to occur within the mine lease area based on lack of suitable habitat, and no known records in the area.</p>
<p><i>Leipoa ocellata</i> (Malleefowl) Endangered</p>	<p>Unlikely</p>	<p>There are no records of <i>Leipoa ocellata</i> within 5 km of the mine pit expansion area, and the species was not detected during the field surveys conducted (Ecological Associates, 2007b).</p> <p>Malleefowl have not been recorded in the wider area (Eastern Lofty Ranges). The species typically inhabits mallee associations with a heath or thicket understorey, and require large (500 ha) areas of long unburnt intact mallee for long term survival. The mallee habitat within the expansion area is small and degraded with little native understorey, and therefore does not meet the species habitat requirements. The species is relatively easily surveyed for, particularly in relatively open mallee habitat. Malleefowl are unlikely to occur within the mine lease area based on no recent records in the wider area, and lack of suitable habitat.</p>

<p><i>Psophodes nigrogularis leucogaster</i> (western whipbird, eastern) Endangered</p>	<p>Unlikely</p>	<p>There are no records of <i>Psophodes nigrogularis leucogaster</i> within 5 km of the mine pit expansion area, and the species was not detected during the field surveys conducted.</p> <p>Western whipbird have not been recorded within the mine pit expansion area, or the mine area. In the wider area, the species occupies dense shrubby understorey below open mallee eucalypt woodlands. Populations are thought to require a minimum of 1,000 ha of <i>Eucalyptus incrassata</i> open low mallee, <i>Eucalyptus diversifolia</i> mallee, or <i>Eucalyptus diversifolia</i>, <i>Olearia axillaris</i> open mallee. Such habitat is not found within or adjacent to the expansion area. Western whipbird are unlikely to occur within the mine lease area based on lack of records, and lack of suitable habitat.</p>
<p><i>Rostratula australis</i> (Australian painted snipe) Endangered</p>	<p>Unlikely</p>	<p>There are no records of <i>Rostratula australis</i> within 5 km of the mine pit expansion area, and the species was not detected during the field surveys conducted.</p> <p>Australasian painted snipe have not been recorded within the mine pit expansion area, or the mine area. The species inhabits shallow inland wetlands that are either permanently or temporarily filled. Australian painted snipe are unlikely to occur within the expansion area based on lack of suitable habitat.</p>
<p><i>Craterocephalus fluviatilis</i> (Murray hardyhead) Endangered</p>	<p>Unlikely</p>	<p>Murray hardyhead have not been recorded within the mine pit expansion area, or the mine area. The species occurs within ephemeral lowland rivers, lakes, wetlands and billabongs. Such habitats are not found within the mine lease. Murray hardyhead are unlikely to occur within the mine lease area based on lack of suitable habitat.</p> <p>There are no records of <i>Craterocephalus fluviatilis</i> within 6 km of the mine pit expansion area, and the species was not detected during the field surveys conducted.</p>
<p><i>Maccullochella peeli peeli</i> (Murray cod) Endangered</p>	<p>Unlikely</p>	<p>Murray cod have not been recorded within the mine pit expansion area, or the mine area. The species occur within natural water habitats. Such habitats are not found within the mine lease. No suitable habitat. Murray cod are unlikely to occur within the mine lease area based on lack of suitable habitat.</p> <p>There are no records of <i>Maccullochella peeli peeli</i> within 5 km of the mine pit expansion area, and the species has not been detected.</p>
<p><i>Litoria raniformis</i> (southern bell frog) Endangered</p>	<p>Unlikely</p>	<p>There are no records of <i>Litoria raniformis</i> within 5 km of the mine pit expansion area, and the species was not detected during the field surveys conducted.</p> <p>Southern bell frogs have not been recorded within the mine pit expansion area, or the mine area. The species are strongly associated with habitats containing aquatic and emergent vegetation, and an overstorey of River red gums (<i>Eucalyptus camaldulensis</i>) or black box (<i>E. largiflorens</i>). Southern bell frogs are unlikely to occur within the mine lease area based on lack of suitable habitat.</p>

No EPBC threatened species have been confirmed as occurring within the mine pit expansion area following field investigations and desktop assessments. In addition, the likelihood of occurrence assessment (above) did not identify any threatened species as likely to occur, or possibly occurring within the mine pit expansion area. Threatened species have thus not been considered further.

Nature and extent of likely impact

The mine pit expansion will involve activities that could potentially result in a significant impact on the listed threatened community Peppermint box grassy woodland of South Australia. These potential impacts include:

- Vegetation clearance of the mine pit expansion area.
- Introduction of weeds and pathogens to the immediately adjacent area which may reduce species diversity.
- Fire caused from the heavy machinery used to conduct the vegetation clearance and earthworks.
- Site contamination.
- Surface drainage interference.

Extensive mitigation measures have been developed to manage these risks, which have been developed through consultation with relevant state regulatory bodies. These measures are detailed in the projects PEPR, which can be viewed at the following location:

http://www.minerals.dmitre.sa.gov.au/mines_and_developing_projects/approved_mines/kanmantoo

Vegetation clearance of the EPBC listed Peppermint box grassy woodland patches (totalling 3.23 ha) is considered the most significant impact associated with the expansion, which will be mitigated through a range of offset plantings, rehabilitation and closure planning activities. These will be agreed by the appropriate regulatory governing body, through discussions with DMITRE, as part of the project's Native Vegetation Management Plan. A revised Native Vegetation Management Plan has recently been submitted to DMITRE for approval, which includes detailed mitigation activities to create a significant environmental benefit (SEB) in relation to the proposed mining operations. This document is provided as a draft attachment to this referral and includes detailed offset calculations for rehabilitation and planting activities for each community at the site, including Peppermint box, together with details of environmental management practices, such as weed and pest control.

A total area of 3.23 ha of Class B *Eucalyptus odorata* grassy woodland is proposed to be cleared as part of the mine expansion. An additional 1.18 ha total area of Class C *Eucalyptus odorata* grassy woodland would also be cleared as part of the increased footprint of impact. A total of 5.20 Ha of *Eucalyptus odorata* grassy woodland, including non classified Peppermint box woodland patches.

It is recognised that Patch 11 (Attachment C and Attachment E), comprises a range of small vegetation communities, with some areas dominated by *Stipa* grassland rather than *E. odorata* woodland. However, to take a precautionary approach these patches of grassland (totalling approximately 0.35 Ha within patch 11) have been included in the calculation of *E. odorata* grassy woodland (Class B) for the purpose of mitigation and offset management measures.

