Lake Leake Road Quarry

Flora and Fauna Assessment
## Document information

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## Revision history

**Revision 0**

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2 EXECUTIVE SUMMARY

A planned $400m upgrade to the Midlands Highway which is due to be constructed from 2015-2025, is likely to produce a significant demand for quality quarry products to supply the Department of State Growth’s road and bridge infrastructure in the Midlands area.

Shaw Contracting (Aust) Pty Ltd. through a fully owned subsidiary, Midlands Quarries Pty Ltd is proposing to open and operate a rock quarry (Category 3 Level 2 Mining Lease) to meet these needs. Quarrying activities will involve drilling, blasting, and crushing to make a range of quarry materials.

It is envisaged that by June 2016 the quarry could be potentially producing 100,000m$^3$ per annum to supply the Midlands Highway Upgrade. A quarry plan will be developed for the site that will cover quarry staging and progressive rehabilitation. The quarry is located on the Lake Leake Road, approximately 6 kilometres from the Campbell Town turn off and is on the Quorn Hall property.

The area of the proposed quarry site (49.3 hectares) was assessed during a vegetation and fauna habitat assessment undertaken on the 27 November and 2 December 2014. The surveys were used to develop mitigation strategies to avoid threatened species and communities.

Vegetation

The study area consisted of a series of small dolerite ridges which ran predominantly in an east to west direction. Exposed ridge tops generally supported *Bursaria-Acacia* woodland while upper and lower slopes supported grasslands dominated by a variety of grass species. Generally plant diversity was low in all vegetation types and is likely to be the result of heavy grazing. Various areas across the study area had been burnt as a means of managing gorse. Past fire management as well as dry conditions and heavy grazing has resulted in significant areas of bare ground.

Two vegetation communities were identified within the proposed study area (*Bursaria-Acacia* woodland and Lowland Grassland Complex) and neither of these communities is considered threatened under State or Federal legislation. The field survey recorded 83 species within the study area of which 38 were introduced species however no threatened flora species were recorded from the survey.

Fauna

A number of threatened fauna species had the potential to utilise the site due to the presence of suitable habitat. These were, the Tasmanian devil (*Sarcophilus harrisii*), the spotted-tailed quoll (*Dasyurus maculatus maculatus*), the eastern barred bandicoot (*Perameles gunnii gunnii*) and the
tussock skink (*Pseudemoia pagenstecheri*). Habitat on site is marginal for the spotted tailed quoll and Tasmanian devil but they may occasionally utilise the site. Some habitat for the eastern barred bandicoot and the tussock skink may be lost from the site during construction of the quarry however the impact on these species will be minimal.

**Weeds**

A number of weed species were present within the study area of which two species, *Ulex europaeus* (gorse) and *Carduus pycnocantha* (slender thistle) are declared weeds listed in the *Weed Management Act 1999*.

**Impact Assessment and Mitigation**

There are minimal environmental values present on the site that need specific mitigation however general minimisation of disturbance should adequately mitigate the small impact caused by the proposed development and future management of the site is likely to improve the condition of the remaining vegetation through the management of grazing, weeds and fire.

No environmental values were identified from the adjacent drainage line and so no impact would be expected from any run off from site.

**Recommendations**

The following recommendations are made with regard to the proposal.

1. Disturbance to areas of potential fauna habitat (Poa tussocks, native vegetation, trees with hollows, fallen logs) in grasslands and woodlands should be kept to a minimum. All areas identified for clearing for construction of the access road, crushing plant and quarry should be appropriately marked and impacts associated with construction should be confined to these areas where ever possible.

2. Management of the lease areas outside the construction site should focus on the reduction of grazing and burning to allow for the recovery of native vegetation.

3. A weed management plan should be developed for both the construction and operation of the quarry. Weed management should focus on controlling existing infestations and preventing the spread of gorse and slender thistle within and from the property. Construction machinery should be cleaned prior to first entry to the site as well as when leaving the site and any weed
material and soil should be removed to prevent the spread of weeds and diseases. Construction machinery should be cleaned as described in DPIWE 2004 Washdown Guidelines for Weed and Disease Control Edition 1. 4.

