

Referral of proposed action

Project title: Dugald River Zinc/Lead Mine Expansion, north-west of Cloncurry, Queensland

1 Summary of proposed action

1.1 Short description

MMG Dugald River Pty Ltd (MMG) is proposing to expand infrastructure at their established Dugald River Mine project in order to progress the mine to full operations. The proposed action involves the construction and operation of:

- a Tailings Storage Facility and associated pipelines and access roads;
- a 65 km power line from Chumvale substation to the site;
- expansion of an existing accommodation camp; and
- mine processing and operations infrastructure.

Exploration work is also proposed as part of the proposed action.

1.2 Latitude and longitude

Power line	
Latitude	Longitude
-20.7201	140.4038
-20.7193	140.4041
-20.6883	140.4129
-20.6744	140.4062
-20.6561	140.3799
-20.6340	140.3646
-20.6121	140.3510
-20.5698	140.3212
-20.5638	140.3200
-20.5466	140.3105
-20.5378	140.3070
-20.5311	140.3031
-20.5188	140.2939
-20.5133	140.2897
-20.5027	140.2807
-20.4789	140.2542
-20.4591	140.2535
-20.4482	140.2390
-20.4265	140.2171
-20.4202	140.2038
-20.4075	140.1868
-20.3684	140.1577
-20.3483	140.1468
-20.3105	140.1462
-20.2836	140.1655
-20.2722	140.1654
-20.2554	140.1656
-20.2542	140.1632
-20.2502	140.1605
-20.2498	140.1600

Mine site		
Location	Latitude	Longitude
North eastern corner	-20.17561	140.18662
North western corner	-20.17561	140.11273
South western corner	-20.28965	140.11273
South eastern corner	-20.28965	140.18662

1.3	Locality and property description					
	The Dugald River Mine is located approximately 85 km north-east of Mt Isa and 60 km north-west of Cloncurry in north-western Queensland. The proposed 60 km power line will run in a northerly direction from an existing substation at Chumvale (10 km west of Cloncurry) to the mine site. The location and layout of the project is shown in Figure 1 .					
1.4	Size of the development footprint or work area (hectares)	Total area of current and proposed infrastructure: 123.3 ha Total area of the power line corridor: 41.3 ha Total area of exploration activities: 28.5 ha				
1.5	Street address of the site	Dugald River Mine 65 km north of Cloncurry Burke Developmental Road Cloncurry Queensland Australia 4824				
1.6	Lot description					
	The mine tenement and power line corridor are comprised of 42 tenements: MDL79, ML2467, ML2468, ML2469, ML2470, ML2471, ML2477, ML2478, ML2479, ML2480, ML2481, ML2482, ML2496, ML2497, ML2498, ML2499, ML2500, ML2501, ML2502, M2556, ML2557, ML2558, ML2559, ML2596, ML2599, ML2601, ML2638, ML2684, ML2685, ML7496, ML90047, ML90049, ML90050, ML90051, ML90211, ML90212, ML90213, ML90218, ML90220, ML90230, ML90237, and MLA90231. Lot numbers and Tenure Holder details are outlined in Table 3.3 of the Environmental Impact Statement (EIS) completed at the state level and available on request.					
1.7	Local Government Area and Council contact (if known)					
	Cloncurry Local Government Area.					
1.8	Time frame					
	Construction activities for the mine expansion will commence around early March 2016. The mine will operate for an estimated 28 years.					
1.9	Alternatives to proposed action	<table border="1"> <tr> <td>X</td> <td>No</td> </tr> <tr> <td></td> <td>Yes, you must also complete section 2.2.</td> </tr> </table>	X	No		Yes, you must also complete section 2.2.
X	No					
	Yes, you must also complete section 2.2.					
1.10	Alternative time frames etc	<table border="1"> <tr> <td>X</td> <td>No</td> </tr> <tr> <td></td> <td>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).</td> </tr> </table>	X	No		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).
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1.11	State assessment	<table border="1"> <tr> <td></td> <td>No</td> </tr> <tr> <td>X</td> <td>Yes, you must also complete Section 2.5</td> </tr> </table>		No	X	Yes, you must also complete Section 2.5
	No					
X	Yes, you must also complete Section 2.5					
1.12	Component of larger action	<table border="1"> <tr> <td>X</td> <td>No</td> </tr> <tr> <td></td> <td>Yes, you must also complete Section 2.7</td> </tr> </table>	X	No		Yes, you must also complete Section 2.7
X	No					
	Yes, you must also complete Section 2.7					
1.13	Related actions/proposals	<table border="1"> <tr> <td>X</td> <td>No</td> </tr> <tr> <td></td> <td>Yes, provide details:</td> </tr> </table>	X	No		Yes, provide details:
X	No					
	Yes, provide details:					

1.14	Australian Government funding	X	No
			Yes, provide details:
1.15	Great Barrier Reef Marine Park	X	No
			Yes, you must also complete Section 3.1 (h), 3.2 (e)

2 Detailed description of proposed action

2.1 Description of proposed action

MMG proposes to further develop the Dugald River Mine which is estimated to contain 53 million tonnes (Mt) of zinc/lead/silver and copper resource. The Dugald River Mine is located approximately 65 km north-west of Cloncurry, Queensland (see **Figure 1**).

The mine will use conventional underground mining techniques to recover and process approximately 1.5 Mtpa producing approximately 300,000 T of zinc/silver concentrate and 25,000 T of lead/silver concentrate. Once the mine is fully operational it will operate 24 hours a day, 7 days a week over an estimated 28 year mine life.

The mine was initially established in 2011. The following infrastructure is currently on site and either currently operational or work is presently underway to make it operational:

- two mine portal entrances;
- two underground mine declines (North and South mines);
- Potentially Acid Forming (PAF) & Non Acid Forming (NAF) pads and ponds;
- mine access roads;
- water pipeline which provides raw water supply to site (from the Lake Julius/ Ernest Henry Pipeline);
- raw water pipelines between the process plant and the accommodation camp;
- sewage treatment plants and STP dam;
- telecommunications infrastructure;
- camp accommodation; and
- main access road to site.

The site also contains cleared areas of land which have been prepared for future construction of the process plant and associated infrastructure (see **Figure 2**).

In order for the mine to become fully operational, MMG is proposing to further expand the existing infrastructure at the Dugald River Mine site. The proposed action which is the subject of this referral involves the construction and/or operation of this infrastructure, including the following mine components:

- Tailings Storage Facility (TSF) and associated pipelines/access roads;
- a 65 km power line from Chumvale substation to the Dugald River Mine site;
- accommodation facilities (expansion of existing accommodation camp); and
- mine infrastructure (process plant, administration buildings etc.) and operation.

Further exploration will be undertaken and resource appraisal activities are ongoing in order to further map and evaluate the ore body within the mine tenement. **Figures 3 and 4** illustrate the location of the infrastructure components and exploration activities proposed within the mine site. **Figure 5** illustrates the location of the proposed power line.

The total future disturbance footprint associated with these activities will be 151.9 ha within the mine tenement and a further 41.3 ha for construction of the power line (also located within existing mining tenements).

Timing for this work is proposed to commence with the end of the wet season in early March 2016.

A detailed description of each of the components of the proposed action is provided below.

Tailings Storage Facility (TSF) and associated pipelines

Construction

Tailings resulting from the processing plant will be disposed of to a purpose built Tailings Storage Facility (TSF). The TSF will be located in a long, narrow bifurcated valley running north-south on the western side of the Knapdale Range (**Figure 3**). The valley is approximately 4 km north-west of the processing plant location. Tailings containment will be almost entirely provided by the natural valley topography. Tailings will be pumped up into the TSF from the process plant through a series of pipelines (**Figure 3**). The TSF will allow for the containment of 22.8 Mt of solid tailings (41.6 MT slurry) over the estimated 28 year life of the mine. The total direct footprint of the TSF will be 100.3 ha.

Construction of the TSF will be from the inside of the valley floor and will involve:

- clearing of vegetation within the valley floor using scrapers and graders;
- stockpiling of topsoil for rehabilitation;
- construction of a main embankment to enclose the main opening of the valley;
- construction of embankments and bunds using rock fill to constrain tailings within MMG's mining tenure; and
- construction of a seepage collection pond.

Three pipelines will be constructed between the processing plant and the TSF. These pipelines will allow tailings to be pumped to the TSF and return decant water to the process plant. They include:

- a tailings pipeline running to the northern end of the TSF;
- a tailings pipeline running towards the southern end of the TSF; and
- a raw water pipeline running from the TSF in an easterly direction to the accommodation camp.

The tailings pipelines will be constructed from steel with Victaulic style couplings. The piping system will be a low pressure system. The easement along the edge of the existing access road includes longitudinal bunds that would channel any leak within the easement. The steel line will be constructed above ground on concrete sleepers with clearance under the steel line.

The pipelines will be installed alongside the existing access road and water pipelines which currently exist between the processing plant and accommodation camp. Between the accommodation camp and TSF, the pipelines will be positioned within a bunded easement alongside new access roads. The new access roads will comprise of single lane, dirt tracks requiring an average 20 m width for construction. The indicative alignments for the road and pipeline corridors are shown in **Figure 3**. Avoidance of potential habitat for the Carpentarian Antechinus will be one of the key factors in identifying the final alignment. The final alignment will be determined following detailed design and ground truthing..

Construction of the TSF and associated pipelines/access roads is likely to take approximately 6 months (scheduled for June 2016 – December 2016).

Operation

Zinc and lead tailings will be combined with a carbon pre-flotation cleaner concentrate and pumped to the tailings thickener. The slurry will be thickened, then pumped to the TSF via the tailings pipelines (or to the paste-fill plant for use in the underground mine operations). Tailings thickener overflow water will be recycled through to the process-water circuit. Water will be decanted from the TSF and returned via the tailings pipelines to be recycled through the plant process-water circuit.

The process control system would detect and alarm on blocked flow, low pressure or other abnormal flow situations. In addition, daily visual inspections of the tailings line will be carried out during operation.

The access roads will be operational for the life of mine with an operational footprint of 8 m. This width allows for a nominal 4 m wide road with a 2 m shoulder to each side and a bunded section for the pipelines. During construction of the TSF, the roads will be used by construction vehicles during the day. Following TSF construction, traffic is expected to be a light vehicle once daily during daylight hours for inspection purposes only.

Power line

Construction

MMG propose to construct a 220 kV line running south-east from the Dugald River Mine to the Chumvale substation west of Cloncurry to provide a permanent electricity supply to the mine (see **Figure 5**).

A 100 m power line corridor has been identified. Determination of the location and number of poles within this corridor is awaiting detailed design. As an indication, it is expected around 182 poles will be required and these will be spaced at an average distance of 300 – 350 m apart. The poles are proposed to be single steel pole structures approximately 35 m high. Avoidance of potential habitat for the Carpentarian Antechinus will be one of the key factors in identifying the final design.

During construction a nominal 6 m wide access track will be required along the full length of the line within the 100 m power line corridor. At each pole location a pad approximately 15 m by 20 m (300 m²) will be cleared on the high side of the pole to allow for erection of the pole. Approximately every 4 km a larger area will be cleared to enable the placement of conductor winching machines for drawing the conductors.

Construction of the power line is scheduled to commence as weather conditions become favourable around March 2016 and is estimated to take approximately 1 year and 3 months.

The total footprint of the power line corridor resulting from construction activities will be approximately 41.3 ha.

Operation

Vegetation clearance envelopes will be maintained along the power line corridor to ensure protection of the line from fire and/or physical damage once constructed.

Accommodation camp

Construction

Employees of the Dugald River Mine will be housed in an onsite accommodation camp during their time at the mine. Accommodation facilities currently exist on the project site. These facilities provide residence for 100 employees. They are located north-west of the existing mine operations area, on the eastern side of the Knapdale Range. These facilities are proposed to be expanded in order to accommodate an additional 250 employees (350 person camp). An additional 9.6 ha will be cleared directly adjacent to the existing facilities to allow for construction of the expanded accommodation camp (see **Figure 3**).

The accommodation camp will be cleared of vegetation using a grader and/or dozer with topsoil being stripped by scrapers or dozers and trucks and placed nearby. The accommodation units will be delivered to site by road trains and lifted into place using cranes. Services to the buildings will then be connected.

Construction of the accommodation camp is scheduled to commence as weather conditions become favourable around March 2016 and is estimated to take approximately 6 months.

Operation

The accommodation camp will be operational 24 hours/ 7 days a week. Movement of people, general activity and lighting will all be associated with an operating camp.