The following discusses the anticipated significance of the proposed activities in relation to the listed vegetation community, following the significant impact guidelines for critically endangered ecological communities (DEWHA, 2009). These guidelines consider where an action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:

- Reduce the extent of an ecological community. *Up to 3.23 ha of Class B Eucalyptus odorata grassy woodland is proposed to be cleared as part of the mine expansion. Proposed rehabilitation activities to degraded Class C and unclassified patches of Peppermint box grassy woodlands within the mining lease are proposed to avoid a net loss of listed communities resulting from the proposed expansion activities. Extensive revegetation, including onsite works, will occur to replant Eucalyptus odorata woodlands to the satisfaction of the governing body in South Australia (DMITRE and associated stakeholders). A revised Native Vegetation Management Plan has recently been submitted to DMITRE for approval, which includes detailed mitigation activities to create a significant environmental benefit (SEB) in relation to the proposed mining operations and Peppermint box woodlands.*
- Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or

transmission lines. *Due to the historical agricultural practices in the Kanmantoo region, extensive clearing has been undertaken resulting in highly fragmented occurrence of Eucalyptus odorata grassy woodland in the area, with only small scattered patches remaining. As such, a significant increase to fragmentation of this community is not anticipated.*

- *Adversely affect habitat critical to the survival of an ecological community. The proposed action is not considered to have impacts upon the habitat of patches of Eucalyptus odorata grassy woodland to be retained within the mining lease. Proposed rehabilitation activities to degraded Class C and unclassified patches of Peppermint box grassy woodlands within the mining lease are proposed to avoid a net loss of listed communities resulting from the proposed expansion activities. Extensive revegetation, including onsite works, will occur to replant Eucalyptus odorata woodlands to the satisfaction of the governing body in South Australia (DMITRE and associated stakeholders). A revised Native Vegetation Management Plan has recently been submitted to DMITRE for approval, which includes detailed mitigation activities to create a significant environmental benefit (SEB) in relation to the proposed mining operations. This document is provided as a draft attachment to this referral and includes detailed offset calculations for rehabilitation and planting activities for each community at the site to meet regulatory requirements, including details of Peppermint box mitigation.*
- *Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns. Management practices at the site comply with strict environmental requirements, governed by DMITRE and associated stakeholders. Detailed groundwater monitoring and management has demonstrated that significant drawdown is not anticipated as a result of the current and proposed mining activities. As such, the proposed action is not anticipated to affect the health and survival of remaining patches of Eucalyptus odorata grassy woodland.*
- *Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting. No vegetation burning practices will be undertaken, or flora and fauna harvesting in relation to the project.*
- *Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:*
 - *Assisting invasive species, that are harmful to the listed ecological community, to become established. An intensive weed and pest management plan is implemented at the site, to the satisfaction of DMITRE and associated stakeholders to minimise this risk. It should also be noted that intensive grazing and agricultural activities have historically occurred in the region, leaving an existing legacy of weed impacts in relation to this community. Grazing no longer occurs within the mining lease.*
 - *Causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community. The proposed action is not anticipated to generate or release any substances which will kill or inhibit the Eucalyptus odorata grassy woodland.*
- *Interfere with the recovery of an ecological community. The proposed action is not considered to interfere with the recovery of Eucalyptus odorata grassy woodland because of the offset program that will be put in place (Hillgrove, 2013). Significant Eucalyptus odorata rehabilitation and planting activities are proposed on site and immediately offsite, which seek to increase the recovery of this community. This includes removal of grazing pressures from degraded patches of Eucalyptus odorata woodlands in the area for rehabilitation, which would have otherwise continued to be degraded through agricultural activities.*

3.1 (e) Listed migratory species

Description

The EPBC Protected Matters search identified 11 migratory/marine species as being potentially present within 5 km of the mine pit expansion area. The list is based on the likelihood of occurrence according to distribution of

species and their habitats and is not based on known records. Table 4 examines the likelihood of occurrence (unlikely, possible or confirmed) within the mine pit expansion area based on proximity to known records, results of the field surveys conducted, and habitat preferences of the species. Key aspects of the species ecology (including behaviour, activity and migratory patterns) were considered

Table 4 EPBC Act migratory and marine species identified as potentially occurring within 5 km of the mine pit expansion area

Common Name (Scientific Name)	EPBC Act Status	Likelihood of Occurrence	Occurrence Comments
<i>Leipoa ocellata</i> (malleefowl)	Migratory terrestrial.	Unlikely	<p>There are no records of <i>Leipoa ocellata</i> within 6 km of the Kanmantoo Copper Mine, and the species (or signs of the species) has not been detected during the field surveys conducted (Ecological Associates, 2007b).</p> <p>The species prefers mallee habitat (low Eucalypt woodlands dominated by mallee and associated habitats such as <i>Melaleuca uncinata</i> and <i>Callitris verrucosa</i>) (DSEWPaC, 2012d) which are not present within the project site or surrounding areas.</p> <p>Due to the lack of records in the area, and lack of suitable habitat in the area, it is unlikely <i>Leipoa ocellata</i> occurs within the mine pit expansion area. This species has not been considered further.</p>
<i>Apus pacificus</i> (fork-tailed swift)	Migratory: marine / Marine	Unlikely	<p>There are no records of <i>Apus pacificus</i> within 5 km of the Kanmantoo Copper Mine, and the species (or signs of the species) has not been detected during the field surveys conducted.</p> <p><i>Apus pacificus</i> is predominantly aerial and very rarely lands on the ground. It is mostly observed flying over inland plains and sometimes seen above foothills or in coastal areas. <i>Apus pacificus</i> is considered common in coastal parts of Eyre Peninsula (DSEWPaC, 2012h). As the project site is located over 40 km from the coastline, it is unlikely the species will frequent the area.</p> <p>Although fly-over is possible, given the lack of records in the Kanmantoo area, the non-detection during the field surveys conducted, the non-coastal location, and the aerial behaviour of the species, it is unlikely the <i>Apus pacificus</i> would occur within the mine pit expansion area. This species has not been considered further.</p>
<i>Ardea modesta/alba</i> (Great egret)	Migratory: marine, / wetland. Marine	Unlikely	<p>There are no records of <i>Ardea modesta</i> within 5 km of the Kanmantoo Copper Mine, and the species (or signs of the species) has not been detected during the field surveys conducted.</p> <p>Non-breeding <i>Ardea modesta</i> have been recorded across most of Australia with the exception of the arid interior, whilst breeding birds have only been recorded in the coastal areas of the Northern Territory. <i>Ardea modesta</i> is a wetland species, and has been recorded in a wide range of wetland habitats, including swamps, marshes, riparian areas of rivers and lakes, flooded areas of grasslands, pastures and agricultural lands, as well as reservoirs, drainage channels, estuaries and mangroves (DSEWPaC, 2012i).</p> <p>Although fly-over is possible, given the lack of records in the area, the non-detection during the field surveys conducted, and the lack of the species preferred habitats within the area, it is unlikely the <i>Ardea modesta</i> would occur within the mine pit expansion area. This species</p>