4. Dust caused through the operation of the quarry and crushing plant has the potential to impact on surrounding vegetation. Management of dust emissions should be implemented so that this does not occur.

5. A rehabilitation plan should be developed for the construction and operational phase of the quarry and should aim to restore the native vegetation on the site.
3 INTRODUCTION

With planned $400m upgrade to the Midlands Highway which is due to be constructed from 2015-2025 it is envisaged that there will be a significant demand for quality quarry products to supply the Department of State Growth’s road and bridge infrastructure in the Midlands area.

Shaw Contracting (Aust) Pty Ltd, through a fully owned subsidiary, Midlands Quarries Pty Ltd, is proposing to open and operate a rock quarry to meet these needs. Quarrying activities will involve drilling, blasting, and crushing to make a range of quarry materials. Including: business will produce quarry products including:

- Road pavement materials;
- Sealing aggregates;
- Concrete aggregates;
- Rock amour;
- Rock spawls; and
- Drainage rock and pipe bedding

It is envisaged that by June 2016 the quarry could be potentially producing 100,000m3 per annum to supply the Midlands Highway Upgrade. A quarry plan will be developed for the site that will cover quarry staging and progressive rehabilitation.

The quarry is located on the Lake Leake Road, approximately 6 kilometres from the Campbell Town turn off and is on the Quorn Hall property.
4 ASSESSMENT METHOD

4.1 FLORA AND FAUNA

The area of the proposed quarry site was assessed during a vegetation and fauna habitat assessment undertaken on the 27 November and 2 December 2014. The field investigation involved a meandering pass survey of the property. Information recorded included community structure and condition. Vegetation communities were identified and attributed to Tasmanian Vegetation Mapping Units (Harris and Kitchener 2005). Investigation of the drainage line to the south of the study area was also undertaken to ensure that no values could be impacted by runoff from the site. All species of flora and fauna encountered during the survey were recorded. Nomenclature for flora follows the current census of Tasmanian Vascular Plants (http://www.tmag.tas.gov.au/__data/assets/pdf_file/0009/77607/2013_Census_of_Tasmanian_Vascular_Plants.pdf).

4.2 LIMITATIONS

Due to varying flowering times and seasonality of occurrence it is possible that not all flora species that occur at the site were identified in the survey. Some threatened species, particularly short lived annuals, orchids and lilies that may be present at the site may have been missed because they were not able to be identified (they were not flowering) or they were not evident at this time of year (they were annual plants that had died back or not emerged at the time of survey).

The fauna assessment was limited to a habitat assessment for fauna species, including the ground truthing of potential habitats for significant fauna species that were identified in database searches. Any indirect evidence of fauna presence was also recorded (e.g. scats, diggings, burrows, shelters etc). No systematic fauna surveys were undertaken.

4.2.1 Criteria for Determining Flora and Fauna Species of Conservation Significance

The conservation significance of the flora and fauna at the proposed quarry site was assessed using the following criteria.
• They were listed on the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

• They were listed on the *Tasmanian Threatened Species Protection Act 1995*

The requirements of the Tasmanian *Threatened Species Protection Act 1995*, and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* are summarised below. The requirements of the *Tasmanian Forest Practices Act 1985* are also summarised below. This Act and the associated Forest Practices Code are included because they prescribe the manner in which the clearing of native vegetation can be undertaken and afford protection to Threatened Native Vegetation Communities listed on Schedule 3A of the *Nature Conservation Act 2002*.

### 4.2.2 Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA) provides for the protection of matters of national environmental significance and the conservation of Australia’s biodiversity. Whilst the States are primarily responsible for environmental impact assessment there are a number of triggers that may initiate Commonwealth involvement in a project. These are:

- listed threatened species and communities
- listed migratory species
- Ramsar wetlands of international importance
- Commonwealth marine environment
- world heritage properties
- national heritage places
- the Great Barrier Reef Marine Park
- nuclear actions
- a water resource, in relation to coal seam gas development and large coal mining development.