Treated sewage effluent from the accommodation facility (and production facilities), will be disposed of to the STP Dam. All general waste on site will be removed and recycled where possible.

Mine infrastructure and operation

Construction

Additional mine operation infrastructure will be constructed within an existing cleared area which currently supports a number of buildings constructed for the establishment of the mine. Additional mine operation infrastructure to be constructed includes:

- a crushing and grinding circuit;
- flotation plant including associated; regrind, lead thickening, zinc thickening and filtration;
- concentrate storage; seven days bulk storage of zinc concentrate on site (supplementary storage will be in containers). All lead concentrate storage will be in containers;
- reagents storage facility and vehicle wash bay;
- Paste Fill Plant; Cement Rock Fill and paste fill plant for life of mine;
- plant workshop and warehouse;
- laboratory, crib and ablution building, weighbridge, bus stand and walkways; and
- buildings including change house and mine training, heavy and light vehicle wash down area.

Operation

The zinc/lead/silver ore will be mined from underground by conventional mechanised methods (longhole open stoping and modified benching). The mine will be approximately 2.0 km along strike and 1.0 km deep. Twin declines (already established) will be used to haul ore and waste from the mine in diesel powered trucks. All ore and waste will be drilled and blasted. The mine will be ventilated via five vertical shafts. The twin declines separate the mine into two distinct operating areas, the South Mine and the North Mine. Each area will have independent networks for ventilation, power, water and drainage and they will be joined by link drives every 150 m vertically. Mined out voids will be backfilled with either rock fill, using waste rock, or paste fill, using process plant tailings.

There will be a separate processing plant circuit for the zinc/lead/silver ore. Processing of the zinc/lead/silver ore will be through a conventional flotation and concentrating plant producing approximately 300,000 tpa of zinc/silver concentrate and 25,000 tpa of lead/silver concentrate. Total concentrate production at full production will be approximately 325,000 tpa. The final concentrate products will be stored in a fully enclosed shed, prior to being transported off site.

The main form of excavated waste produced by the mine will be waste rock from the underground workings. Waste rock will be disposed of underground, stockpiled at surface, or used for construction of roads, mine pads, or other site infrastructure. Some non-acid forming waste rock will also be used for encapsulating potentially acid forming material in a specifically designed waste rock dump. The other excavated waste during the construction phase will be in the form of civil cut materials which will be removed from the stormwater dam and sediment pond areas at the mine and processing area during construction. On mine closure the majority of non-acid forming material remaining on the surface will be used in the rehabilitation of the TSF.

The concentrates will be stored onsite in half height closed containers adjacent to the ore processing facility. A forklift will load the containers onto triple road trains that will transport the containers on the existing sealed highway from Dugald River to a container handling facility just east of Cloncurry. The containers will be loaded on an intermodal train for transportation along the existing Mt Isa System to the rail yard in Townsville. The containers will be lifted off the wagons and transported to registered stevedoring storage areas within the Townsville Port precinct. The concentrate will either be stored in the containers or discharged into a concentrate storage facility. The concentrates will then be reclaimed and loaded back into a container to be loaded into the vessel hold by a rotainer system. Contracted vessels will then deliver concentrates via established east coast shipping routes to market destinations in Asia.

This supply chain is comprised entirely of existing infrastructure and facilities. Concentrates from the Dugald River mine will contribute to an incremental increase in the number of trucks and ships which are already operating along these routes. As a result, there are no impacts expected from the Dugald River mine in relation to this supply chain.

Exploration drilling

MMG propose to undertake further exploration of the ore body on the western side of the Knapdale Range (see **Figure 4**). Exploration activities will involve:

- clearing and earthworks along a series of exploration drilling lanes to allow for 4WD access; and
- drilling of short holes every 5 m along each drilling lane (base of weathering).

Exploration drilling lines are spaced 100 m apart. The total footprint of the proposed exploration drilling program will be 28.5 ha.

Decommissioning and rehabilitation

On closure and decommissioning of the Dugald River Mine, it is proposed to return the majority of disturbed land to a condition similar to the pre-existing condition of low intensity grazing, native habitat or an agreed beneficial use. The three main areas that will be disturbed as a result of the mine are the:

- processing plant/mining area;
- the accommodation camp area; and,
- the TSF.

Due to the potentially acid forming nature of the tailings, rehabilitation of the tailings storage facility will include a capillary break, a low permeability sealing layer and a water-shedding layer of waste rock as capping material. This will be covered with topsoil and revegetated with shallow-rooting native species. This area will be rehabilitated with a view to re-create habitat for the threatened Carpentarian Antechinus (see further information in section 3 below).

The material from waste rock dumps will be disposed of underground or rehabilitated using a compacted low permeability layer of waste rock, followed by a thicker layer of non acid forming, watershedding waste rock. The top of the dump will be gently sloped to prevent water pooling on the surface. Potentially acid forming waste rock will be disposed of underground. Non-acid forming waste rock will be disposed of underground or used for rehabilitation of site infrastructure or Carpentarian Antechinus habitat.

Most of the stormwater dams, sediments ponds and roads on site will be returned to their pre-mining land use and suitability. The stormwater dam downstream of the rehabilitated waste rock dump will be retained to remove sediment from rainfall runoff from this permanent land form.

The water pipeline and power transmission line will be retained on mine closure as this infrastructure may be of beneficial use to the region or future mining operations. The access road may also be retained through written agreement with the landholder.

2.2 Alternatives to taking the proposed action

There are no feasible alternatives to taking the action. The type of activities and location of the action are driven by the presence of a significant underground mineral resource. The only alternative would be a 'do-nothing' scenario which would have negative economic and employment repercussions.

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

There are no alternative time frames, locations or activities proposed.

2.4 Context, planning framework and state/local government requirements

Relevant legislation and policy requirements for the project include:

- *Environmental Protection Act 1994*;
- *Environmental Protection Regulation 2008*;
- *Environmental Protection (Water) Policy 2009*;
- *Environmental Protection (Noise) Policy 2008*;
- *Environmental Protection (Air) Policy 2008*;
- *Environmental Protection (Waste Management) Policy 2000*;
- *Environmental Protection (Waste Management) Regulation 2000*;
- *Mineral Resources Act 1989*;
- *Sustainable Planning Act 2009*;
- *Water Act 2000*;
- *Water Regulation 2002*;
- *Water Resource (Gulf) Plan 2007*;
- *Environment Protection and Biodiversity Conservation Act 1999*;
- *Nature Conservation Act 1992*;
- *Nature Conservation (Wildlife) Regulation 2006*;

- *Vegetation Management Act 1999*;
- *Land Protection (Pest and Stock Route Management) Act 2002*;
- *Aboriginal Cultural Heritage Act 2003*;
- *Queensland Heritage Act 1992*;
- *Native Title Act 1993*;
- *Transport Infrastructure Act 1994*;
- *Fisheries Act 1994*;
- *National Greenhouse and Energy Reporting Act 2007*; and
- *Energy Efficiency Opportunities Act 2006*.

A detailed discussion of the requirements for each piece of legislation/policy has been provided in the Dugald River Environmental Impact Assessment Report (AARC 2010). This report can be provided upon request.

2.5 Environmental impact assessments under Commonwealth, state or territory legislation

The Dugald River Project has been assessed and approved under the Queensland *Environmental Protection Act 1994* (EP Act). A voluntary Environmental Impact Statement for the 'Dugald River Project' was prepared in 2010 by AARC (2010). The project was assessed by the Queensland Department of Environment and Resource Management (DERM), with approval given for the project in November 2011. The Environmental Impact Statement (AARC 2010) and associated DERM Environmental Impact Statement (Report) under the *Environmental Protection Act 1994* (DERM 2011) are available and can be provided on request.

An environmental authority was first issued by the Department of Environment and Heritage Protection in 2012. The current environmental authority (permit number EPML00731213) was issued on 17 March 2015.

The relevance of the EPBC Act was originally considered as part of planning and approvals for the mine. MMG showed due diligence during this stage of the project by:

- considering the potential presence of MNES as part of ecological survey work in 2011; and
- seeking specialist EPBC Act advice from Ashgrove Environmental in April 2012.

Database searches for protected matters using the Commonwealth's PMST were carried out in October 2008, April 2011 and again in April 2012. These searches identified a small number of potential MNES within the area. The key results and conclusions of this work are as follows:

- Database searches identified the potential for the following matters to occur within the project area:
 - Three threatened species including the endangered *Sminthopsis douglasi* (Julia Creek dunnart), the vulnerable *Pristis microdon* (Freshwater sawfish) and the vulnerable *Rostratula australis* (Australian Painted Snipe).
 - Ten migratory species, all birds, including migratory marine birds, migratory terrestrial species and migratory wetland species.
 - Eleven listed marine species, including ten birds (some of which are also listed migratory species) and *Crocodylus johnstoni* (freshwater crocodile or Johnston's crocodile).
- The project area was considered unlikely to support any of the listed threatened species based on information about the species' known ranges, lack of suitable habitat on site and absence of any records.
- Three migratory/marine species were identified on site (including the Whistling Kite (*Haliastur sphenurus*), Rainbow Bee-eater (*Merops ornatus*) and Sacred Kingfisher (*Todiramphus sanctus*) however these were common and widespread and the EIS concluded no significant impacts on these species.
- The remaining migratory/marine species were not considered to be relevant based on a lack of suitable or important habitat and considering their mobility and widespread distributions.

All together, significant impacts to any MNES were considered unlikely and a referral for the project was not submitted to the Commonwealth at this time.

However, in May 2015 an individual Carpentarian Antechinus (*Pseudantechinus mimulus*), listed as vulnerable under the EPBC Act) was recorded as part of regular monitoring required for the state-listed Purple-necked Rock Wallaby (a non-EPBC listed species).

This species was not previously identified through any on-ground surveys or protected matters searches. The closest known record to the mine site prior to this discovery was located at Lunch Creek (Woolley 2011), approximately 60 km to the south-west. In response to the discovery of the species, MMG commissioned targeted survey and habitat mapping work, and ensured no further ground disturbances at the site. The discovery of the Carpentarian Antechinus also prompted the preparation and submission of this referral.

2.6 Public consultation (including with Indigenous stakeholders)

Public consultation was undertaken as part of statutory requirements of the EP Act assessment process. MMG undertook community consultation with members of the public and other stakeholders during the public submission period for the State EIS.

Two Native Title claimants groups have been recognized as owners of indigenous cultural heritage over the Dugald River Mine site and proposed power line corridor:

- the Kalkadoon People; and
- the Mitakoodi and Mayi People.

Consultation with Traditional Owners over the Dugald River Mine site has occurred in order to put in place Cultural Heritage Management Plans (CHMP) with both the Kalkadoon and Mitakoodi. Consultation is ongoing with both of these parties in order to conduct indigenous cultural heritage assessments of the project area and infrastructure areas.

Details of the consultation undertaken as part of the Queensland EIS assessment process are provided in Section 1.5 of the Dugald River Environmental Impact Statement, including a comprehensive list of groups or individuals consulted, method of consultation, the issues raised, MMG's response to the issues and follow-up action to address the issues.

2.7 A staged development or component of a larger project

The proposed mine development is not a staged development or a component of a larger project.

3 Description of environment & likely impacts

3.1 Matters of national environmental significance

3.1 (a) World Heritage Properties

Description

The nearest World Heritage Property is the Australian Fossil Mammal Sites (Riversleigh), which is approximately 200 km north-west of the Site.

Nature and extent of likely impact

No impacts will occur to a World Heritage Property as a result of the proposed action.

3.1 (b) National Heritage Places

Description

The nearest National Heritage Place is the Australian Fossil Mammal Sites (Riversleigh), which is approximately 200 km north-west of the Site.

Nature and extent of likely impact

No impacts will occur to a National Heritage Place as a result of the proposed action.

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

Description

The nearest Ramsar wetland is Bowling Green Bay Ramsar site, which is over 500 km to the east of the Site.

Nature and extent of likely impact

No impacts will occur to a Wetland of International Importance as a result of the proposed action.

3.1 (d) Listed threatened species and ecological communities

Description

Separate searches of the online EPBC Protected Matters Search Tool (PMST) were performed on the 10th and 11th September 2015 for the:

- mine tenement (with a 10 km buffer); and
- power line corridor (with a 1 km buffer).

These searches identified the potential for:

- eight listed threatened fauna species to be present within the mine tenement (and buffer area); and

- nine listed threatened fauna species to be present within the power line corridor (and buffer area).

No threatened flora species or threatened ecological communities were identified by the two searches.