			has not been considered further.
<i>Ardea ibis</i> (cattle egret)	Migratory: marine, / wetland. Marine.	Unlikely.	<p>There are no records of <i>Ardea ibis</i> within 5 km of the Kanmantoo Copper Mine, and the species (or signs of the species) has not been detected during the field surveys conducted.</p> <p>The species prefers moist areas with tall grass, and predominantly uses shallow, open and fresh wetlands, as well as grasslands and swamps with low emergent vegetation and abundance aquatic flora.</p> <p>Although fly-over is possible, given the lack of records in the area, the non-detection during the field surveys conducted, and the lack of the species preferred habitats within the area, it is unlikely the <i>Ardea ibis</i> would occur within the mine pit expansion area. This species has not been considered further.</p>
<i>Haliaeetus leucogaster</i> (white-bellied sea-eagle)	Migratory: terrestrial. Marine	Unlikely	<p>There are no records of <i>Haliaeetus leucogaster</i> within 5 km of the Kanmantoo Copper Mine, and the species (or signs of the species) has not been detected during the field surveys conducted.</p> <p><i>Haliaeetus leucogaster</i> is distributed along coastlines and near-coastal areas, and only extends inland around major river entrances (DSEWPaC, 2012k). Kanmantoo is located approximately 20 km inland, with no significant rivers in the vicinity.</p> <p>Although fly-over is possible, given the lack of records in the area, the non-detection during the field surveys conducted, the inland location rather than along the coast, and the lack of the species preferred habitats, it is unlikely the <i>Haliaeetus leucogaster</i> would occur within the mine pit expansion area. This species has not been considered further.</p>
<i>Hirundapus caudacutus</i> (white-throated needletail)	Migratory: terrestrial. Marine	Unlikely	<p>When in Australia <i>Hirundapus caudacutus</i> spends the non-breeding season primarily in on the east coast. The distribution stretches to the south east and Mount Lofty Ranges in South Australia. The species is not known to occur on Eyre Peninsula. <i>Hirundapus caudacutus</i> are almost exclusively aerial, and landing is not common. Habitats the species has been observed flying over are primarily woodlands and forests (DSEWPaC, 2012l).</p> <p>Although fly-over is possible, given the lack of records in the area, the non-detection during the field surveys conducted, the inland location rather than along the coast, and the lack of the species preferred habitats, it is unlikely the <i>Hirundapus caudacutus</i> would occur within the mine pit expansion area. This species has not been considered further.</p>
<i>Merops ornatus</i> (rainbow bee-eater)	Migratory: terrestrial. Marine.	Confirmed presence	<p><i>Merops ornatus</i> have been recorded within the Kanmantoo Copper Mine site area. The records indicate the observations were within the <i>Eucalyptus odorata</i> woodland, however the records cannot identify if the observations were within the mine pit expansion area.</p> <p><i>Merops ornatus</i> is widely distributed across mainland Australia, and found in a variety of habitats, including woodlands, forests, arid woodlands and coastal dunes. Abundance is common. The species is highly mobile, and able to undertake long-distance movements (DSEWPaC, 2012m).</p> <p>The potential rainbow bee-eater habitat within the area to be cleared will not support an important population of the species with no known nesting sites identified.</p> <p><i>Merops ornatus</i> may breed in the area. The typically construct nests at the end of burrows excavated in exposed watercourse or excavated</p>

			<p>walls. Populations that breed in southern Australia (including the Kanmantoo region), migrate to northern Australia after the breeding season.</p> <p>At Kanmantoo they are likely to present between September and February. The existing mining activities and disturbance does not appear to have deterred the species for visiting and temporarily inhabiting the area to date.</p> <p>Given the records of the species within the Kanmantoo lease area, and the known suitability of the habitats present, it is likely the species occurs within or utilises the mine pit expansion area. No nesting sites have been identified within the areas proposed for expansion of the mine.</p>
<p><i>Gallinago hardwickii</i> (Latham's snipe)</p>	<p>Migratory: wetland. Marine.</p>	<p>Unlikely</p>	<p>When in Australia, <i>Gallinago hardwickii</i> travels through northern Australia to reach non-breeding areas in the south, particularly the south east. In South Australia it has been recorded on the Adelaide plains and Mount Lofty Ranges, and extends to the Eyre Peninsula. The species relies on wetland habitats, and occurs in both permanent and ephemeral wetlands. Recorded habitats include swamps, flooded grasslands and heathlands, and other water bodies of both fresh, brackish and saline waters, as well as modified and artificial habitats (DSEWPaC, 2012o). No suitable wetland habitat meeting the requirements of <i>Gallinago hardwickii</i> occurs within the mine pit expansion area.</p> <p>Although fly-over is possible, given the lack of records in the area, the non-detection during the field surveys conducted, the lack of the species preferred wetland habitats within the area, it is unlikely that <i>Gallinago hardwickii</i> would occur within the mine pit expansion area. This species has not been considered further.</p>
<p><i>Rostratula benghalensis</i> s.lat (painted snipe)</p>	<p>Migratory: wetland. Marine.</p>	<p>Unlikely.</p>	<p>When in Australia, <i>Rostratula benghalensis</i> has a widespread distribution, but is most common in eastern mainland area. The species has been recorded in south eastern South Australia. <i>Rostratula benghalensis</i> is a wading species, and inhabits shallow terrestrial freshwater wetlands, temporary and permanent lakes, swamps and clayplans, as well as waterlogged grasslands, satmarsh and dams. Riparian vegetation, including emergent tussocks of grasses, sedges, rushes or reeds, and clumps of <i>Muehlenbeckia</i> and <i>Melaleuca</i> are common habitat elements (DSEWPaC, 2012p). No suitable wetland habitat meeting the requirements of <i>Rostratula benghalensis</i> occurs within the mine pit expansion area.</p> <p>Although fly-over is possible, given the lack of records in the surrounding area, the non-detection during the field surveys conducted, the lack of the species preferred wetland habitats, it is unlikely <i>Rostratula benghalensis</i> would occur within the mine pit expansion area. This species has not been considered further.</p>

Nature and extent of likely impact

With the exception of rainbow bee-eater (*Merops ornatus*), no migratory species are considered likely to occur at the site. The potential rainbow bee-eater habitat within the area to be cleared will not support an important population of the species with no known nesting sites identified. *Merops ornatus* is widely distributed across mainland Australia, and found in a variety of habitats, including woodlands, forests, arid woodlands and coastal dunes. Abundance is common. The species is highly mobile, and able to undertake long-distance movements.

Due to the existing disturbed nature of the majority of the site, impacts to migratory species are considered unlikely as a result of the proposed expansion.

3.1 (f) Commonwealth marine area

(If the action is in the Commonwealth marine area, complete 3.2(c) instead. This section is for actions taken outside the Commonwealth marine area that may have impacts on that area.)

Description

There were no Commonwealth marine areas identified within the EPBC Protected Matters search (Attachment B). The exclusive economic zone and territorial sea boundary is over 50 km to the north of the mine pit expansion area.

Nature and extent of likely impact

Not applicable.

3.1 (g) Commonwealth land

(If the action is on Commonwealth land, complete 3.2(d) instead. This section is for actions taken outside Commonwealth land that may have impacts on that land.)

Description

There is no Commonwealth land identified in the EPBC Protected Matters search within or in the vicinity of the mine pit expansion area (Attachment B).

Nature and extent of likely impact

Not applicable.

3.1 (h) The Great Barrier Reef Marine Park

Description

The mine pit expansion area is not in the vicinity of the Great Barrier Reef Marine Park.

Nature and extent of likely impact

Not applicable.