### 4.2.3 Threatened Species Protection Act 1995

Generally, the following obligations under the *Tasmanian Threatened Species Protection Act 1995* (TSPA) are relevant to proposed works. In the absence of a permit:

- no listed species may be killed, injured or collected
• listed species on land subject to an interim protection order must not be disturbed

• there must be no disturbance to listed species contrary to a land management agreement

• any interim protection order made to conserve the critical habitat of a listed taxon of flora or fauna must be complied with. In the absence of a permit, no activity may be undertaken on land subject to an interim protection order.

4.2.4   Forest Practices Act 1985

The Forest Practices Act 1985 provides that the Forest Practices Code (FPC) prescribes the manner in which forest practices or clearance and conversion of native vegetation is to be conducted and provides for the protection of the natural and cultural values. Forest Practices Plans are required when clearing trees or clearance and conversion of Threatened Native Vegetation Communities listed on Schedule 3A of the Nature Conservation Act 2002.

A Forest Practices Plan (FPP) will not be required for the proposed works as a FPP is unnecessary where “the harvesting of timber or the clearing of trees on any land, or the clearance and conversion of a threatened native vegetation community on any land, in the course of mineral exploration activities, or mining activities, that are authorised under –

(i) a permit granted under the Land Use Planning and Approvals Act 1993; or

(ii) an exploration licence within the meaning of the Mineral Resources Development Act 1995; or

(iii) a retention licence within the meaning of the Mineral Resources Development Act 1995; or

(iv) a mining lease within the meaning of the Mineral Resources Development Act 1995;
5 RESULTS

5.1 FLORA

5.1.1 Vegetation Communities

The study area consisted of a series of small dolerite ridges which ran predominantly in an east to west direction. Exposed ridge tops generally supported *Bursaria-Acacia* woodland while upper and lower slopes supported grasslands dominated by a variety of species including *Austrodanthonia* spp. (wallaby grass), *Themeda triandra* (kangaroo grass), *Poa labillarierei* (silver tussock) and *P. rodwayii* (velvet tussock).

Generally plant diversity was low in all vegetation types and is likely to be the result of heavy grazing by both domestic stock (sheep and cattle) but also native and non-native animals. Bennet’s wallaby were abundant across the site during the middle of the day and rabbits and deer were both observed. Various areas across the study area had been burnt as a means of managing gorse. Past fire management as well as dry conditions and heavy grazing has resulted in significant areas of bare ground.

Two Tasmanian Vegetation Mapping Types (TASVEG), as described in Harris & Kitchener (2005) were identified within the proposed study area (Table 5-1 and Figure 5-3). Neither of these communities is considered threatened under State or Federal legislation.

<table>
<thead>
<tr>
<th>TASVEG Community</th>
<th>Code</th>
<th>Area in study area (hectares)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lowland Grassland Complex</td>
<td>GCL</td>
<td>36.9</td>
</tr>
<tr>
<td>Bursaria – Acacia woodland and scrub</td>
<td>NBA</td>
<td>12.4</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>49.3</td>
</tr>
</tbody>
</table>

Table 5-1. Vegetation communities occurring in the study area.
Lowland Grassland Complex (GCL)