The threatened fauna identified by the EPBC PMST report are presented in Table 1, together with a discussion of their likelihood of occurrence within the mine tenement, power line corridor and adjacent areas.

The key resources used in this assessment were:

- Dugald River Environmental Impact Statement. Prepared by AustralAsian Resource Consultants, November 2010.
- Dugald River Project. Terrestrial Flora and Fauna Assessment. Prepared by AustralAsian Resource Consultants, July 2011. (**Attachment A**)
- Dugald River Supplementary Environmental Impact Statement. Prepared by AustralAsian Resource Consultants, July 2011.
- Environmental Impact Statement Report under the *Environmental Protection Act 1994*. Dugald River Project. Proposed by MMG. November 2011, Queensland Department of Environment and Resource Management (DERM).
- Carpentarian Pseudantechinus (*Pseudantechinus mimulus*) Survey Results. Dugald River Mine. Prepared by EcoSmart Ecology for MMG Australia Ltd. July 2015. (**Attachment B**)
- Carpentarian Pseudantechinus (*Pseudantechinus mimulus*) habitat mapping. Dugald River Mine. Prepared by EcoSmart Ecology for MMG Australia Ltd. August 2015. (**Attachment C**)
- Carpentarian Pseudantechinus (*Pseudantechinus mimulus*): Existing knowledge and the Dugald River Mine population. Prepared by EcoSmart Ecology for MMG Australia Ltd. September 2015. Note that this information has been integrated into Section 7 of the species management plan which is included as **Attachment D** to this referral.
- Wildlife Online (WildNet database).
- Online SPRAT profiles.

Details regarding the flora and fauna assessments carried out at the mine tenement and power line corridor are provided below in section 3.3(a).

Table 1: Likelihood of occurrence of EPBC Act listed threatened species within the proposed Dugald River Mine tenement and associated power line corridor.

Species name	Listing status	Identified in EPBC PMST		Likelihood of occurrence	Details
		Mine tenement	Power line corridor		
<i>Erythrotriorchis radiatus</i> Red Goshawk	Vulnerable	Yes	Yes	Unlikely	This species predominately occurs in coastal and sub-coastal areas throughout northern tropical and warm-temperate areas of Australia. Very few records of the species occur in central Australia. The few records that have been confirmed are thought to be dispersive individuals (DoE 2015). Potential habitat modelling for the Red Goshawk in Queensland indicates that high quality records and potential habitat for the species occurs along the coast (Queensland Herbarium 2012). The mine tenement and power line corridor are a significant distant from existing records and potential habitat.
<i>Erythrura gouldiae</i> Gouldian Finch	Endangered	Yes	Yes	Unlikely	The Gouldian Finch is found in northern Australia, occurring in grassy tropical open woodlands and occasionally open grassy plains (DEHP 2015). Potential habitat modelling for the Gouldian Finch in Queensland indicates the species is most commonly found in the hinterland, south-west of Cairns (Queensland Herbarium 2012). Records and potential habitat are not present near the mine tenement or power line corridor.
<i>Rostratula australis</i> Australian Painted Snipe	Endangered	Yes	Yes	Unlikely	This species inhabits shallow inland wetlands, either permanent or temporary (DoE 2015). Limited habitat occurs on the mine tenement or within the power line corridor.

Species name	Listing status	Identified in EPBC PMST		Likelihood of occurrence	Details
		Mine tenement	Power line corridor		
<i>Macrotis lagotis</i> Greater Bilby	Vulnerable	Yes	Yes	Unlikely	<p>The Greater Bilby is thought to be mainly restricted to Western Australia and the Northern Territory. An outlier population occurs in far south-western Queensland between Boulia and Birdsville (DoE 2015; Queensland Herbarium 2012).</p> <p>The Queensland population is predominately found in the Astrebla Downs National Park (DoE 2015) which is over 300 km south of the mine tenement or power line corridor. It is therefore unlikely that this species is present on the project site.</p>
<i>Pezoporus occidentalis</i> Night Parrot	Endangered	No	Yes	Unlikely	<p>The distribution and ecology of the Night Parrot is not well understood. The species is extremely cryptic, only being active at night in dense spinifex habitat. The most recent sighting of the species was in 2013 in an undisclosed location in Western Queensland (Joseph 2014). Prior to that, only a handful of records existed for the species throughout its potential extent of distribution (DoE 2015).</p> <p>Habitat for the species is thought to occur in arid and semi-arid areas, characterised by dense, low vegetation (DoE 2015). Habitat is thought to consist of:</p> <ul style="list-style-type: none"> • <i>Triodia</i> grasslands in stony or sandy environments; • samphire and chenopod shrublands, including genera such as <i>Atriplex</i>, <i>Bassia</i> and <i>Maireana</i>, • on floodplains and claypans; and • on the margins of saltlakes, creeks or other sources of water (DoE 2015). <p>Given the extreme rarity of the species and the availability of potential habitat within the broader region, it is considered unlikely that the species is present within the project area.</p>
<i>Pseudantechinus mimulus</i> Carpentarian Antechinus	Vulnerable	Yes	Yes	Known	<p>The Carpentarian Antechinus has recently been recorded within, and adjacent to the mine tenement. Potential impacts to the Carpentarian Antechinus are discussed in detail below.</p>
<i>Sminthopsis douglasi</i> Julia Creek Dunnart	Endangered	Yes	Yes	Unlikely	<p>Known only from Mitchell Grass Downs country between Julia Creek and Moorrinya National Park, north Queensland (DoE 2015).</p> <p>No Mitchell Grassland Downs communities are present within the mine tenement or power line corridor. These areas are also outside of the species' currently known range, therefore it is unlikely this species inhabits the mine tenement or power line corridor.</p>
<i>Acanthophis hawkei</i> Plains Death Adder	Vulnerable	Yes	Yes	Unlikely	<p>This species occurs in habitat consisting of flat, treeless, cracking-soil riverine floodplains. There is limited information available regarding its distribution, however it is thought to occur from western Queensland, across the north of the Northern Territory and to the north-east of Western Australia (DEWHA 2011).</p> <p>It is thought that within Queensland, the species is mostly restricted to the Barkly Tablelands where it inhabits black soil Mitchell Grasslands, exploiting fissures for shelter (Cogger 2014). Regional Ecosystem (RE) descriptions suggests these habitats are most likely to be mapped as RE 1.3.1, and perhaps 1.3.3. None of these RE's occur within the mine tenement or power line corridor (including a 1 km buffer). It is therefore unlikely that the</p>

Species name	Listing status	Identified in EPBC PMST		Likelihood of occurrence	Details
		Mine tenement	Power line corridor		
					Plains Death Adder occurs within the area of the proposed action.
<i>Eseya lavarackorum</i> Gulf Snapping Turtle	Endangered	Yes	Yes	Unlikely	<p>The Gulf Snapping Turtle is known from north-western Queensland and north-eastern Northern Territory (DEHP 2015). Its habitat is within deep water pools of permanently flowing spring fed rivers (DEHP 2015). Within Queensland, the species has been located within the Lawn Hill Gorge, near Riversleigh, which is over 300 km north-west of the project site.</p> <p>Given there are no major watercourses or permanent deep water pools within the mine tenement or power line corridor it is unlikely that the Gulf Snapping Turtle would occur within the area of the proposed action. The mine tenement and power line area also a large distance from known records of the species within Queensland.</p>

Nature and extent of likely impact

The only EPBC Act listed threatened species known or likely to occur within or adjacent to the mine tenement and power line corridor is the Carpentarian Antechinus (*Pseudantechinus mimulus*). The species is listed as vulnerable under the EPBC Act. All other threatened species identified through the EPBC PMST report were considered to be unlikely to occur (see Table 1 above for details).

Carpentarian Antechinus (*Pseudantechinus mimulus*)

The Carpentarian Antechinus is a small, grey marsupial with reddish-brown fur behind its large ears and a reddish-brown tail. The species is nocturnal and feeds primarily on invertebrates (particularly termites), but may also potentially take small vertebrates such as skinks.

The species has been recorded in the Northern Territory and Queensland, occurring in rocky habitats. Until very recently, populations of the species were known from four localities:

- on Sir Edward Pellew Group of Islands (NT);
- within the Pungalina-Seven Emu area (NT);
- along the Selwyn Range south of Cloncurry (Qld); and
- on a number of ridges around Mt Isa (Qld) (DoE 2015).

In May 2015 the species was recorded along the Knapdale range within the Dugald River Mine tenement as part of regular monitoring required for the state-listed Purple-necked Rock Wallaby (a non-EPBC listed species). The closest known record to the mine site prior to this discovery was located at Lunch Creek (Woolley 2011), approximately 60 km to the south-west. As such, the discovery of this Knapdale Range population at Dugald River Mine significantly extended the known eastern limit of the species' range. Its current extent of distribution is illustrated in **Figure 6**.

There are a large number of information gaps regarding the ecology and distribution of the Carpentarian Antechinus. The species was only known from 11 records until 2013, and as a result, there has been limited opportunity to undertake detailed studies of the species (EcoSmart Ecology 2015a). Recent works (2013+) by the Sunshine Coast University (Burnett et al 2014) has significantly increased the number of known individuals in Queensland and has provided preliminary information on the species' habitat preferences.

The Carpentarian Antechinus is known to occur in rocky habitats. The species is thought to find shelter, forage and reproduce within areas of larger, consolidated rock. Their use of other rocky habitats is not well known, although it is thought that they may be used for movement or foraging when in proximity to consolidated rock.

No correlation has been found between the presence of Carpentarian Antechinus and:

- vegetation type;
- lithology;
- land form;
- percentage ground cover;
- cavity size or number.

Pseudantechinus species have a restricted breeding season that occurs only once each year, following which some males and some females survive to breed in at least a second year, while the remaining die. The limited available field data

suggests breeding occurs in winter, with pouch young detected in July and August, and females with enlarged teats (indicative of post-breeding) detected during October. This life-cycle, which results in a significant, albeit temporary reduction in the population, may explain why the species is less likely to be detected after August.

TARGETED SURVEY

Targeted surveys for the Carpentarian Antechinus were undertaken within the mine tenement in July 2015 by EcoSmart Ecology (EcoSmart Ecology 2015b, **Attachment B**). The survey method involved:

- A total of 20 Elliot trapping sites over four consecutive nights. 25 Elliot traps were used at each site.
- A total of 40 motion-sensor camera sites over four consecutive nights. 20 of the camera sites were located at Elliot trapping sites. The remaining 20 sites used motion-sensor cameras only.

Carpentarian Antechinus were observed at five separate survey sites during these surveys. One female was caught in an Elliot trap, and the other four individuals were identified from motion-sensor cameras (sex and mating status unknown).

HABITAT MAPPING

Following targeted field survey for the species, mapping for the Carpentarian Antechinus was undertaken to identify the extent and location of potential habitat areas across the mine tenement (EcoSmart Ecology 2015a; **Attachment C**).

The mapping approach and methodology was developed based on the following key pieces of information (EcoSmart Ecology 2015a):

- Previous records and recent studies (Burnett *et al.* 2014) demonstrate that the species is absent from areas that have little or no rocks. As such these areas have been identified as unsuitable habitat.
- Previous records and studies also demonstrate that areas of consolidated rock (larger more exposed rock, difficult to move by hand) provide suitable habitat including rock fissures, cracks and crevices for shelter. As such, these areas have been mapped as 'potentially suitable habitat'.
- Little is known about the use of unconsolidated rock areas (smaller, rounder rocks on bare earth or on loose rocks of similar size) for movement or foraging by Carpentarian Antechinus, however it can be assumed that the species uses areas of unconsolidated rock when in close proximity to consolidated rock. As such, a conservative approach was taken and areas containing a mix of unconsolidated and consolidated rock were mapped as 'potentially suitable habitat'.

In identifying potentially suitable habitat areas, the mapping was conducted at two levels:

- More refined identification of potential habitat within the key disturbance areas of the TSF and the accommodation camp area. This mapping identified three categories of habitat including:
 - 'little/no rock', which are considered unsuitable for the species;
 - 'consolidated rock', which is expected to contain areas of good, highly suitable habitat; and
 - 'mixed rock', which represents areas likely to contain a mosaic of both 'unconsolidated' and 'consolidated' rock of varying proportions. It is expected that this category may also contain good, highly suitable habitat, though the abundance of this quality habitat will be less and may be more restricted.
- Broad identification of potential habitat across the whole of the mine tenement using two categories:
 - 'little/no rock', which represent areas of no habitat for the species; and
 - 'rock', which represent areas of potential habitat for the species.