3.2 Nuclear actions, actions taken by the Commonwealth (or Commonwealth agency), actions taken in a Commonwealth marine area, actions taken on Commonwealth land, or actions taken in the Great Barrier Reef Marine Park

3.2 (a)	Is the proposed action a nuclear	X	No
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	action?		Yes (provide details below)
If yes, nature & extent of likely impact on the whole environment			
3.2 (b)	Is the proposed action to be taken by the Commonwealth or a Commonwealth agency?	X	No
			Yes (provide details below)
If yes, nature & extent of likely impact on the whole environment			
3.2 (c)	Is the proposed action to be taken in a Commonwealth marine area?	X	No
			Yes (provide details below)
If yes, nature & extent of likely impact on the whole environment (in addition to 3.1(f))			
3.2 (d)	Is the proposed action to be taken on Commonwealth land?	X	No
			Yes (provide details below)
If yes, nature & extent of likely impact on the whole environment (in addition to 3.1(g))			
3.2 (e)	Is the proposed action to be taken in the Great Barrier Reef Marine Park?	X	No
			Yes (provide details below)
If yes, nature & extent of likely impact on the whole environment (in addition to 3.1(h))			

3.3 Other important features of the environment

3.3 (a) Flora and fauna

Flora

No nationally significant flora species were found during the surveys or have been identified during previous surveys within the wider Kanmantoo Copper Mine lease area. Two species of state conservation significance under the *National Parks and Wildlife Act 1972*, *Diuris behrii* (Behr's cowslip orchid) and *Acacia iteaphylla* (Flinders Ranges wattle) were recorded in the 2007 surveys (Ecological Associates, 2007a; Ecological Associates, 2007b). The shrub *Acacia iteaphylla* (recorded during the February 2007 survey) was growing outside of its natural range and was therefore considered introduced.

An additional 22 species of regional significance have been recorded within the area during previous surveys (14 of these species were listed as rare). There is also one historical record of *Ptilotus erubescens* (hairy-tails; rare) from within the project area. This record is from the Biological Database of South Australia (managed by DEH) and dates from 1994. Despite this historical record, no evidence of *P. erubescens* was found by subsequent detailed surveys of the area specifically targeting threatened species.

A total of 71 introduced species including grasses, herbs, shrubs and woody weeds have been documented for the wider Kanmantoo Copper Mine lease area.

Fauna

Three major fauna habitats have been identified within the ML area: *Eucalyptus odorata* woodland, *Lomandra effusa* grassland and *Austrostipa* spp. grassland. Baseline fauna surveys of the ML area found 49 bird, 12 reptile, 3 amphibian and 15 mammal (11 native and 4 introduced) species. The greatest diversity and abundance of fauna was found in the *E. odorata* woodland in the north of the ML area, with this vegetation providing relatively complex habitat components such as hollows, understorey vegetation, logs and deep debris. Species diversity and abundances were lower in the *L. effusa* tussock grassland in the south of the area. However, this habitat type supports specialist grassland species that are unlikely to be found in other vegetation types in the ML area.

One threatened fauna species of national conservation significance (i.e., listed migratory under the EPBC Act), the rainbow bee-eater (*Merops ornatus*), is present within the ML area. It is considered unlikely that any other EPBC Act-listed species are present in the ML area (PB, 2006).

Additional species of state conservation significance (i.e., listed as vulnerable, endangered or rare under the South Australian NPW Act) that are present, or potentially present, within the ML area are the diamond firetail (*Stagonopleura guttata*), listed as vulnerable, the peregrine falcon (*Falco peregrinus*) and the brushtail possum (*Trichosurus vulpecula*), both listed as rare. Four introduced vertebrate species (other than sheep and cattle) have been identified in the ML area and surrounding region: the European rabbit (*Oryctolagus cuniculus*), European (brown) hare (*Lepus capensis*), house mouse (*Mus domesticus*) and red fox (*Vulpes vulpes*).

3.3 (b) Hydrology, including water flows

Surface water

Drainage in the Kanmantoo Copper Mine lease area is ephemeral, with streams only flowing after high rainfall events. The annual average flow rate of the area (based on a catchment area of 4.4 km²) is estimated to be 4.7 L/s (Aquaterra, 2007). Drainage from the mine lease area reports eventually to the Bremer River either via Dawesley Creek and Mount Barker Creek or via an unnamed ephemeral stream. The Bremer River has distinct annual high (winter and spring) and low (summer) flows, and runs south for about 40 km through Hartley and Langhorne Creek before discharging to Lake Alexandrina which is associated with the Coorong Ramsar Wetland. Water quality of the Dawesley Creek upstream of the Dawesley Creek/Mount Barker Creek confluence shows signs of ARD including elevated levels of acidity (median pH 5.4), sulphate (630 to 800 mg/L) and some metals, where concentrations of aluminium, cadmium, cobalt, copper, manganese, nickel and zinc exceed the ANZECC/ARMCANZ and/or EPA guidelines. The source of ARD has been attributed to the former Brukung Mine, which is located approximately 10 km upstream of the Kanmantoo Copper Mine lease area. The Mount Barker Creek does not show signs of ARD contamination and downstream of the confluence with the Dawesley Creek the water quality improves with a substantial decrease in metal concentrations and higher pH.

Water quality data for the Bremer River some 8 km downstream of the Dawesley Creek/Bremer River confluence shows median total metal concentrations are below the state water quality criteria with the exception of cadmium and copper, which are slightly elevated. However, nutrient levels are elevated, with median concentrations of oxidised nitrogen and total nitrogen exceeding ANZECC/ARMCANZ guidelines. The source of nutrients is likely to be runoff from grazing land (mainly fertilisers and animal wastes) and septic tank overflows. Stream sediments contain high concentrations of some metals and largely reflect the geological mineralisation of the area. Most median metal concentrations in sediments collected from the Bremer catchment exceed average crustal abundances, however these are below the interim sediment quality (ISQG-High) guidelines, with the exception of copper concentrations that ranged from 140 to 13,500 mg/kg, (where the latter value is 50 times the ISQG-High value). The area with the highest concentrations of heavy metals is the Dawesley/Mount Barker confluence, with cadmium ranging from <0.1 to 54 mg/kg (ISQG-High = 10), lead ranging from 2 to 42,400 mg/L (ISQG-High = 220) and zinc ranging from 16 to 5,850 mg/L (ISQG-High = 410). It is believed that, at this point, the more acidic waters of Dawesley Creek mix with the more alkaline waters of

Mount Barker Creek and cause precipitation of dissolved metals. The project does not discharge mine affected waters, which are treated onsite through a recycling plant.

Groundwater

The Kanmantoo Copper Mine lease area lies within the Eastern Mount Lofty Ranges water management area, where groundwater is sourced from either fractured rock or sedimentary aquifers and is of varying quality and yield. The area is underlain by the Kanmantoo Group aquifer, a fractured rock aquifer that is generally tight and impermeable and yields only low-flow brackish groundwater. Regional groundwater flow is in a generally east direction across the mine lease area and in a south to south easterly direction in the southern portion of the site (consistent with undulating topography). A conceptual model of the hydrogeology of the ML area has been developed for planning and management of groundwater in the area.

The main uses of groundwater in the Eastern Mount Lofty Ranges are for stock and domestic purposes. The groundwater is sourced from relatively shallow bores equipped with windmills or low capacity submersible pumps. The water quality in the area surrounding the Kanmantoo Copper Mine is generally potable, ranging from fresh to brackish, but sampling indicates occasional high concentrations of some metals such as copper, selenium, iron and zinc. These concentrations are expected to be naturally occurring and related to regionally high metal content of local rocks rather than human activities. On-going monitoring has demonstrated that significant impacts to groundwater are not occurring as a result of current mining activities.

3.3 (c) Soil and Vegetation characteristics

Soil

Soils across the Kanmantoo Copper Mine lease area are predominantly shallow and stony with rocky outcrops formed on basement rocks, but in the north western edge of the mine lease area the soils are deeper sands and loams. Topsoil depth ranges from 0.05 to 0.50 m.