This community was generally found on the lower slopes and flatter saddles of the study area and graded in to *Bursaria-Acacia* woodland (Figure 5-1). This community was dominated by a range of grass species and dominance was difficult to determine as it changed rapidly over small areas and changed between *Austrodanthonia* spp. (wallaby grass) and *Poa labillardierei* (silver tussock), *P. rodwayii* (velvet tussock) and introduced species such as *Bromus catharticus* (prairie grass), *Cynosorus cristatus* (crested dogs tails) and *Vulpia* species (fescue). *Lomandra longifolia* (sagg), was present in patches and the sedge, *Carex iynx* (tussock sedge) was frequent. Native herbs were present but in low abundance and included *Convulvulus angustissimus* (blushing bindweed) as well as *Leptorhynchos squamatus* (scaly buttons), *Dichondra repens* (kidney weed), *Solegyne gunnii* (hairy flat-herb), *Ptilotus spathulatus* (pussy tails) and *Plantago varia* (variable plantain). The native herb layer in this community was generally quite depauperate and was a possibly due the long history of grazing and use of fire. Introduced herbs were common and had a high percentage cover and included *Erodium cicutarium* (common heronsbill), *Leontodon taraxicoides* (hairy hawkbit), and *Hypochaeris radicata* (rough cats ear) and *Trifolium spp.* (clover). This community had its closest affiliations to the TASVEG mapping unit Lowland Grassland Complex.

Figure 5-1. Lowland Grassland Complex with *Bursaria-Acacia* woodland in the background.
**Bursaria - Acacia woodland and scrub (NBA)**

This community was characterised by small (less than six metre high) *Bursaria spinosa* (prickly box) and *Acacia. mearnsii* (black wattle) with the occasional * Allocasuarina verticillata* (drooping sheoak) with a grassy understorey similar to that described above (Figure 5-2). *Poa labillardierei* (silver tussock) and *P. rodwayi* (velvet tussock) were common as were *Lomandra longifolia* (sagg) and *Carex iynx* (tussock sedge). *Astroloma humifusum* (native cranberry) and *Lissanthe strigosa* (peach berry) were occasional as were *Convulvulus angustissimus* (blushing bindweed), *Leptorrhynchos squamatus* (scaly buttons), *Ptilotus spathulatus* (pussy tails) and *Plantago varia* (variable plantain). Introduced herbs and pasture grasses were common and included *Erodium cicutarium* (common storksbill), *Cirsium vulgare* (spear thistle), *Centaurium erythrea* (common centaury), *Leontodon taraxicoides* (hairy hawkbit), and *Hypochaeris radicata* (rough catsear), *Trifolium spp.* (clover) as well as *Hordeum murinum* (shortflower barelygrass), *Cynorsorus cristatus* (crested dogstail), *Bromus catharticus* (prairie grass), and *Dactylis glomeratus* (cocksfoot).

*Figure 5-2. Bursaria-Acacia woodland found on dry rocky slopes.*
Figure 5-3. Vegetation communities and weed species recorded from the study area
5.1.2 Threatened Vegetation Communities
No vegetation communities present in the study area are listed as threatened on the *Nature Conservation Act 2002* or the *Environment Protection and Biodiversity Conservation Act 1999*.

5.1.3 Threatened Flora
The field survey recorded 83 species within the study area of which 38 were introduced species including two species listed as declared weeds under the *Weed Management Act 1999*. A full list of species is provided in Appendix A. Fifteen threatened flora species have previously been recorded within 5 km of the study area (Table 5-2) however none were recorded during the field survey.

*Table 5-2. Threatened Species previously recorded from within 5km of the study area.*