Separating rocky habitats into 'consolidated' and 'unconsolidated rock' requires some visual experience. The more refined level of mapping was only possible for the key disturbance areas due to increased field experience within these areas. Across the whole of the mine tenement a more broad-scale approach was needed. Rocky habitats were able to be distinguished from non-rocky habitats based on aerial interpretation and topography.

It should be noted that the maps produced through this work represent *potential* habitat. They have been produced at a desktop level using previous field experience, aerial imagery and topographical data. They provide a good level of confidence that the areas identified as potentially suitable or unsuitable will generally meet these definitions on the ground. Importantly, the habitat mapping is considered adequate for this assessment in providing a baseline understanding of habitat values across the tenement where potential impacts can be analysed.

Table 2 provides the areas (ha) of potentially suitable and unsuitable habitat throughout the mine tenement.

The areas that have been mapped as potentially suitable for the Carpentarian Antechinus broadly occur across the Knapdale range running north to south through the middle of mine tenement. Suitable mapped areas are associated with steep slopes, gullies, outcrops and ridges. The core mine processing and operating areas are situated to the east of the Knapdale range on the flat plains that do not contain the necessary rocky features to support the species. The elements of the proposed action that do occur within areas of potential habitat include the accommodation camp, access roads/pipelines and the TSF. **Figure 7** shows the species records and habitat within the mine tenement.

Table 2: Extent of suitable and unsuitable Carpentarian Antechinus habitat within the proposed Dugald River Mine (EcoSmart Ecology 2015a)

Location	Habitat type		Extent (ha)
Disturbance zone	Little/no rock	Unsuitable	36.98
	Mixed rock	Suitable	145.62
	Consolidated rock	Suitable	87.75
Surrounding area (excluding disturbance area)	Little/no rock	Unsuitable	2184.15
	Rock	Suitable	1152.92

The Dugald River Mine tenement contains approximately:

- 2,221 ha of unsuitable habitat; and
- 1,386 ha of potential habitat.

Areas of potential habitat were also identified along the power line corridor. Mapping of these areas involved identification of potential rocky outcrops using the information contained in the AARC (2012) survey report and Google Earth imagery. The power line corridor has not been visually assessed for suitable habitat, however based on aerial interpretation areas of rock habitat seem scant at best. Those that are present within the current alignment generally seem small and isolated.

Approximately 0.09 ha of rocky outcrops have been identified within the corridor as shown in **Figure 8**.

IMPORTANCE OF THE KNAPDALE RANGE POPULATION

A report was developed by EcoSmart Ecology to document the existing knowledge of the species and evaluate the importance of the population identified within the Dugald River Mine (referred to as the Knapdale Range population) in the context of an 'important population' as defined by the EPBC Act (EcoSmart Ecology 2015c). The following table (Table 3) summarises the reports evaluation of existing information against the EPBC Act criteria for the definition of an important population. The report concluded that it is likely that the population of Carpentarian Antechinus within the Knapdale Range is an important population.

Table 3: Evaluation of the Knapdale Range Carpentarian Antechinus population against EPBC Act 'important population' criteria

Criteria	Evaluation
Key source population for either breeding or dispersal	Likely. The Knapdale Range is a sizable outcrop surrounded by medium (e.g., Mt Rose Bee) and small rock outcrops of similar suitable habitat. While the species movement capability is not known, movement and dispersal to these areas cannot be discounted.
Necessary for maintaining genetic diversity	Likely. Due to the low number of known populations, all remaining populations are likely to be necessary for maintaining genetic diversity.
Near the limit of the species range	Certain. The Knapdale Range population extends this species range in Queensland by around 50 km to the north-east.

ANALYSIS OF IMPACTS

The proposed action has the potential to impact on the Carpentarian Antechinus. A range of direct and indirect impacts have been identified as potentially relevant including:

- loss of suitable habitat;
- mortality of individuals;
- human disturbance,
- noise and vibration;
- artificial lighting;
- introduction and spread of weeds;
- proliferation of feral predators;
- changes to surface water;

- erosion and sedimentation;
- contamination;
- disruption of connectivity; and
- changes to the fire regime.

The following sections provide an analysis of the relevance, extent and potential significance of these impacts.

Loss of habitat

Approach to understanding habitat loss

Loss of habitat as a result of the proposed action will occur through direct clearing of vegetation and land modification during construction of the TSF infrastructure, the access roads/pipelines and the accommodation camp. Further loss of habitat will occur over the life-of-mine through the gradual filling of the TSF.

Areas of habitat loss have been calculated based on the potential habitat mapping described above. This approach provides a conservative estimate of actual habitat loss. While polygons of 'consolidated rock' should, on balance, be considered suitable in their entirety, areas of 'mixed rock' consist of suitable habitat interspaced with unlikely habitat.

MMG are proposing to further refine the habitat mapping within the disturbance areas prior to any clearing or inundation. This refinement will involve ground truthing to confirm the suitability and type of areas of mapped habitat and delineate areas which are considered unlikely to support the species. This information will be used:

- during the detailed design phase to inform micro-alignment of infrastructure (described below) in order to avoid habitat loss wherever possible;
- as part of the Habitat Loss Protocol to monitor and report on habitat loss over time to ensure the area of loss does not exceed the limit specified in this referral; and
- to guide reinstatement of habitat within temporary construction areas and at mine closure.

Avoidance of impacts through micro-alignment

During the detailed design phase MMG will seek to avoid areas of habitat wherever possible. A micro-alignment procedure will be followed involving ground truthing to identify:

- the exact location and delineation of suitable habitat areas;
- areas of unsuitable habitat which could be maximised within the development footprint.

This micro-alignment procedure will be used to inform design of:

- the access road and pipeline corridors, where the aim will be to minimise loss of habitat as far as practicable;
- the power line corridor and location of poles and construction envelopes, where the aim will be total avoidance of habitat; and
- the lanes for exploration drilling, where the aim will be total avoidance of habitat.

Extent of loss

Loss of potential habitat from proposed activities will be limited to a maximum of 79 ha over the life-of-mine. This area represents around 6% of available habitat across the mine tenement. The accumulated loss of potential habitat from relevant activities over the life-of-mine is shown in **Figure 9** and provided in Table 4.

MMG will implement a Habitat Loss Protocol to manage and monitor activities associated with loss of habitat. This protocol has been developed to mitigate the risk of exceeding the maximum disturbance limit of 79 ha. The protocol is detailed in the Carpentarian Antechinus Management Plan and will apply to all relevant construction works, as well as the inundation of the TSF.

Table 4: Accumulated loss of potential habitat from relevant activities over the life-of-mine

Activity	Habitat type	Clearing (ha)
TSF	Mixed rock	34.7
	Consolidated rock	30.4
	Little/No rock	35.2
Roads and pipeline construction	Mixed rock	0.8
	Consolidated rock	3.5
	Little/No rock	2.4
Accommodation camp construction	Mixed rock	9.6
	Consolidated rock	0

	Little/No rock	0
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Habitat restoration

Habitat will be reinstated progressively within temporary construction footprints and following mine closure across the majority of disturbed areas.

The progressive reinstatement of habitat relates to the access roads and pipelines and is expected to mitigate the short-term loss of at least 20% of this impact.

The reinstatement of habitat at mine closure will aim to restore all habitat within disturbed areas associated with the:

- processing plant/mining area;
- accommodation camp area;
- access roads and
- TSF.

The type and location of habitat to be reinstated will be informed by the detailed habitat mapping which will be developed through ground truthing of the disturbance areas prior to any clearing.

It should also be noted that loss of habitat from inundation of the TSF will be a gradual process occurring over the life-of-mine. This area accounts for 82% of habitat loss. This means the majority of habitat loss will not be immediate, but will instead occur incrementally over a 30 year period. Habitat loss in the short to medium term of mine life will therefore remain well below this limit. In the later stage of mine life, further habitat loss from inundation of the TSF will be relatively short term as the habitat will be reinstated following mine closure.

Indirect impacts

Mortality from construction and inundation

Mortality of individuals will occur through the direct loss of habitat during construction, as well as a result of gradual flooding of the TSF.

The species is unlikely to be able to rapidly relocate from their shelter sites during construction, or have the ability to outpace clearing. Furthermore, the species is difficult to capture making translocation unfeasible. Mortality of individuals within clearing zones is therefore considered to be unavoidable impact.

Natural mortality is also likely during the gradual inundation of the TSF. Research has established that vertebrates dislocated from their home ranges and territories are less competitive than resident animals. As such, gradual flooding of the TSF is likely to lead to increased mortality.

It is not possible to quantify the number of individuals which may be lost from the population as a result of the proposed action. However, the area of habitat loss will not exceed 6% of habitat available within the immediate vicinity, suggesting that only a small proportion of the population will be affected. The significant natural attrition which the population undergoes following breeding is far more substantial by comparison.

Human disturbance

The Carpentarian Antechinus is a nocturnal species which inhabits massive rock outcrops. During the day they are expected to reside down deep rock crevices and are unlikely to respond to minor surface activity (such as that from human movement or light vehicle operation along designated tracks). Human actions during daylight hours are not expected to impact on the species.

It is theoretically possible that foraging efficiency, and perhaps mate location, may be negatively affected by frequent human activity at night. However, the proposed action does not require visitation of large rock outcrops, and human activity across the Knapdale Range at night outside of the accommodation area is extremely unlikely. The risk and rate of human activity at core rock areas will be extremely low.

Both the risk and the likely magnitude of impacts to the Carpentarian Antechinus from human disturbance are therefore likely to be negligible.

Noise and vibration

Noise will primarily occur as a result of:

- light and heavy vehicles on the project site and accessing the project site;
- hauling and dumping operations;
- surface vent fans;
- crushing; and
- ore processing.

Surface vibrations will occur from underground blasting. Vibration is monitored as peak particle velocity (measured as mm/s). Existing surface limits for vibration are:

- 1 mm/s night time;
- 5 mm/s day time with 4 out of every 5 blasting having to be less than this value; and
- 10 mm/s absolute limit

There have been no studies of the response of the Carpentarian Antechinus to increased noise and vibration. However, it is considered possible that the species might show a temporary change in behaviour within affected areas (e.g. becoming startled) - particularly if the levels are high compared with background levels, sudden or unpredictable and novel.

The majority of the noise and vibration generated from the proposed action will be associated with the main mine processing and operating areas located on the flat plains. It is considered unlikely that the noise and vibration levels generated within this area will affect the Carpentarian Antechinus for the following reasons:

- This area does not contain the necessary rocky features to support the species. The noise and vibration generated from this area may extend to the west where the species habitat occurs. However, the levels will be diffused over this distance.
- The Dugald River Mine has already been in operation for a number of years. The noise and vibration levels generated from existing operations are expected to be the same or in some instances greater than those that will occur as a result of the proposed action (noting that underground mine operations will get progressively deeper, lessening surface impacts). The species persistence within habitats across the mine tenement suggests that the species is likely to be habituated to existing noise and vibration levels and that they are not negatively affected. Similar conclusions can be drawn for other populations known to persist within proximity to mining elsewhere (for example, Exco Resources Mt Colin project).

There will be construction activities within and adjacent to potential habitat that will lead to low levels of increased noise for short periods of time during day light hours. These activities will be associated with the construction of TSF infrastructure, access roads/pipelines and the accommodation camp. Impacts on the species use of habitat is expected to be negligible given they will occur during day light hours and will only occur in the short term.

Operational noise within habitat areas would be restricted to the accommodation camp. Noise sources associated with the camp would include general human noise (laughing, talking etc) and power generation units (generators). The former would be restricted to the early hours of the evening, with large periods of the night unaffected. Furthermore, this noise would be localised and minor and unlikely to affect individual Carpentarian Antechinus in immediately adjacent habitats. Generators will operate while the power lines are under construction and as a backup after the power lines are operational. Noise from generators will occur throughout the night, but noise levels will be low and continuous and likely to be tolerated by the species.

The mine is subject to existing controls and limits in relation to noise and vibration and undertakes ongoing monitoring of these potential impacts. In consideration of the above, it seems likely that the impact from construction and/or operational noise and vibration at the mine site on Carpentarian Antechinus would be negligible. No further mitigation is therefore considered necessary.

Artificial lighting

The effect of lighting on the behaviour and ecology of the Carpentarian Antechinus is unknown. However, given it is a shy and reclusive species, individuals may be reluctant to move through or around well-lit areas, possibly as a function of perceived predatory risk.

Most operations at the Dugald River Mine will be restricted to areas which do not contain suitable habitat. Therefore lighting sources in these areas will be of no consequence to the species. The only expected lighting sources that are in proximity to possible habitat could include those associated with the accommodation camp.