Vegetation

The project area occurs within the region covered by the Biodiversity Plan for the South Australian Murray–Darling Basin and within the Eastern Mount Lofty Ranges Regional Ecological Area (REA). There has been extensive clearance of native vegetation within the Eastern Mount Lofty Ranges REA, with only 6% of the pre-European settlement vegetation cover remaining (Ecological Associates, 2007).

Eight vegetation communities are present in the project area which are summarised in Table 5.

Table 5. Vegetation communities in the project area

Vegetation Community	Conservation Significance
<i>Eucalyptus odorata</i> low woodland	Class B and Class C EPBC Listed community
<i>Lomandra effusa</i> ± <i>Helichrysum leucopsideum</i> open tussock grassland	Class B (not impacted by the proposed expansion) and Class C communities impacted as discussed previously and in Attachment D and E
<i>Austrostipa</i> sp. open tussock grassland	Regional level, threatened.
<i>Callitris gracilis</i> low woodland	Regional level, threatened.
<i>E. leucoxydon</i> woodland	Regional level, threatened
<i>E. gracilis</i> ± <i>E. oleosa</i> open mallee	Not listed

<i>Acacia pycnantha</i> low woodland	Not listed
<i>Allocasuarina verticillata</i> , +/- <i>Callitris gracilis</i>	Not listed
Scattered trees	Not listed

Table 6 presents the areas of Class B and C Peppermint box grassy woodland and Iron-Grass Class C proposed to be cleared as part of the proposed expansion, including historical clearing as part of the approved PEPR.

Table 6 EPBC Vegetation communities of the Kanmantoo Copper Mine pit expansion area, taken from data provided from EBS, 2013 (Attachment E)

	PEPR Approved Disturbance (2011)	Proposed Additional LOM Disturbance	
Vegetation Community	Unclassified (survey prior to Policy Act 3.7 and communities listing)	Class B	Class C
Peppermint box grassy woodland	3.39 ha	3.23 (patches 10, 12 and 14)	1.18 (patches 11 and 13)
Iron-grass natural temperate grassland	7.89 ha		3.75 (patch 22)

3.3 (d) Outstanding natural features

There are no outstanding features such as caves or cliffs within the mine pit expansion area or in the adjacent areas.

3.3 (e) Remnant native vegetation

Apart from mining activity, over the past 50 years much of the Kanmantoo Copper Mine area and surrounds have been extensively cleared for agriculture and used for grazing and/or cropping. About three-quarters (325 ha, 74%) of the Kanmantoo Copper Mine lease area is either cleared (221 ha, 50.5%) or affected by previous mining activity (103 ha, 23.5%). Agricultural land is currently used for moderate to high-intensity sheep grazing. The remaining land (113 ha, 26%) of the mine lease area contains remnant vegetation.

3.3 (f) Gradient (or depth range if action is to be taken in a marine area)

The Kanmantoo Copper Mine area is dominated by northwest to southeast trending ridges, with surface elevations ranging from 150 to 260 m Australian Height Datum (AHD), which form several small sub-catchments and ephemeral creeks.

3.3 (g) Current state of the environment

Attachment C presents the current approved footprint within the mining lease. This includes significant areas comprising the tailings storage facility and integrated waste rock landform, mine pits and waste rock storage piles, linear infrastructure, processing plant and administration buildings, including car parking and other hard standing areas.

3.3 (h) Commonwealth Heritage Places or other places recognised as having heritage values

There are no known Commonwealth Heritage Places on the Register of the National Estate in the immediate vicinity of the mine expansion area, or the wider Kanmantoo Copper Mine lease area.

Non-indigenous cultural heritage of the project site is predominantly linked to farming and mining activities. Several historic buildings and unidentified building ruins have been identified in the Kanmantoo Copper Mine lease area including the Paringa homestead, and remains of the Paringa Engine House, flue between the engine house and the chimney stack and stone stack, stone-settling tank and the mine manager's residence. None of these sites are registered or are considered to have heritage value according to the *Heritage Places Act 1993*. All historic buildings and objects identified in the course of the survey were comprehensively documented, recording the nature of the structure/object and state of preservation utilising photography, measured scale drawings and GPS coordinates.

3.3 (i) Indigenous heritage values

The Kanmantoo Copper Mine lease area lies within the traditional territory of the Peramangk people. No sites or objects of indigenous archaeological or cultural heritage significance were identified within the area. Three creeks identified within the area were examined during the field survey, but no archaeological sites were discovered. A search for archaeological sites was also undertaken at three natural springs adjacent to creeks. No archaeological material was observed in the vicinity of the springs and they were not found to have any known traditional significance.

3.3 (j) Other important or unique values of the environment

No other important or unique values of the environment are known to exist in relation to the Kanmantoo Copper Project.

3.3 (k) Tenure of the action area (eg freehold, leasehold)

The Kanmantoo Copper Mine, including the mine pit expansion area is freehold land, held by Hillgrove's wholly owned subsidiary, Kanmantoo Properties Pty Limited. The mine pit expansion is within allotment 59, Plan Number D20509, within the Hundred of Kanmantoo, with full Tenure details provided in Table 7, below.

Table 7. Land Titles

Description	Allotment	Plan No.	Hundred
<i>Within ML area</i>			
Old integrated landfill	59	D20509	Kanmantoo
Paringa station	58	D20509	Kanmantoo
Paringa smelter block	57	D20509	Kanmantoo
<i>Surrounding Properties</i>			
Lot adjacent to southeast corner of ML along Éclair Mine Road.	25	D60948	Kanmantoo
Lot adjacent to Neutrog with site access road bisected property.	21	D80644	Kanmantoo
Lot containing eastern component site access road.	5	F1636	Kanmantoo
Lot two blocks south of lot 62.	1	F1636	Kanmantoo
Lot one block south of lot 62.	61	F160800	Kanmantoo
Lot at northern end of Mine Road.	62	F160801	Kanmantoo

3.3 (l) Existing land/marine uses of area

The existing land use comprises open cut mining operations as part of the Kanmantoo Copper Project.

Areas of disturbance from previous mining operations comprised approximately 103 ha (23.5%) of the ML area. The majority of these areas have not been actively used since the Kanmantoo Copper Mine closed, with the exception of exploration activities undertaken by Hillgrove and a previous heap leach operation adjacent to the old copper oxide stockpile. Apart from mining activity, over the past 50 years much of the ML area and surrounds have been extensively cleared for agriculture and used for grazing and/or cropping. About three-quarters (325 ha, 74%) of the ML area is either cleared (221 ha, 50.5%) or affected by previous mining activity (103 ha, 23.5%). Agricultural land is currently used for moderate to high-intensity sheep grazing. The remaining land (113 ha, 26%) of the ML area contains remnant vegetation, with some of this also being grazed.

The primary current land use in the Kanmantoo-Callington area is moderate- to high-intensity sheep grazing, although only a few commercial farms remain within the surrounding area. Land within the Mount Barker Local Government Area is predominately zoned as rural, with some land zoned as industrial.

No marine areas are present within the site, or within approximately 50km of the mining lease.

3.3 (m) Any proposed land/marine uses of area

Please refer information provided in Section 2.