<table>
<thead>
<tr>
<th>Species</th>
<th>Common name</th>
<th>Conservation category</th>
<th>Habitat or occurrence on property</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acacia axillaris</td>
<td>midlands wattle</td>
<td>Vulnerable</td>
<td>Midlands wattle is a small shrub which grows to about four metres in height. The leaves are very narrow and taper to a very sharp point. Midlands wattle is found only in Tasmania, its main locations being Elizabeth River, St Pauls River, Dukes River, Mount Barrow, Lake River and Lake Leake Road. No suitable habitat present.</td>
</tr>
<tr>
<td>Arthropodium strictum</td>
<td>chocolate lily</td>
<td>Rare</td>
<td>A lily up to 90 cm tall with bright purple flowers. Not recorded and not likely to have been overlooked.</td>
</tr>
<tr>
<td>Austrostipa nodosa</td>
<td>knotty speargrass</td>
<td>Rare</td>
<td>Tufted spear grass up to 80 m tall that occurs in open woodlands and native grasslands (DPIPWE, Tas.). Not observed and unlikely to have been overlooked.</td>
</tr>
<tr>
<td>Austrostipa scabra</td>
<td>rough speargrass</td>
<td>Rare</td>
<td>A tufted spear grass to 50 cm that occurs in dry open woodlands and native grasslands. Not observed and unlikely to have been overlooked.</td>
</tr>
<tr>
<td>Colobanthus curtisiae</td>
<td>grassland cupflower</td>
<td>Rare</td>
<td>A small perennial herb growing to 40 mm high. Is endemic to Tasmania. Not observed and unlikely to have been overlooked.</td>
</tr>
<tr>
<td>Dianella amoena</td>
<td>grassland flaxlily</td>
<td>Rare</td>
<td>Tufted mat-forming perennial lily that occurs grassy woodlands and native grasslands usually on basalts. No suitable habitat present</td>
</tr>
<tr>
<td>Hovea tasmanica</td>
<td>rockfield purplepea</td>
<td>Rare</td>
<td>A spindly, erect shrub that grows to approximately 3 metres in height. The leaves are stalked and between 1.5-5 cm long and 4-7 mm wide. They are narrow oblong in shape and the upper leaf surface is green and glossy with a dense line of curly hairs along the midrib. The lower surface is completely covered with deep cream or orange-tan hairs that become grey with age. The pea flowers are deep mauve in colour and arranged together in groups of 2 or 3. Flowering occurs from September to October. Not observed and unlikely to have been overlooked.</td>
</tr>
</tbody>
</table>
5.2 Threatened Fauna

Available data sources, including the Natural Values Atlas (NVA) and the EPBC Protected Matters Search Tool have identified a number of species that have the potential to occur in suitable habitat on the site. Four of these species were identified as potentially occurring on site because of the presence of suitable habitat, the Tasmanian devil (*Sarcophilus harrisii*), spotted-tailed quoll (*Dasyurus maculatus maculatus*), the eastern barred bandicoot (*Perameles gunnii gunnii*) and the tussock skink (*Pseudemoia pagenstecheri*).
Table 5-3. Listed threatened fauna species recorded within in 5km of the site or potentially occurring on the site.