Walkways and access ways around the accommodation camp will be lit throughout the night using fluorescent or LED tube lights generally with cool to white colour (3000K to 3500K). These lights are low intensity and light spill quickly dissipates beyond approximately 15 m. Further, many of these lights will be separated from natural habitats by buildings and other solid structures which reduce direct light spill into adjacent natural areas. As the camp will be surrounded by a fire break of approximately 3 m, the area that might be affected will be relatively small, particularly in context of surrounding habitat available within the vicinity.

It is also notable that the camp is located well away from outcropping massive rock. Instead, rock extruding from the surface is smaller and more restricted in its extent. While this may still provide value for the species, it is likely that the animals, if present, are less abundant in this area. Both these factors suggest that the risk and possible impact of light spill from the accommodation camp on the species is likely to be minor. Nevertheless, the potential impacts of artificial lighting within proximity of habitat will be mitigated through a number of measures outlined in Section 5.

Introduction and spread of weeds

Declared weed species are not prolific in the dry skeletal soils associated with the Mount Isa/Cloncurry region, and the risk of declared weeds being accidentally introduced from mining related activities into Carpentarian Antechinus habitats is extremely low. Two declared weed species, Calotrope (*Calotropis procera*) and Rubbervine (*Cryptostegia grandiflora*), are currently known from a small number of outbreaks within the mine tenement near the Dugald River. Both of these species are highly unlikely to survive on the Knapdale Range.

Buffel Grass (*Cenchrus ciliaris*) is a non-native grass species which is considered an environmental weed and favoured by pastoralists. It has however, been demonstrated to negatively influence biodiversity and potentially lead to altered fire regimes (Smyth et al 2009, Marshall et al 2012). Buffel Grass is currently present within the mine tenement where it is typically associated with creeklines and plains with a deeper soil profile and (probably) higher moisture content. It is not present on the Knapdale Range or in existing Carpentarian Antechinus habitats, though there remains a small risk that some plants may become established where soil disturbance occurs such as adjacent to tracks, roads and infrastructure. Erosion in association with these structures could lead to localised sediment collection and allow the species to establish.

Despite the low risk of impacts from weeds on Carpentarian Antechinus habitats within the Dugald River Mine tenement, weeds are broadly recognised as a relevant threat to the species. As such, a number of measures will be implemented to ensure management of this potential impact.

Proliferation of feral predators

A number of exotic pest species are known to occur within and surrounding the Knapdale Range including feral pigs, dingo/wild dog, and feral cats. MMG has existing feral animal monitoring and control procedures for pest species which includes securing waste foods. These measures, which are inherent to their mining activity, will reduce the risk of feral animal proliferation.

Feral Pigs

Feral Pigs are predominantly restricted to the creeklines and plains which surround the Knapdale Range. In these areas they can cause considerable damage to vegetation and habitat while foraging. However the Knapdale Range has hard skeletal soils with abundant rock and these features inhibit pig foraging. As such, they are highly unlikely to occur with any frequency on the Knapdale Range. Feral pigs are therefore unlikely to be a threat to Carpentarian Antechinus and no additional control or monitoring of this species is required.

Dingo/wild dog

Dingo/wild dogs have been recorded both in the plains and creeklines surrounding the Knapdale Range, as well as on the Knapdale Range. While dingos/wild dogs can take a wide variety of native fauna, they are unlikely to take wary and agile Carpentarian Antechinus. As such, dingos/wild dogs are unlikely to have a significant negative effect on Carpentarian Antechinus populations. Dingos/wild dogs may, in fact, have a positive effect on Carpentarian Antechinus by reducing the much more relevant threat of feral cat activity (Johnson et. al. 2007, Wang 2011, Kennedy 2012).

Feral Cats

Feral cats are a major predator of small native mammals and are a listed threatening process. High numbers of feral cats are likely to increase predatory pressure on small mammals of the Knapdale Range, including Carpentarian Antechinus. The severity of this threat will vary, influenced by feral cat and alternative prey abundance (e.g., Common Rock-rats, small lizards, birds etc).

Feral cats can benefit from human activity, most notably through an increase in prey or food associated with careless disposal of perishable food. Mine sites also provide shelter and hiding areas and can lead to an increase in feral cat numbers. However MMG has existing measures to ensure food scraps are appropriately disposed, and as such it is not anticipated that feral cat abundance will substantially increase as a result of the proposed action.

While it is unlikely that the proposed will increase predator abundance due to existing mitigation measures, MMG will undertake monitoring of feral cats and control if recorded to ensure any potential impacts are avoided or minimised.

Changes to surface water

The Carpentarian Antechinus lives in dry rocky environs with little or no surface water. While they may take advantage of temporary water, they do not need surface water for their survival. Changes to surface water hydrology is therefore unlikely to affect the species.

No further mitigation of this impact is considered necessary.

Erosion and sedimentation

Habitat in which Carpentarian Antechinus occurs is largely situated on steep rocky slopes with massive rock boulders. These areas are heavily weathered through natural processes and increased erosion or sedimentation in these areas from mining activities is not expected. Furthermore, the Dugald River Mine has existing measures to control erosion and sedimentation including commitments to:

- minimise the extent and duration of land disturbance;
- stabilise land promptly;
- install sediment retention measures in potential water flow locations around land disturbance areas; and
- monitor and maintain erosion and sediment control structures.

These are considered sufficient to reduce erosion and sedimentation risk and impacts.

Contamination

Land contamination has the potential to have localised impacts on Carpentarian Antechinus habitats. The risk of impacts are most relevant where the tailings line crosses habitat areas. Process control systems will be installed along the tailings line to detect and alarm on blocked flow, low pressure or abnormal flow situations. In addition daily visual inspections of the tailings line will be carried out during operation. These measures will ensure that any faults or leakages are identified and responded to early. If a leakage were detected, MMG's spill response measures will ensure any impacts to habitat are localised and temporary. The risk of any substantive impacts from contamination is therefore considered small and well mitigated.

Disruption of connectivity

Connectivity of habitat may be disrupted where new infrastructure or activities prevent movement of the Carpentarian Antechinus. The access road and pipeline corridors are the only elements of the proposed action which have the potential to permanently isolate areas of habitat. This infrastructure could form a physical barrier which the species is unable to traverse – for instance, if the pipeline is partially embedded along its full length or the surface of the access road is too wide or dissimilar to the species' natural habitat.

The pipelines will be constructed using materials and methods designed to maintain the species' movement. In particular, the pipelines will be constructed above ground on concrete sleepers with clearance under the steel line.

The access roads will comprise single lane, dirt tracks. The operational width of the access road and pipeline corridor will be 8 m. There is limited information on the species' dispersal behaviour and movement between areas of consolidated rock. However, one of the locations where an individual was recorded during targeted surveys within the mine tenement comprised only a minor extent of rocky habitat (0.18 ha) separated from other areas of mapped rock by approximately 200 m. The intervening habitat consisted primarily of unconsolidated rock. This suggests that the species may move through less rocky habitat up to at least a distance of around 200 m. As such, an 8 m dirt track surrounded by suitable rocky habitat is not expected to disrupt movement of the species.

Changes to the fire regime

Construction and operation activities have the potential to increase the risk of fire to adjoining vegetation and habitat areas, reducing the availability of food resources. Although this has not been demonstrated for Carpentarian Antechinus, impacts of severe fires have been shown for the similar Sandstone Antechinus (Begg et al 1981). As such, potential impacts associated with an increased risk of fire may be a relevant to the Carpentarian Antechinus.

Fuel load associated with Carpentarian Antechinus habitat at Dugald River Mine is low which reduces the likelihood of severe fires. MMG have a number of systems and processes in place to minimise the potential of bushfires as a result of construction and operation activities. These measures are outlined in MMG's Bushfire Management Plan. Key elements of the plan include:

- use of fire breaks;
- identification of ignition sources;
- identification of fire risk areas; and
- training.

Implementation of the Bushfire Management Plan is considered adequate to manage this potential risk to the species.

Significance of potential impacts

All direct and indirect impacts associated with the proposed action that could potentially affect the Carpentarian Antechinus have been considered. Based on the analysis above, the majority of these impacts pose a low risk and can be expected to have a negligible impact on the species. The mine is subject to a range of existing controls and limits which are considered adequate in managing many of these potential impacts (for example, changes to surface water or noise and vibration). Other impacts will be avoided due to sensitive design features (for example, above ground construction of the pipelines with clearance underneath to ensure habitat connectivity is maintained).

In some instances, additional measures specifically relating to the protection or management of the Carpentarian Antechinus have been identified. These measures relate to issues that have been documented as key threats or impacts to the species or a similar species within its broader range. Therefore, management of these threats is considered appropriate at Dugald River Mine even though the risk to the species at this site is considered small. They include:

- contamination;
- the introduction and spread of weeds;
- proliferation of feral predators;
- changes to the fire regime; and
- artificial lighting.

The measures to manage these threats will be implemented under the Carpentarian Antechinus Management Plan, as outlined in Section 5 and included as an attachment to this referral (**Attachment D**).

The key residual impact relevant to the species during the mine life will be the loss of habitat. This will occur as a result of construction of the TSF infrastructure, the access roads/pipelines and the accommodation camp, and through the gradual filling of the TSF.

MMG have committed to a total disturbance limit of 79 ha of Carpentarian Antechinus habitat. This area of habitat loss represents a small proportion (around 6%) of similar habitat available within the mine tenement. Further areas of highly suitable habitat are also likely to occur in the local region with very extensive rock habitats becoming common place approximately 10 km west. As a result, the loss of habitat as a result of the proposed action is not expected to reduce the overall availability of habitat to the extent that the species is likely to decline.

Furthermore, loss of habitat from inundation of the TSF will be a gradual process occurring over the life-of-mine. This area accounts for 82% of habitat loss. This means the majority of habitat loss will not be immediate, but will instead occur incrementally over a 30 year period. Habitat loss in the short to medium term of mine life will remain well below this limit. The increasing loss of habitat during the later years of mine life as the TSF becomes further inundated will be relatively short-term with complete habitat reinstatement following mine closure of most disturbance areas.

Based on the limits to habitat loss and measures to manage indirect impacts (see Section 5), it is considered unlikely that significant impacts to the species will occur. Table 5 outlines the EPBC Act significant impact criteria and their relevance.

Table 5: EPBC Act significant impact criteria

EPBC Act significant impact criteria (DoE 2013)	Relevance
Lead to a long-term decrease in the size of an important population of a species	Unlikely given the small amount of temporary habitat loss, and complete habitat reinstatement on closure of the mine
Reduce the area of occupancy of an important population	Will not be substantially affected. Complete habitat reinstatement on closure of the mine
Fragment an existing important population into two or more populations	Connectivity will be maintained within the mine tenement
Adversely affect habitat critical to the survival of a species	Will not be substantially affected. Complete habitat reinstatement on closure of the mine
Disrupt the breeding cycle of an important population	
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	Unlikely. Weeds and feral predators will be controlled across the mine tenement
Introduce disease that may cause the species to decline	Unlikely
Interfere substantially with the recovery of the species	Unlikely. Key threats to the species (weeds, feral predators, altered fire regimes) will be managed across the mine tenement

3.1 (e) Listed migratory species

Description

Results from the EPBC Act Protected Matters Report Search Tool indicated that seven migratory birds species may occur within, or in areas adjacent to the mine tenement or power line corridor. Using the resources identified in section 3.1(d) (above), an assessment of their likely presence within the mine tenement, power line corridor or adjacent areas was undertaken. An assessment of the nature and extent of potential impacts, and likelihood of significant impacts, has been provided below for species with the potential, or known to occur within the project site.

Table 6: Likelihood of occurrence of EPBC Act listed migratory species within the proposed Dugald River Mine tenement and associated power line corridor.