4 Measures to avoid or reduce impacts

4.1 Overview

The following mitigation and management measures will be implemented to address the potential impacts outlined in Section 3. Mitigation measures to avoid a net loss of Peppermint box grassy woodlands discussed below which form components of the projects Native Vegetation Management Plan A revised Native Vegetation Management Plan has recently been submitted to DMITRE for approval (which is provided as a separate attachment to this referral), which includes detailed mitigation activities to create a significant environmental benefit (SEB) in relation to the proposed mining operations. This document is provided as a draft attachment to this referral and includes detailed offset calculations for rehabilitation and planting activities for each community at the site, including Peppermint box, together with details of environmental management practices, such as weed and pest control.

4.2 Rehabilitation of Degraded Peppermint Box Woodlands

19.5 ha of degraded (Class C and unclassified) Peppermint box grassy woodland is available to be rehabilitated within the mining lease under the current life of mine. Proposed management of these areas will comprise bushcare programs to meet the following objectives:

- Reduce the influence of weeds;
- Incorporate additional plantings to increase the diversity of understorey vegetation within this community from local provenance; and
- Remove grazing pressures which historically resulted in the degradation of these communities.

These activities aim to increase the understory diversity within these communities with a vision of rehabilitating to Class B or Class A. This vision would allow no net loss of Peppermint box grassy woodland which meets the EPBC criteria (DEWHA, 2007).

4.3 Planting of *Eucalyptus odorata* Woodlands

4.3.1 Revegetating Disturbed Areas

Hillgrove's objective in revegetating disturbed areas is to expand and link areas of *E. odorata* grassy woodland within the project area. A total of 334.68 ha is anticipated to be available for vegetation to Peppermint box woodland within the mining lease. This will depend to some extent upon the suitability of landforms and constraints regarding soil conditions and closure components of the mine. This will include 19.64 ha of revegetation of native pasture and abandoned cropping land to *E. odorata* woodland to link existing patches of *E. odorata* grassy woodland.

It is intended that disparate vegetation remnants will be connected across the landscape providing, in time, links for dependant fauna. Vegetation communities dominated by *Eucalyptus odorata* would be successfully replanted through direct seeding and subsequent revegetation, although the ecological complexity of ecosystems, especially those in very good and good condition, will be impossible to re-establish in the short term. In the long term it is anticipated that these areas should be able to recover full ecological function, particularly as fauna habitat. Local climatic conditions will play a significant role in the success of any revegetation activities in the project area.

To meet this objective, Hillgrove proposes to:

- Commence rehabilitation and revegetation of areas dominated by introduced pasture with the potential to act as linkages of habitat for threatened fauna, such as areas dominated by introduced pasture which intersperse patches of good condition *E. odorata* vegetation to the north and northwest of the existing pit.
- Progressively rehabilitate and revegetate areas disturbed during operation of the mine, wherever practicable.
- Revegetate the TSF and waste rock storage area on project closure.
- Revegetate roadsides along the access road route.

4.3.3 Offset Planting

Additional off site planting is also proposed with approximately 345.85 ha available for revegetation activities. The nature and extent of off site vegetation activities is currently under review, which will be developed in consultation with DMITRE and associated stakeholders to meet South Australian significant environmental benefit (SEB) offset requirements. This is anticipated to include planting of *Eucalyptus odorata* woodland.

4.3.4 Seed Collection

As the Kanmantoo Project will require large quantities of seed for rehabilitation, project staff will work closely with contractors to capitalise on favourable seasons, and ensure that sufficient seed is acquired and stored from the local provenance in good seasons. As of March 2008, Blackwood Seeds have collected *E. odorata*, *L. effusa* and other native seed stock for use in revegetation activities. Plant trials are underway and an onsite nursery has been established, which is managed by Hillgrove Resources onsite Environmental Advisor. Further details are provided in the project's Native Vegetation Management Plan (Hillgrove 2013).

4.4 Weed Management

Weed management practices will continue to be implemented to reduce the spread of weed species at the site, including into Peppermint box grassy woodland patches. Eradicating existing weeds in the project area has proved difficult due to the well-established nature of many of these species. As a result, efforts have concentrated on eradicating any new populations of previously unknown weed species and controlling the density and distribution of existing known weed infestations in these areas.

Measures designed to avoid, minimise and manage the risks associated with weed infestations as a result of the project include:

- Reducing the area of vegetation to be cleared and disturbed as a first priority.
- Ensuring that vehicles and project equipment arrive on site clean and free of vegetative matter, seeds and mud.
- Liaising with the South Australian Government agencies and the Kanmantoo–Callington Landcare Group on appropriate measures to eradicate or control weed outbreaks, should they occur.
- Focusing on the control of declared weed species present in the project area (e.g., bridal creeper), and the prevention of their spread during the life of the project.
- Targeting weed control measures for any observed significant increase in the distribution or density of existing weeds.
- Targeting weed control measures for new populations of weeds identified in previously uninfested areas.
- Inspecting construction areas for weed outbreaks following rainfall events.
- Monitoring regularly areas with a high potential for, or susceptibility to, weed invasion, such as along roadsides and recently cleared areas.

- Controlling and/or preventing weed infestations in topsoil stockpiles to minimise the likelihood of weed introduction during respreading of topsoil.
- Instigating the progressive rehabilitation of disturbed areas as outlined in the Mine Closure and Rehabilitation Plan (Hillgrove, 2013) to reduce the potential for weed species to become established, where practical.

4.6 Animal Grazing Management

Controlling grazing animals within the project area will assist in:

- Reducing grazing pressure on remnant native vegetation within the project area.
- Limiting the spread of weeds within the project area.
- Minimising the potential for vehicle accidents with large fauna.
- Maximising the potential success of progressive rehabilitation activities.

Measures designed to avoid, minimise and manage the risks associated with an increased attraction of grazing animals to the project area include:

- Maintaining perimeter fencing to prevent stock access to the project area.
- Managing revegetated areas that form part of SEB offsets to prevent overgrazing from native fauna (e.g., wallabies and kangaroos), introduced pest animals (e.g., rabbit and hare) and stock.
- Minimising the potential for water to pool in areas where it is applied as a dust suppressant (e.g., along unsealed access roads), thereby reducing the attraction for animals.
- Managing pest animals to reduce grazing impacts, should this be necessary.

4.5 Minimising Clearance

Since project onset, Hillgrove has strived to reduce the area of vegetation originally proposed to be cleared through the design of infrastructure layout (i.e., locating the abandonment bund where possible on existing tracks).

Areas where the clearing of communities of conservation value has been minimised including, patches of vegetation in very good condition (*E. odorata* grassy woodland, *L. effusa* open tussock grassland to the immediate south of the existing open pit and *Austrostipa* sp. open tussock grassland on the western slope of MacFarlane Hill), good condition (*E. leucoxydon* open woodland) and moderate condition (*L. effusa* open tussock).

Since project onset, the amount of *E. odorata* grassy woodland in very good condition to be cleared has reduced. This has been achieved in part by relocating the tailings storage facility and designing the open pit and the haul road (relocating it to the western side of the pit) to avoid disturbance to *E. odorata* grassy woodland.