<table>
<thead>
<tr>
<th>Species</th>
<th>Common name</th>
<th>Conservation status</th>
<th>Habitat / Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dasyurus maculatus maculatus</td>
<td>spotted-tailed quoll</td>
<td>Rare, Vulnerable</td>
<td>Inhabits wet and dry forests and coastal heath. There are records on the NVA from within 5 km of the proposed dam site. Priority habitat is not present at the site (wet forest) but the species may occasionally use the site. No impact expected.</td>
</tr>
<tr>
<td>Sarcophilus harrisii</td>
<td>Tasmanian devil</td>
<td>Endangered, Vulnerable</td>
<td>Inhabits forest, woodland and agricultural areas. There are records from within 5 km of the site. Habitat at site is unsuitable because there is little ground cover for shelter or suitable areas for den sites. May occasionally use the site.</td>
</tr>
<tr>
<td>Perameles gunnii gunnii</td>
<td>eastern barred bandicoot</td>
<td>Not listed, Vulnerable</td>
<td>Inhabits grassy woodlands, native grasslands, and mosaics of pasture and shrubby ground cover. There are records from within 5km of the site. Potential suitable foraging habitat is present at the site. Species may occur on site.</td>
</tr>
<tr>
<td>Aquila audax fleayi</td>
<td>wedge-tailed eagle</td>
<td>Endangered, Endangered</td>
<td>Nesting habitat is large tracts (more than 10 ha) of eucalypt or mixed forest. Forest habitat at site is unsuitable for nesting. The nearest known nest is over 4km to the north near the Elizabeth River. May overfly the site.</td>
</tr>
<tr>
<td>Tyto novaehollandiae castanops</td>
<td>Tasmanian masked owl</td>
<td>Endangered, Vulnerable</td>
<td>It occurs across Tasmania apart from the southwest. Most records of the species are from lowland, dry sclerophyll forest in the south east and central north of Tasmania (Bell et al. 1997). The masked owl nests in large hollows in large old trees in dry forest and woodland and paddock trees. No nest known in area and no large habitat trees on site.</td>
</tr>
<tr>
<td>Pseudemoia pagenstecheri</td>
<td>tussock grass skink</td>
<td>Endangered, Not listed</td>
<td>Inhabits lowland native grassland and grassy woodland. The lowland grassland complex at the site is generally suitable habitat as it has the structural complexity necessary for this species.</td>
</tr>
<tr>
<td>Litoria raniformis</td>
<td>green and gold frog</td>
<td>Vulnerable, Vulnerable</td>
<td>Large green tree-frog which inhabits lakes, lagoons and dams with permanent water and emergent vegetation. No suitable habitat is present for this species within the study area or adjacent creek lines.</td>
</tr>
<tr>
<td>Oreixenica ptunarra</td>
<td>ptunarra brown butterfly</td>
<td>Vulnerable, Endangered</td>
<td>The Ptunarra brown butterfly is a small brown and orange butterfly belonging to the family Nymphalidae. It is generally a montane to alpine species being restricted to sites above 400 m. It does not extend into the lowland plains of the Midlands, where it may be too warm for the butterfly and where it is too dry for its food plant to flourish. Suitable habitat present but outside known range.</td>
</tr>
</tbody>
</table>

Source: Natural Values Atlas, Protected Matters Search Tool, and site survey. Shading indicates that there is potentially suitable habitat at the site for the species.
Tasmanian devil (*Sarcophilus harrisi*)

The Tasmanian devil is listed as **endangered** on the TSPA and the EPBCA. The devil is widely distributed in Tasmania where it inhabits forest, woodland and agricultural areas. However, devil facial tumour disease (DFTD) has caused a significant decline in the population. There are several Tasmanian devil records from within 5 km of the site. Habitat at site is poor because there is little ground cover for shelter or den sites. The field survey did not reveal any dens or signs of devils. The site may form part of the foraging range of local devils.

**Eastern Barred Bandicoot (*Perameles gunnii gunnii*)**

The eastern barred bandicoot is listed as **vulnerable** on the EPBCA. The species inhabits grassy woodlands, native grasslands, and mosaics of pasture and shrubby ground cover which provides foraging and shelter habitat. The eastern barred bandicoot has been recorded from within 5 km of site and there is suitable foraging habitat on site within the grasslands and grassy woodland and shelter available in denser vegetation present. It is unlikely that the proposal would have any significant impact on this species given the relatively small area to be impacted and the broad areas of adjacent habitat.

**Spotted-tailed Quoll (*Dasyurus maculatus maculatus*)**

The spotted-tailed quoll is listed as **rare** on the TSPA and **vulnerable** on the EPBCA. It is primarily a forest-dwelling species and wet forest in particular. There are records of this species on the NVA from within 5 km of the site and it is likely that the spotted-tailed quoll occurs in and around the site. However priority habitat is not present on the site and it is unlikely that this species will be significantly impacted by the proposed works because of the relatively small scale of the disturbance and large tracts of native forest adjacent to the site.

**Tussock Skink (*Pseudemoia pagenstecheri*)**

This species is listed as **endangered** under the TSPA. While not previously recorded within 5km of the site it is with the range boundaries of this species and suitable habitat is present on site. This small, striped lizard usually inhabits native grassland where there is grassland structure in the form of tussocks. The species has been recorded from near Ross approximately 18 km away. The species has the potential to occur within the grasslands where *Poa* tussock are well formed (Figure 5-4) within the study area site. Some loss of habitat will occur due to construction activities but will be minimal.
Ptunarra brown butterfly (*Oreixenica ptunarra*).