Species name	Listing status	Identified in EPBC PMST		Type of presence	Details
		Mine tenement	Power line corridor		
<i>Apus pacificus</i> Fork-tailed Swift	Migratory	Yes	Yes	Potential	This species breeds from central Siberia eastwards through Asia. Non-breeding individuals most commonly arrive in Australia in October then returns to their breeding grounds from Australia in April (DoE 2015). The Fork-tailed swift is aerial. Within Queensland, the Fork-tailed Swift is found most commonly west of the Great Divide, including west of

Species name	Listing status	Identified in EPBC PMST		Type of presence	Details
		Mine tenement	Power line corridor		
					<p>Richmond and Winton (DoE 2015).</p> <p>It may seasonally occur within the project site between October to April, however despite extensive surveys during the dry and wet season surveys, no individuals were observed (AARC 2011).</p> <p>Potential impacts to this species as a result of the proposed action are discussed in detail below.</p>
<i>Merops ornatus</i> Rainbow Bee-eater	Migratory	Yes	Yes	Known	<p>The Rainbow Bee-eater has frequently been recorded within and around the project site during wet and dry season surveys.</p> <p>Potential impacts to this species as a result of the proposed action is discussed in detail below.</p>
<i>Ardea alba</i> Great Egret	Migratory	Yes	Yes	Potential	<p>Great Egrets occur throughout Australia, except for the driest regions of the western and central deserts (DoE 2015). Breeding populations occur throughout the species distribution.</p> <p>Great Egrets inhabit a very wide range of wetland habitats, frequenting shallow waters. They are dispersive. They may move to coastal areas during the dry season when inland waters are absent (DoE 2015).</p> <p>No individuals have previously been observed at the project site, however, there is potential for individual Great Egrets to occur within the project site and adjacent areas during the wet season.</p> <p>Potential impacts to this species as a result of the proposed action is discussed in detail below.</p>
<i>Ardea ibis</i> Cattle Egret	Migratory	Yes	Yes	Unlikely	<p>The Cattle Egret has a widespread distribution throughout Australia. The species inhabits tropical and temperate grasslands, wetlands and wooded areas. The species is rarely observed in arid and semi-arid areas (DoE 2015).</p> <p>There is very limited suitable habitat for the Cattle Egret within the project area. It is unlikely that the species would occur within the area.</p>
<i>Charadrius veredus</i> Oriental Plover	Migratory	Yes	Yes	Potential	<p>The Oriental Plover migrates to Australia for the non-breeding season. It occurs in Australia between early to mid-September and departs between February and March (DoE 2015).</p> <p>The species inhabits coastal areas when it first arrives in Australia, then disperses to inland areas. Habitat includes open grasslands where individuals forage in short grass or stony bare ground. It may also forage on mudflats or beaches.</p> <p>The species has not previously been recorded within the project area or adjacent areas. There is, however, potential for individuals to transit through the project site between September and March as suitable habitat is present.</p> <p>Potential impacts to this species as a result of the proposed action is discussed in detail below.</p>
<i>Glareola maldivarum</i> Oriental	Migratory	Yes	Yes	Unlikely	<p>The species spends its non-breeding season in Australia, arriving in late October to early November and leaving at the end of the wet season in mid-March to early April</p>

Species name	Listing status	Identified in EPBC PMST		Type of presence	Details
		Mine tenement	Power line corridor		
Pratincole					(DoE 2015). The species is predominately present at Eighty Mile Beach and Broome in Western Australia while present in Australia (DoE 2015). Limited numbers of the species may use river corridors within Queensland (DoE 2015). The species has not previously been recorded within the project site. There is limited habitat available on site, as there are no permanent rivers. The Dugald River to the east of the project site may provide suitable habitat, however it is likely that few individuals would transit through this area.
<i>Pandion cristatus</i> Eastern Osprey	Migratory	Yes	Yes	Unlikely	The Eastern Osprey predominately uses coastal areas, but may travel inland along major rivers. Their habitat requirements include extensive areas of open waters (fresh, brackish or saline) for foraging. There is no habitat within the project site and adjacent areas. Individuals are unlikely to be observed in the project site or surrounding areas.

Nature and extent of likely impact

Rainbow Bee-eater (*Merops ornatus*)

The Rainbow Bee-eater is widespread throughout Australia, being recorded throughout all states except for Tasmania. Non-breeding birds migrate north of Australia to Papua New Guinea and Indonesia, arriving in March and leaving in late September. Migration movements within Australia are not well understood. It is thought that southern breeding populations of Rainbow Bee-eaters migrate north, while populations in northern Australia are considered to be residents, and may be present throughout the year (DoE 2015).

The species has been recorded during wet and dry season surveys within the project site (Sanders M. pers. comm. 2015). The species is highly mobile and distributed across most of mainland Australia. Significant impacts to the Rainbow Bee-eater as a result of the proposed action are considered unlikely to occur as the project site:

- is not known to support important habitat for the species; and
- is not known to support an ecologically significant proportion of the species.

Other migratory bird species

Three migratory bird species were identified as potentially occurring within the project site or adjacent areas:

- Fork-tailed Swift (*Apus pacificus*).
- Great Egret (*Ardea alba*).
- Oriental Pratincole (*Glareola maldivarum*).

Individuals of these species have not previously been recorded within the project site. While there is potential for individual vagrants to occur within the area, the proposed action is unlikely to result in a significant impact on any of these three species as the project site:

- is not known to support important habitat for any of the three species; and
- is not known to support an ecologically significant proportion of any of these three species.

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

The project site is not located near the Commonwealth marine area.

Nature and extent of likely impact

No impacts will occur to the Commonwealth marine area as a result of the proposed action.

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

The project site is not located near Commonwealth land.

Nature and extent of likely impact

No impacts will occur to Commonwealth land as a result of the proposed action.

3.1 (h) The Great Barrier Reef Marine Park

Description

The project site is located over 700 km west of the Great Barrier Reef Marine Park.

Nature and extent of likely impact

No impacts will occur to the Great Barrier Reef Marine Park as a result of the proposed action.

3.1 (i) A water resource, in relation to coal seam gas development and large coal mining development

Description

The proposed action does not involve a coal seam gas development or large coal mining development.

Nature and extent of likely impact

No impacts to water resources as a result of coal seam gas development or large coal mining development will occur as a result of the proposed action.

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 action?	X	No
			Yes (provide details below)

If yes, nature & extent of likely impact on the whole environment

Not applicable.

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

Not applicable.

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))

Not applicable.

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))

Not applicable.

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))

Not applicable.

3.3 Other important features of the environment

3.3 (a) Flora and fauna

Flora and fauna surveys

A total of three flora and fauna surveys have been undertaken for the project site by AARC (AARC 2011) in both wet and dry seasons. Surveys were undertaken in:

- April 2008;
- August 2008; and
- March 2011.

EcoSmart Ecology has also undertaken bi-annual monitoring of the state listed Purple-necked Rock Wallaby within the Dugald River mine site since 2012.

As previously mentioned, a further targeted survey for the Carpentarian Antechinus was undertaken in July 2015. See section 3.1 (d) above for a detailed description of these surveys and survey findings.

Survey results

The surveys found the project site supported the following:

- eight vegetation communities classed as Remnant Vegetation (as per *Queensland Vegetation Management Act 1999*, discussed in section 3.3 (e) below);
- 222 flora species, 17 of which are introduced; and
- 113 fauna comprising 16 reptiles, 65 birds, 26 mammals and 6 amphibians.

Of the flora and fauna species recorded within the survey area, the following EPBC Act listed species were observed:

- Carpentarian Antechinus (*Pseudantechinus mimulus*) listed as Vulnerable;
- Rainbow Bee-eater (*Merops ornatus*) listed as Migratory/Marine;
- Whistling Kite (*Halisatur spenurus*) listed as Marine; and
- Sacred Kingfisher (*Todiramphus sanctus*) listed as Marine.

The Purple-necked Rock-wallaby (*Petrogale purpureicollis*) was recorded along the Knapdale Range within the project site. While not listed under the EPBC Act, the species is listed as "Vulnerable" under Queensland's Nature Conservation (Wildlife) Regulation 2006. The Black-chinned Honeyeater (*Melithreptus gularis laetior*) has previously found to be abundant within the project site. This species is also not listed under the EPBC Act, but listed as "Near Threatened" under the Queensland Nature Conservation (Wildlife) Regulation 2006.

Introduced fauna species on the site included the House Mouse (*Mus musculus*), Feral Cat (*Felis catus*), Feral Pig (*Sus scrofa*) and the Dingo (*Canis familiaris dingo*).

3.3 (b) Hydrology, including water flows

There are no major drainage lines within the project site. Several minor ephemeral creeks traverse the project site, and are separated by a ridgeline (Knapdale Range), which runs north-south through the middle of the site. Ephemeral creeks on the eastern side of the ridgeline drain into the Dugald River, which is a tributary of the Flinders River that flows north to the Gulf of Carpentaria. Ephemeral creeks on the western side of the range drain into Cabbage Tree Creek that is a tributary of the Leichardt River.

Surface water downstream of the project site is used predominately for stock watering and aquatic habitat.

3.3 (c) Soil and Vegetation characteristics

Soils were mapped across the project site as part of a Soil and Land Suitability Assessment undertaken by AARC. Six soil mapping units were found to occur:

- Red Plain Soil: Red sandy loam to sandy clay loam. Dominant vegetation on this soil type consists of Cloncurry Box And Snappy Gum Open Woodland. Soil found on flatter areas of the site and subject to low intensity cattle grazing.
- Knapdale Soil: Brown skeletal sandy clay loam. Found on the eastern and western slopes of the Knapdale Range, supporting mainly native vegetation including Snappy Gum Open Woodland and Spinifex Grass.
- Dale Soil: Brown sandy loam, located in the Knapdale Range in depressions such as valley floors and plateaus. This soil supports Snappy Gum Open Woodland.
- Miners Soil: Lode outcrop sandy clay loam. This soil is located on the eastern side of the Knapdale Range and supports Cloncurry Box Open Woodland.
- Prospectors Soil: Western Knapdale clay loam. This soil is found on the western side of the Knapdale Range with the dominant vegetation community being Snappy Gum Open Woodland. These areas are sloped and rocky.

- Pocket Soil: Grey clay loam. This soil type supports Snappy Gum Open Woodland and Cloncurry Box Open Woodland. Areas containing this soil are located in pockets along the eastern and northern side of the Knapdale Range. These areas support low intensity cattle grazing.

All soils identified on the site are non-sodic, meaning that they are non-dispersive and not predisposed to erosion.

3.3 (d) Outstanding natural features

There are no outstanding natural features within the project site. The landscape is comprised of:

- flat semi-grassed areas;
- undulating open woodlands; and
- many rocky outcrops.

The most notable natural feature in the project site is the Knapdale Range, which runs in a north-south direction through the middle of the project site. It is a continuous range of sparsely vegetated rocky outcropping hills that has rocky scree slopes and sheer rock walls.

3.3 (e) Remnant native vegetation

Flora and fauna surveys found the project site supported the following eight vegetation communities classed as Remnant Vegetation (as per *Queensland Vegetation Management Act 1999*):

- Snappy Gum Open Woodland on steep hills and strike ridges (1.11.2a);
- Snappy Gum Open Woodland on foothills (1.11.2e);
- Cloncurry Box Open Woodland on low broad hills (1.11.3a);
- Cloncurry Box Open Woodland on hills (1.11.3x1);
- Mixed Bloodwood Riparian Woodland (1.3.6b);
- River Red Gum Riparian Woodland (1.3.7b);
- Gidgee Open Woodland (1.11.2x2); and
- Silver Box/Cloncurry Box Open Woodland on red earths (1.5.4x3).

None of these vegetation communities are listed under the EPBC Act, and all communities are listed as "Least Concern" under the *Queensland Vegetation Regulation 2000*.

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

The Knapdale Range within the project site rises to an elevation of 300 m above sea level, and 100 m above the surrounding area. Surrounding the ranges the topography is gently sloping.

3.3 (g) Current state of the environment

The current state of the environment within the project site is comprised of both disturbed and undisturbed areas.

The area was subject to small-scale mining during the previous century. There is a small exploration camp located on the project site itself which is utilised by MMG. Areas that are not suitable for cattle grazing or mineral exploration (such as the Knapdale Range) are relatively undisturbed and provide native habitat.

The Roseby Homestead is located approximately 2.5 km from the southern boundary of the project site.

The project site is in a region where there are several major mines currently operating. The nearest mine is the Little Eva mine (also known as the Rosebury Copper Project) which is proposed to begin production in the near future. The mine is directly adjacent and east of the project site and is operated by Altona Minerals. The Little Eva mine is an open cut copper mine (3 – 4.5 Mtpa).

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

There are no Commonwealth Heritage Places or other places recognised as having heritage values within, or adjacent to the project site. The nearest place recognised as having heritage values are the Australian Fossil Mammal Sites (Place ID: 105691), at Riversleigh over 200 km north-west from the project site, near the border of Queensland and the Northern Territory.

3.3 (i) Indigenous heritage values

Two native title claimant groups have been recognised for the project site:

- The Kalkadoon People; and
- The Mitakoodi and Mayi People.

The two groups have been consulted with, and have completed cultural clearance surveys across the project site. Each group has approved Cultural Heritage Management Plans (approved in 2008).