4.6 Appropriately Managing the Clearing of Unavoidable Listed Ecological Community patches

Measures to appropriately manage the clearing of vegetation, where the above steps cannot avoid this, include:

- Educating workers in the importance of protecting native vegetation by:

- Including the education of all construction personnel in the identification of threatened plant species during the induction process.
- Ensuring that plant identification charts and or information sheets are readily available and displayed in prominent locations (e.g., site offices, mess rooms).
- Protecting areas of vegetation to be retained by:
 - Ensuring areas of vegetation to be retained are clearly marked on site plans.
 - Clearly marking ‘no go’ zones (e.g., with fencing or bunding) to ensure areas to be protected are clearly defined, identified and avoided.
 - Avoiding introduction of soil pathogens to areas of remnant vegetation by identifying and clearly demarcating soil stockpile sites.
- Developing site-specific vegetation clearance protocols for all personnel to follow. These protocols will include:
 - A step-by-step process to follow prior to commencing the clearing of any native vegetation.
 - A vegetation clearance request form or similar that must be signed-off by the appropriate person (e.g., on-site Environmental Officer) prior to commencing the clearing of any vegetation.
 - The requirement for verification of areas to be cleared.
 - The requirement for verification of areas to be retained.
 - A continuous-checking system to minimise the potential for inadvertent clearing of native vegetation.
 - Only clearing areas immediately prior to their development.
 - Ensuring clearing and ground disturbance is only undertaken within designated areas.

Disturbed areas will be progressively rehabilitated and unnecessary future disturbance of these areas will be avoided.

Regular auditing will be done to assess the compliance of all personnel with the vegetation clearance protocols.

Measures to mitigate the unavoidable clearance of vegetation in the project area include:

- Working with local interest groups and other stakeholders to maximise the benefits of the revegetation programs.
- Revegetating, using appropriate species, to link isolated vegetation remnants within the project area.
- Where possible, relocating threatened flora species that will be disturbed by the project, such as *Diuris behrii*, in consultation with local interest groups and South Australian Government agencies.
- Establishing in-house environmental capabilities to develop, apply and manage revegetation programs throughout the life of the project.
- Establishing methods to monitor and maintain progressively rehabilitated and revegetated areas, including:
 - Establishing 360° photo-monitoring points throughout the project area.
 - Conducting post closure follow-up visits to the project area on a regular basis (of a decreasing frequency with time) to monitor the success rate of seedling emergence and survival, weed invasion, browsing levels (i.e., insect and animal attack of regenerating vegetation) and erosion, using photo-monitoring points to track progress.

- Ensuring that the monitoring program reflects agreed closure criteria established through consultation with stakeholders.
- Acting where monitoring has identified erosion, weed invasion, failure of revegetation (to a material degree) or excessive browser damage to regenerating vegetation. This may include:
 - Repairing eroded areas.
 - Controlling weeds (chemical, mechanical, and manual methods).
 - Controlling pests (baiting, fencing, ripping etc.).
 - Infill planting.
 - Spot sowing.
 - Reseeding.

5 Conclusion on the likelihood of significant impacts

5.1 Do you THINK your proposed action is a controlled action?

x	No, complete section 5.2
	Yes, complete section 5.3

5.2 Proposed action IS NOT a controlled action.

Proposed mitigating measures, as discussed in Section 4, comprise significant rehabilitation activities to existing Class C and unclassified Peppermint box grassy woodlands present within the mining lease. A revised Native Vegetation Management Plan has recently been submitted to DMITRE for approval, which includes detailed mitigation activities to create a significant environmental benefit (SEB) in relation to the proposed mining operations, complying with regulatory requirements. This document is provided as a draft attachment to this referral and includes detailed offset calculations for rehabilitation and planting activities for each community at the site, including Peppermint box. The Native Vegetation Management Plan also details environmental management practices to rehabilitate Peppermint box woodlands and other vegetation communities, such as weed and pest control.

These activities aim to avoid a net loss of Class B Peppermint box grassy woodlands through the provision of a significant environmental benefit. Additional planting of *Eucalyptus odorata* is also proposed which has the potential to create Peppermint box grassy woodlands through appropriate management of the understorey flora. Further details can be found in the Native Vegetation Management Plan, provided as a separate attachment to this referral.

No other matters of National Significance have been identified as potentially impacted by the proposed expansion activities.

5.3 Proposed action IS a controlled action

Matters likely to be impacted

<input type="checkbox"/>	World Heritage values (sections 12 and 15A)
<input type="checkbox"/>	National Heritage places (sections 15B and 15C)
<input type="checkbox"/>	Wetlands of international importance (sections 16 and 17B)
<input type="checkbox"/>	Listed threatened species and communities (sections 18 and 18A)
<input type="checkbox"/>	Listed migratory species (sections 20 and 20A)
<input type="checkbox"/>	Protection of the environment from nuclear actions (sections 21 and 22A)
<input type="checkbox"/>	Commonwealth marine environment (sections 23 and 24A)
<input type="checkbox"/>	Great Barrier Reef Marine Park (sections 24B and 24C)
<input type="checkbox"/>	Protection of the environment from actions involving Commonwealth land (sections 26 and 27A)
<input type="checkbox"/>	Protection of the environment from Commonwealth actions (section 28)
<input type="checkbox"/>	Commonwealth Heritage places overseas (sections 27B and 27C)

6 Environmental record of the responsible party

	Yes	No
<p>6.1 Does the party taking the action have a satisfactory record of responsible environmental management?</p> <p>Provide details</p> <p>Hillgrove Resources have undertaken environmental activities in accordance with approval requirements during the life of the Kanmantoo Copper Mine. Hillgrove Resources maintain strict environmental practices, managed by the site Environmental Manager and site Environmental Advisor. Details of Hillgrove's environmental policy is provided in Section 6.3.</p>	X	
<p>6.2 Has either (a) the party proposing to take the action, or (b) if a permit has been applied for in relation to the action, the person making the application - ever been subject to any proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources?</p> <p>No.</p> <p>If yes, provide details</p>		X
<p>6.3 If the party taking the action is a corporation, will the action be taken in accordance with the corporation's environmental policy and planning framework?</p>	Y	

If yes, provide details of environmental policy and planning framework

Hillgrove is committed to achieving best practice outcomes through:

- High operating standards in all aspects of its activities to minimise environmental impact and prevent environmental harm.
- Communication and consultation with all stakeholders.
- Employee awareness of sound environmental practice as part of day-to-day activities.
- Continuous improvement through measurement of environmental performance.
- Regular audits and review of policies, systems and procedures.
- Compliance with applicable legislation.

This commitment is captured in Hillgrove’s environmental policy, which is signed by both the Managing Director and the Hillgrove General Manager. Compliance with the policy is emphasised in the company’s induction program. The commitment is also demonstrated through the company’s corporate governance principles and by Hillgrove’s appointment of an Environment Manager for the project, based on site, who is supported by an Environmental Advisor, with a focus upon vegetation management.

Hillgrove recognises that all activities impact on the environment. Since it is not possible to eliminate all impacts, Hillgrove’s policy is to engineer and conduct operations with the objective of achieving best practice so that adverse effects on the environment are minimised and benefits are maximised. Hillgrove’s Kanmantoo operation has adopted the environmental policy by developing site-specific procedures and documentation that will support the implementation of the environmental policy.

These will include the following (many of these are currently at draft stage and are pending final approval to proceed before getting finalised):

- Safety, health, environment and social commitments, policies, objectives and targets.
- Environmental management plans (EMPs).
- Standard operating procedures (SOPs).
- Internal audit and work place inspections.

The Kanmantoo Copper Project management team is committed to the implementation of the environmental policy, and developing processes and documentation that reflect the environmental, social and regulatory setting specific to the Kanmantoo Copper Project.