MMG will continue to engage the Kalkadoon People to conduct cultural heritage surveys in accordance with the approved Cultural Heritage Management Plans prior to any mining works commencing.

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

The nearest protected area is the Ballara Nature Reserve, approximately 80 km south of the project site, near Cloncurry. The nearest National Park: Boodjamulla (Lawn Hill) National Park, is a significant distance from the project site (approximately 200 km).

The project will not impact on any important or unique values of the environment.

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

The project site consists of 33 existing Mining Leases (ML), one Mineral Development Licences (MDL) MDL79 and one MDL Application MDL393.

The majority of the Lots within the project site and corridor areas are held for cattle grazing purposes. The nearest homestead is the Mount Roseby Homestead, approximately 2.5 k to the south-east of the Project boundary.

3.3 (l) Existing land/marine uses of area

See section 3.3 (g) above.

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

The project site and surrounding areas are proposed to be developed for their mineral resources.

4 Environmental outcomes

As discussed in Section 3, the key EPBC Act issue for the proposed action is the Carpentarian Antechinus. For this species, MMG will achieve the following outcomes:

1. Following completion of the project, there will be reinstatement of habitat for the species for all disturbed areas (possibly excluding the pipelines).
2. Key threats to the species (increased weeds, increased feral predators, and altered fire regimes) will be managed across the mine tenement.
3. Knowledge about the ecology of the species will be improved.

Baseline data on which the outcomes are based

The baseline data available for the Carpentarian Antechinus is considered appropriate for defining these outcomes. There are recognised gaps in current understanding of the species' ecology and distribution. Expert input has been used in the preparation of this referral and supporting documentation to address this issue. The information used is the best available, and the interpretation of relevant impacts and identification of suitable mitigation strategies is informed by extensive field experience.

Reinstatement of habitat

Potential habitat mapping across the mine tenement was undertaken in August 2015 by EcoSmart Ecology (**Attachment C**) providing a sound basis for understanding the extent of habitat across the site. The species' association with rocky outcrops means that habitat across the site can be defined and spatially assessed. The mapping will also be supplemented by more detailed investigations, including ground truthed mapping and ongoing monitoring over the life of the proposed action to provide a finer scale understanding of habitat areas.

Management of threats

The recovery plan for the species (Woinarski 2004) suggests that increased weeds, increased feral predators, and altered fire regimes as the key threatening processes. It is therefore considered appropriate that these threats are managed within the mine tenement.

Improving species knowledge

As discussed in Section 3, there are gaps in knowledge about the ecology of the species. It is important to note that these gaps do not preclude having a sufficient understanding about habitat, potential impacts and threats. However, providing a greater understanding of the species will help improve management decisions and broader recovery actions for the Carpentarian Antechinus.

Confidence about the likely achievement of the proposed outcomes

There is a high level of confidence that the proposed outcomes will be achieved. The measures to achieve the outcomes are discussed below in Section 5. However, in summary:

Reinstatement of habitat

There are limited impacts to habitat for the species compared to available habitat across the mine tenement (approximately 6% of available habitat). Any impact areas will be rehabilitated to re-create habitat for the Carpentarian Antechinus. This will occur progressively where possible and at mine closure. The refined mapping of habitat based on ground truthing will help guide rehabilitation and provide a sound basis to measure this outcome.

Management of threats

Weeds, feral predators and fire regimes are managed across the mine tenement. These processes will continue to be managed over the life of the project with a specific focus on the Carpentarian Antechinus (e.g. management of Buffel grass). Performance targets, monitoring and corrective actions as part of the management program will ensure that these threats are appropriately managed.

Improving species knowledge

Species knowledge will be improved through on-site monitoring and management, and contributions to research. These outcomes are built into the Carpentarian Antechinus Management Plan (**Attachment D**) and will be delivered as part of the overall management program.

5 Measures to avoid or reduce impacts

The Dugald River Mine is an existing mine and operates under a range of comprehensive measures to manage potential environmental impacts. These measures address issues relating to erosion and sedimentation, weeds, fire, feral animals, noise and vibration, land contamination and changes to ground and surface water.

These measures will be applied throughout the construction, operation and rehabilitation phases of the proposed action and are incorporated into the following management plans:

- An over-arching Land and Biodiversity Management Plan that incorporates the following sub-plans:
 - Declared fauna control plan.
 - Declared weed control plan.
 - Fire management plan.
- Sediment and erosion control plan.

As discussed in Section 3, the key EPBC Act issue for the proposed action is the Carpentarian Antechinus. Following is an outline of the specific measures that will be implemented to ensure that significant impacts to this species are avoided.

Impacts associated with the proposed action that may be potentially relevant to the Carpentarian Antechinus can be summarised as:

- loss of potentially suitable habitat through mechanical clearing and inundation from the TSF; and
- potential indirect impacts including: mortality; human disturbance; artificial lighting; spread of weeds; increase in feral predators; alteration to surface water; erosion and sedimentation; contamination; disruption of connectivity; and altered fire regimes.

Potential impacts to the Carpentarian Antechinus will be managed through the implementation of the Carpentarian Antechinus management plan (**Attachment D**). Amendments will also be made to the declared fauna control plan and declared weed control plan to reflect threats relevant to the species. These measures are outlined below and will ensure that the proposed conservation outcomes (see Section 4) are achieved.

The Carpentarian Antechinus management plan has been developed in accordance with the Commonwealth's Environmental Management Plan Guidelines (DoE 2014). It provides detail on the specific measures that will be implemented, including:

- the environmental management activities, controls and performance targets;
- environmental maps and diagrams;
- environmental monitoring; and
- corrective actions.

The other management plans listed above address specific issues and are cross-referenced (where appropriate) in the species management plan.

As identified in Section 3.1 (d) and the Carpentarian Antechinus management plan, the following impacts warrant prescriptive measures which are in addition to the environmental management practices already in place at the site:

- loss of potentially suitable habitat through mechanical clearing and inundation from the TSF;
- mortality;
- lighting;
- contamination;
- spread of weeds;
- increase in feral predators; and
- disruption of connectivity.

Relevant measures (including timing and outcomes) are summarised in Table 7. It should be noted that these measures are generally only considered necessary where construction, operational or rehabilitation works coincide with Carpentarian Antechinus habitat (i.e. on the Knapdale Range). The majority of proposed mine processing and operations are located below the Knapdale Range in areas of unsuitable habitat. In these areas no mitigation measures are required.

In addition to managing potential impacts, MMG will support research into Carpentarian Antechinus over three years to improve understanding of the species distribution, habitat preferences and ecology.

The proposed research project is proposed to be jointly conducted by the University of Sunshine Coast, Queensland University of Technology, and EcoSmart Ecology. The project aims to:

- map distribution and model habitat throughout Queensland and the Northern Territory; and
- undertake regular monitoring at sites of known occurrence to improve data on seasonal detectability of the species.

There is a lack of targeted survey data for the species from Qld and NT. It is not clear whether current gaps in the known occurrence of the species are accurate or reflect an absence of appropriate surveys. The proposed research will conduct surveys across potential rocky habitats in the Southern Gulf, Desert Uplands, Einsleigh Uplands, Brigalow Belt, and Mitchell Grass Downs bioregions in Queensland, and adjacent areas in the Northern Territory. Surveys will use baited trail cameras to improve distribution data and assist in the development of a habitat model for the species.

Repeat baited trail camera surveys will be conducted across 20 sites in the Selwyn Ranges (known to support Carpentarian Antechinus) at two month intervals for a year. Data from these surveys will be used to model seasonal detectability for the species, which will improve the design of future survey and monitoring programs.

This research is estimated to cost \$300,803.

Table 7: Measures to ensure significant impacts are avoided and the proposed conservation outcomes are achieved

Issue to be addressed	Measures	Timing	Outcomes
General	• Implement the Carpentarian Antechinus Management Plan (Attachment D)	Over the life of the project	• Significant impacts are avoided and the proposed conservation outcomes (see Section 4) are achieved
	• Undertake detailed on-ground habitat mapping within disturbance areas	Prior to disturbance of habitat areas	• Micro-alignment (see below) informed by detailed mapping • Monitoring of habitat loss over the life of the project informed by detailed mapping • Rehabilitation of habitat guided by detailed mapping
	• Undertake species monitoring	Each wet and dry season over the life of the project	• Provide data on species presence, distribution, abundance and habitat use within mine tenement over time. • Improve understanding of species interaction with mine site, potential disturbances and use of rehabilitated areas.
Direct impacts	• Clearing of Carpentarian Antechinus habitat within the Dugald River mine tenement limited to 79 ha	Over the life of the project	• Direct impacts to habitat will be limited within the mine tenement • Direct mortality will be minimised
	• Further avoidance of Carpentarian Antechinus habitat through: <ul style="list-style-type: none"> ○ minimising the loss of habitat through micro-alignment of the access road and pipeline corridors ○ micro-alignment of the power line to avoid potentially suitable habitat ○ locating exploration drilling lanes to avoid suitable habitat 	Prior to, and during construction of relevant infrastructure and during exploration activities	• Direct impacts to habitat will be minimised through further avoidance activities • Direct mortality will be minimised
	• Implement Habitat Loss Protocol, including clear demarcation of suitable habitat and tracking of habitat loss in Carpentarian Antechinus Habitat Loss Register	Over the life of the project	• Direct impacts to habitat will be minimised • Direct mortality will be minimised
	• Temporarily cleared construction areas rehabilitated to re-create Carpentarian Antechinus habitat	Within 6 months of completion of activity	• Habitat areas will be restored following temporary disturbance
	• Areas cleared for mine operations rehabilitated to re-create Carpentarian Antechinus habitat	Within 12 months of mine closure	• Habitat areas will be restored following mine closure • Following completion of the project, habitat will be reinstated across disturbance areas
Indirect impacts	• Minimise light spill through the use of appropriate lighting	Over the life of the project	• Potential disturbance to habitat areas from lighting minimised
	• Implement measures to reduce the risk of spill or breach of the TSF pipeline	Over the life of the project	• Potential contamination of species habitat avoided
	• Design linear infrastructure within habitat areas to maintain connectivity	Prior to construction of relevant infrastructure	• Connectivity maintained across the mine tenement

Issue to be addressed	Measures	Timing	Outcomes
	<ul style="list-style-type: none"> Implement sediment and erosion control plan to ensure there are no impacts to habitat from changes to surface water quality, or sediment and erosion 	Over the life of the project	<ul style="list-style-type: none"> Potential impacts to habitat from changes to surface water quality, or sediment and erosion are avoided
	<ul style="list-style-type: none"> Employee mine site inductions to include details regarding the presence, habitat and importance of Carpentarian Antechinus within the Knapdale Range and surrounding area 	Over the life of the project	<ul style="list-style-type: none"> Employees understand the importance of the species and habitat areas to be avoided
Threatening processes	<ul style="list-style-type: none"> Update and implement declared fauna control plan to include and focus on cats 	Over the life of the project	<ul style="list-style-type: none"> Presence of feral predators minimised on site
	<ul style="list-style-type: none"> Update and implement declared weed control plan to include and focus on Buffel grass 	Over the life of the project	<ul style="list-style-type: none"> Presence of weeds minimised on site
	<ul style="list-style-type: none"> Implement fire management plan with a particular focus on the habitat requirements of the Carpentarian Antechinus 	Over the life of the project	<ul style="list-style-type: none"> Fire regime managed to ensure maintenance of suitable habitat for the species
Monitoring	<ul style="list-style-type: none"> Monitor the presence of the species within the mine tenement on an annual basis 	Over the life of the project	<ul style="list-style-type: none"> Ongoing presence of the species within the project site is understood
Research	<ul style="list-style-type: none"> Improve knowledge of the species through an estimated \$300,803 contribution to research into species distribution in Qld and NT, habitat modelling, and seasonal detectability over three years. 	Within 12 months of commencement of the proposed action	<ul style="list-style-type: none"> Knowledge of the species is improved

6 Conclusion on the likelihood of significant impacts

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

<input checked="" type="checkbox"/>	No, complete section 6.2
<input type="checkbox"/>	Yes, complete section 6.3

6.2 Proposed action IS NOT a controlled action

Based on the analysis in this referral, the proposed action will not lead to significant impacts on a matter protected by the EPBC Act.

The Carpentarian Antechinus is the only relevant issue. See Section 3.1(d) for a detailed discussion around this species, Section 4 for proposed conservation outcomes, and Section 5 for the proposed management measures.

All direct and indirect impacts associated with the proposed action that could potentially affect the Carpentarian Antechinus have been considered. The majority of these impacts pose a low risk and can be expected to have a negligible impact on the species. The mine is subject to a range of existing controls and limits which are considered adequate in managing many of these potential impacts (for example, changes to surface water or noise and vibration). Other impacts will be avoided due to sensitive design features (for example, above ground construction of the pipelines with clearance underneath to ensure habitat connectivity is maintained).

In some instances, additional measures specifically relating to the protection or management of the Carpentarian Antechinus have been identified. These measures relate to issues that have been documented as key threats or impacts to the species or a similar species within its broader range. Therefore, management of these threats is considered appropriate at Dugald River Mine even though the risk to the species at this site is considered small. They include:

- contamination;
- the introduction and spread of weeds;
- proliferation of feral predators;
- changes to the fire regime; and
- artificial lighting.

The measures to manage these threats will be implemented under the Carpentarian Antechinus management plan, as outlined in Section 5 and included as an attachment to this referral (**Attachment D**).

The key residual impact relevant to the species during the mine life will be the loss of habitat. This will occur as a result of construction of the TSF infrastructure, the access roads/pipelines and the accommodation camp, and through the gradual filling of the TSF.

MMG have committed to a total disturbance limit of 79 ha of Carpentarian Antechinus habitat. This area of habitat loss represents a small proportion (around 6%) of similar habitat available within the mine tenement. Further areas of highly suitable habitat are also likely to occur in the local region with very extensive rock habitats becoming common place approximately 10 km west. As a result, the loss of habitat as a result of the proposed action is not expected to reduce the overall availability of habitat to the extent that the species is likely to decline.

Furthermore, loss of habitat from inundation of the TSF will be a gradual process occurring over the life-of-mine. This area accounts for 82% of habitat loss. This means the majority of habitat loss will not be immediate, but will instead occur incrementally over a 30 year period. Habitat loss in the short to medium term of mine life will remain well below this limit. The increasing loss of habitat during the later years of mine life as the TSF becomes further inundated will be relatively short-term with complete habitat reinstatement following mine closure of most disturbance areas.

Based on the limits to habitat loss and measures to manage indirect impacts (see Section 5), it is considered unlikely for there to be significant impacts to the species. Table 8 outlines the EPBC Act significant impact criteria and their relevance.

Table 8: EPBC Act significant impact criteria

EPBC Act significant impact criteria (DoE 2013)	Relevance
Lead to a long-term decrease in the size of an important population of a species	Unlikely given the small amount of temporary habitat loss, and complete habitat reinstatement on closure of the mine
Reduce the area of occupancy of an important population	Will not be substantially affected. Complete habitat reinstatement on closure of the mine

Fragment an existing important population into two or more populations	Connectivity will be maintained within the mine tenement
Adversely affect habitat critical to the survival of a species	Will not be substantially affected. Complete habitat reinstatement on closure of the mine
Disrupt the breeding cycle of an important population	
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	Unlikely. Weeds and feral predators will be controlled across the mine tenement
Introduce disease that may cause the species to decline	Unlikely
Interfere substantially with the recovery of the species	Unlikely. Key threats to the species (weeds, feral predators, altered fire regimes) will be managed across the mine tenement

6.3 Proposed action IS a controlled action

N/A

7 Environmental record of the responsible party

	Yes	No
<p>7.1 Does the party taking the action have a satisfactory record of responsible environmental management?</p> <p>Provide details</p> <p>MMG Dugald River has a satisfactory record of environmental management. MMG Dugald River have never been prosecuted for breaching environmental conditions, and has a good working relationship with their state based regulatory DEHP.</p>	X	
<p>7.2 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>If yes, provide details</p>		X
<p>7.3 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> <p>If yes, provide details of environmental policy and planning framework</p> <p>MMG Dugald River's environmental management approach is based on the on the principles of plan, do, check, act and aligns to the principles of ISO14001. The approach involves identification, assessment and control of material risks across all phases of our business, from exploration to through to development, operation and then closure. We work in partnership with our stakeholders to understand the challenges and opportunities of our activities, and how best to manage them.</p> <p>MMG Environment Standard's defines MMG's minimum requirements and provides the basis for sustainable environmental management through its deployment at our operations. These requirements are audited as part of an integrated assurance process.</p> <p>Through the application of the MMG Operating Model, the operations focus on essential environmental delivery work, supported by functional excellence that drives continual improvement of our management processes.</p>	X	
<p>7.4 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?</p> <p>Provide name of proposal and EPBC reference number (if known)</p>		X

8 Information sources and attachments

8.1 References

- AustralAsian Resource Consultants (AARC) (2011) Dugald River Project. Terrestrial Flora and Fauna Assessment. Unpublished report prepared for MMG Australia Limited. July 2011.
- Begg, R.J., Martin, K.C., & Price, N.F. (1981). The small mammals of Little Nourlangie Rock, N.T. V. The effects of fire. *Australian Wildlife Research* 8, 515-527.
- Burnett, S., McDonald, K. and Nugent, D. (2014). Optimising field surveys and exploring habitat associations of the Carpentarian False Antechinus, *Pseudantechinus mimulus* in the Selwyn Range, north-west Queensland. University of the Sunshine Coast, Sippy Downs.
- Cogger, H. G. (2014). Reptiles and Amphibians of Australia. 7th Edition. CSIRO Publishing, Canberra
- Department of the Environment (DoE) *Matters of National Environmental Significance Significant impact guidelines 1.1 - Environment Protection and Biodiversity Conservation Act 1999*. Commonwealth of Australia.
- Department of the Environment (DoE) (2014) *Environmental Management Plan Guidelines*. Commonwealth of Australia.
- Department of the Environment (DoE) (2015) Species Profile and Threats Database. Available from: <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>. Accessed on: 19 August 2015.
- Department of Environment, Water, Heritage and the Arts (DEWHA) (2015) Approved Conservation Advice for *Acanthopis hawkei* (plains death adder). Available from: <http://www.environment.gov.au/biodiversity/threatened/species/pubs/83821-conservation-advice.pdf>. Accessed on: 19 August 2015.
- Department of Environment, Heritage and Protection (2015) Gouldian Finch. Available from: https://www.ehp.qld.gov.au/wildlife/animals-az/gouldian_finch.html. Accessed on: 19 August 2015.
- Department of Environment, Heritage and Protection (2015) Gulf snapping turtle. Available from: https://www.ehp.qld.gov.au/wildlife/animals-az/gulf_snapping_turtle.html. Accessed on: 19 August 2015.
- EcoSmart Ecology (2015a) Carpentarian Pseudantechinus (*Pseudantechinus mimulus*) Survey Results. Dugald River Mine. Unpublished report prepared for Ashurst Pty Ltd. July 2015.
- EcoSmart Ecology (2015b) Carpentarian Pseudantechinus (*Pseudantechinus mimulus*) Habitat Mapping. Dugald River Mine. Unpublished report prepared for MMG Pty Ltd. August 2015.
- EcoSmart Ecology (2015c) Carpentarian Pseudantechinus (*Pseudantechinus mimulus*): Existing knowledge and the Dugald River Mine Population. Dugald River Mine. Unpublished report prepared for MMG Pty Ltd. September 2015.
- Exco Resources Ltd (2013) Referral of Proposed Action Form. Exco Resources Ltd – Mount Colin Project, Queensland. August 2013.
- Joseph L. (2014) Almost revealed: the night parrot's secret. ECOS. January 2014. Available from: <http://www.ecosmagazine.com/paper/EC14009.htm>
- Queensland Herbarium (2012) Potential Habitat Models for Queensland's Threatened Flora and Fauna (August 2012). Queensland Herbarium, Department of Science, Information Technology, Innovation and the Arts, Brisbane.
- Woinarski, J.C.Z. (2004). National Multi-species Recovery Plan for the Carpentarian Antechinus *Pseudantechinus mimulus*, Butler's Dunnart *Sminthopsis butleri* and Northern Hopping-mouse *Notomys aquilo*, 2004 - 2009. Northern Territory Department of Infrastructure Planning and Environment, Darwin.

8.2 Reliability and date of information

The information used to undertake the analysis in this referral (listed in Section 8.1 above) is considered appropriate and fit for purpose. The various information sources are discussed in relation to general information about EPBC Act listed matters and specifically in relation to the Carpentarian Antechinus (*Pseudantechinus mimulus*) in Table 9.

Table 9: Information used in the referral

Information type	Sources	Currency and reliability
General information	<ul style="list-style-type: none"> Flora and fauna surveys for the Dugald River mine site as part of the state approval 	<ul style="list-style-type: none"> Surveys undertaken in 2011 by qualified ecologists using appropriate methods Information considered to be reliable
	<ul style="list-style-type: none"> Commonwealth and State government species information 	<ul style="list-style-type: none"> Variety of dates Information considered reliable for providing a high level understanding of species ecology, distribution and habitat preferences
Specific to the Carpentarian Antechinus	<ul style="list-style-type: none"> Species surveys across the mine tenement 	<ul style="list-style-type: none"> Undertaken in 2015 by qualified ecologists using appropriate methods Information considered reliable in terms of identifying presence of the species (limitations identified in survey report at Attachment B)
	<ul style="list-style-type: none"> Habitat mapping for the species 	<ul style="list-style-type: none"> Undertaken in 2015 by qualified ecologists using appropriate methods Information considered reliable in terms of identifying species habitat (limitations identified in habitat mapping report at Attachment C)
	<ul style="list-style-type: none"> Review of species information 	<ul style="list-style-type: none"> Undertaken in 2015 by qualified ecologists with expertise in the species Information considered reliable in terms of presenting the most up to date knowledge on the species

8.3 Attachments

		✓ attached	Title of attachment(s)
You must attach	figures, maps or aerial photographs showing the project locality (section 1)	✓	Figure 1: Regional project location
	GIS file delineating the boundary of the referral area (section 1)	✓	
	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)	✓	Figure 2: Existing infrastructure Figure 3: Proposed construction activities Figure 4: Proposed exploration activities Figure 5: Proposed power transmission line Figure 6: <i>Pseudantechinus mimulus</i> records and extent of occurrence Figure 7: Carpentarian antechinus records and habitat Figure 8: Carpentarian antechinus records and habitat – proposed power transmission line Figure 9: Potential Carpentarian Antechinus impact

		✓ attached	Title of attachment(s)
If relevant, attach	copies of any state or local government approvals and consent conditions (section 2.5)		
	copies of any completed assessments to meet state or local government approvals and outcomes of public consultations, if available (section 2.6)		
	copies of any flora and fauna investigations and surveys (section 3)	✓	Attachment A: Dugald River Project. Terrestrial Flora and Fauna Assessment. Prepared by AustralAsian Resource Consultants, July 2011 Attachment B: Carpentarian Pseudantechinus (<i>Pseudantechinus mimulus</i>) Survey Results. Dugald River Mine. Prepared by EcoSmart Ecology for MMG Australia Ltd. July 2015
	technical reports relevant to the assessment of impacts on protected matters that support the arguments and conclusions in the referral (section 3 and 5)	✓	Attachment C: Carpentarian Pseudantechinus (<i>Pseudantechinus mimulus</i>) habitat mapping. Dugald River Mine. Prepared by EcoSmart Ecology for MMG Australia Ltd. August 2015 Attachment D: Carpentarian Antechinus management plan
	report(s) on any public consultations undertaken, including with Indigenous stakeholders (section 3)		

9 Contacts, signatures and declarations

Project title: Dugald River Zinc/Lead Mine Expansion, north-west of Cloncurry, Queensland

9.1 Person proposing to take action

1. Name and Title: Pierre Malan, General Manager Dugald River Project

2. Organisation (if applicable): MMG Dugald River Pty Ltd

3. EPBC Referral Number (if known):

4: ACN / ABN (if applicable): 19 083 405 556

5. Postal address
Level 23
28 Freshwater Place
Southbank VIC 3006
Australia

6. Telephone: +61 8 9956 4240

7. Email: Pierre.Malan@MMG.COM

8. Name of designated proponent (if not the same person at item 1 above and if applicable):

9. ACN/ABN of designated proponent (if not the same person named at item 1 above):

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 declare that I am not taking the action on behalf of or for the benefit of any other person or entity.

Signature



Date

30/09/2015

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

Individual or organisation who has prepared the information contained in this referral form.

Name Heather Tolley

Title Director, Open Lines Environmental Consulting

Organisation Organisation name should match entity identified in ABN/ACN search

ACN / ABN (if applicable) 90 150 901 965

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Telephone 0438 368 204

Email heather@openlines.com.au

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 30 Sept 2015