6.4 Has the party taking the action previously referred an action under the EPBC Act, or been responsible for undertaking an action referred under the EPBC Act?

Yes.

Provide name of proposal and EPBC reference number (if known)

2007/3314

x

7 Information sources and attachments

7.1 References

Aquaterra. 2007. Surface water yield assessment report. Prepared for Hillgrove Resources.

Coffey. 2011. Kanmantoo Copper Project: Program for Environment Protection and Rehabilitation. Prepared for Hillgrove Resources.

Davies, R.J.P. 1986. Threatened Plant Species of the Mt Lofty Ranges and Kangaroo Island Regions of South Australia. Conservation Council of South Australia. Adelaide, South Australia.

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DEH. 2007. No species loss. A nature conservation strategy for South Australia 2007-2017. Department for Environment and Heritage.

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DENR. 2012a. Plant distribution mapper: *Caladenia tensa* A WWW publication accessed 7 May <http://www.flora.sa.gov.au/mapper2.shtml>

DENR. 2012b. Plant distribution mapper: *Acacia menzeli* A WWW publication accessed 7 May <http://www.flora.sa.gov.au/mapper2.shtml>

DENR. 2012c. Plant distribution mapper: *Glycine latrobei* A WWW publication accessed 7 May <http://www.flora.sa.gov.au/mapper2.shtml>

DEWHA. 2009. *Matters of Environmental Significance. Significant impacts guidelines 1.1. Environmental Protection and Biodiversity Conservation Act 1999.*

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DSEWPaC. 2012e. *Euphrasia collina* subsp. *osbornii* – Osborn's eyebright SPRAT profile. A WWW publication accessed 8 May 2012 at http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=3684

DSEWPaC. 2012f. *Acacia menzeli* – Menzel's wattle SPRAT profile. A WWW publication accessed 8 May 2012 at http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=13910

DSEWPaC. 2012g. *Glycine latrobeana* – clover glycine SPRAT profile. A WWW publication accessed 8 May 2012 at http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=9218

DSEWPaC. 2007. EPBC Act Policy Statement 3.7 Nationally Threatened Species and Ecological Communities. Peppermint Box (*Eucalyptus odorata*) Grassy Woodland of South Australia and Iron-grass Natural Temperate Grassland of South Australia.

EBS Ecology. 2011. Bird and Brushtail possum survey. Prepared for Hillgrove Resources.

EBS Ecology. 2013. *EPBC Vegetation Survey to classify Peppermint Box (Eucalyptus odorata) grassy woodlands of South Australia and Iron-grass Natural Temperate Grassland of South Australia at the Kanmantoo Copper Mine.*

Ecological Associates, 2006a. Targeted survey for threatened flora species and weed species. Prepared for Hillgrove Resources.

Ecological Associates. 2006b. Targeted surveys for EPBC nominated *Eucalyptus odorata* woodland and *Lomandra effusa* grassland. Prepared for Hillgrove Resources.

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Moritz, K.N. and Bickerton, D.C. 2010. *Recovery Plan for the Nationally Endangered Osborn's Eyebright Euphrasia collina subsp. osbornii.* Report to the Recovery Planning and Implementation Section, Australian Government Department of the Environment, Water, Heritage and the Arts, Canberra, ACT.

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Weber, J.Z., and Bates, R. 1986. Family – Orchidaceae. In: Jessup, J. P., and H.R. Toelken, eds. *Flora of South Australia*. 4:2053-2145. South Australian Government Printing Division, Adelaide, South Australia.

Willson, A., and Bignall, J. 2009. Regional Recovery Plan for Threatened Species and Ecological communities of Adelaide and the Mount Lofty Ranges, South Australia. Department for Environment and Heritage, Adelaide, South Australia.

7.2 Reliability and date of information

The information provided in this referral has been obtained from flora surveys and ecological assessments undertaken by reputable consultants with experience in the local area (Ecological Associates and EBS Ecology) over a period between 5 years. This includes community classification surveys in 2013 to map Peppermint Box grassy woodlands of South Australia and Iron-grass patches in accordance with EPBC Guidelines for these communities.

Surface and groundwater assessments have been prepared by SKM. Calculations of proposed areas requiring clearance have been undertaken by Hillgrove Resources, utilising vegetation mapping information provided by EBS Ecology. This EPBC Referral and the Project's PEPR has been prepared by Coffey Environments.

Information has also been obtained from DEWNR databases. The information is of reliable quality and any uncertainties are listed in the relevant reports.

7.3 Attachments

		✓ attached	Title of attachment(s)
You must attach	figures, maps or aerial photographs showing the project locality (section 1)	✓	Attachment A – Site Location Attachment C – Approved Project Outline Attachment D – Vegetation Communities by SEB Ratio for approved and proposed expansion footprints
	figures, maps or aerial photographs showing the location of the project in respect to any matters of national environmental significance or important features of the environments (section 3)	✓	Attachment D – Vegetation Communities by SEB Ratio for approved and proposed expansion footprints
If relevant, attach	copies of any state or local government approvals and consent conditions (section 2.5)		Link to approved project PEPR provided in document, due to the large size of the files and appendices.
	copies of any completed assessments to meet state or local government approvals and outcomes of public consultations, if available (section 2.6)		Link to approved project PEPR provided in document, due to the large size of the files and appendices.
	copies of any flora and fauna investigations and surveys (section 3)		Attachment E and link to approved project PEPR (which includes original flora and fauna surveys) provided in document, due to the large size of the files and appendices
	technical reports relevant to the assessment of impacts on protected matters that support the arguments and conclusions in the referral (section 3 and 4)		Attachment E and link to approved project PEPR (which includes original flora and fauna surveys) provided in document, due to the large size of the files and appendices
	report(s) on any public consultations undertaken, including with Indigenous stakeholders (section 3)		
	additional attachments		

8 Contacts, signatures and declarations

Project title: Kanmantoo Copper Mine Pit Expansion

Name Catherine Davis

Title Environment Manager

Organisation Hillgrove Resources

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Declaration I declare that to the best of my knowledge the information I have given on, or attached to
this form is complete, current and correct.

I understand that giving false or misleading information is a serious offence.

I agree to be the proponent for this action.

I acknowledge that I may be liable for fees related to my proposed action following the
introduction of cost recovery under the EPBC Act.

Signature



Date 09/08/13

8.2 Person preparing the referral information (if different from 8.1)

Name	Andy Harrison
Title	Associate Environmental Consultant
Organisation	Coffey Environments (Australia) Pty Ltd
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Email	andy.harrison@coffey.com
Declaration	I declare that to the best of my knowledge the information I have given on, or attached to this form is complete, current and correct. I understand that giving false or misleading information is a serious offence.
Signature	 Date 09/08/13

REFERRAL CHECKLIST

HAVE YOU:

- Completed all required sections of the referral form?
- Included accurate coordinates (to allow the location of the proposed action to be mapped)?
- Provided a map showing the location and approximate boundaries of the project area?
- Provided a map/plan showing the location of the action in relation to any matters of NES?
- Provided complete contact details and signed the form?
- Provided copies of any documents referenced in the referral form?
- Ensured that all attachments are less than two megabytes (2mb)?
- Sent the referral to the Department (electronic and hard copy preferred)?