The Ptunarra brown butterfly is listed as **vulnerable** on the TSPA and **endangered** on the EPBCA. Suitable habitat for this species is present on site however the site is outside the considered range of the species. It is generally a montane to alpine species being restricted to sites above 400 and does not extend into the lowland plains of the Midlands, where it may be too warm for the butterfly (Threatened Species Unit. 1998). Furthermore because of the long history of heavy grazing and burning on the site, the ptunarra brown butterfly is unlikely to be present.

### 5.3 Weeds and Diseases

A number of weed species were present within the study area of which two species, *Ulex europaeus* (gorse) and *Carduus pycnocantha* (slender thistle) are declared weeds listed in the *Weed Management Act 1999*. A full list of introduced species can be seen in Appendix 1.

*Ulex europaeus* (gorse) was found scattered throughout the study area. Some areas had been burnt (Figure 5-5) as a means of controlling the gorse but in many of these areas it was regenerating quickly. Often associated with these areas of burnt gorse were scattered occurrences of *Carduus pycnocantha*.
(slender thistle) and *Cirsium vulgare* (spear thistle) which were colonising the bare ground. *Rosa rubignosa* (briar rose) was also present scattered about one locality (Figure 5-3).

![Figure 5-5 Lowland Grassland Complex with areas of burnt gorse.](image)

There are statutory management plans for the *Ulex europaeus* and *Carduus pycnochantha* which outline management measures for these species in the Northern Midlands area. These measures have been considered in developing the following recommendations in the following section.

### 5.4 Geomorphology

A search of the geo-conservation database was undertaken on 29 November 2014. No geo-conservation values were identified from the site.
5.5 **ADJACENT WATERWAYS**

An inspection of the waterway to the south and east of the study area which runs in to Keach Creek was undertaken to check that no environmental values could be potentially impacted by runoff from the site. This drainage line was highly modified and basically was a drain running through improved agricultural land and contained few if any native species and no fauna habitat (Figure 5-6).

*Figure 5-6 A highly modified drainage line running through agricultural land to the south and east of the study area.*
6 IMPACT ASSESSMENT AND MITIGATION

There are minimal environmental values present on the site that need specific mitigation however general minimisation of disturbance should adequately mitigate the small impact caused by the proposed development and future management of the site is likely to improve the condition of the remaining vegetation through the management of grazing, weeds and fire.

No environmental values were identified from the adjacent drainage line and so no impact would be expected from any run off from site.

6.1 THREATENED VEGETATION COMMUNITIES AND FLORA

No vegetation communities or flora species listed on the Environment Protection and Biodiversity Conservation Act 1999 or TSPA were recorded from the site and so no specific mitigation is required.

6.2 THREATENED FAUNA

A number of fauna species have the potential to occur on the site. *Psuedomoia pagenstecheri* (tussock skink) listed on the TSPA while not recorded from the immediate vicinity of the study area has the potential to occur on site due to the presence of suitable habitat. Some loss of habitat of this species will occur however it will be only a small area for the establishment of the access road, crushing plant and quarry. Much of this habitat however is in relatively poor condition due to heavy grazing and burning. Management of the lease area in the long term has the potential of improving the condition of the Poa dominated areas by reducing grazing pressure and managing fire and weeds.

6.2.1 EPBC fauna species

Three species listed as both on the TSPA and the EPBCA have the potential to occur on the site due to the presence of suitable habitat.

The Tasmanian devil (*endangered* on the TSPA and *endangered* on the EPBCA), the spotted-tailed quoll (*rare* on the TSPA and *vulnerable* on the EPBCA) and the eastern barred bandicoot (*rare* on the TSPA and *vulnerable* on the EPBCA) have the potential to occasionally occur and forage on the site. While some loss of habitat will occur the proposal is unlikely to have a significant impact on these species and management of the lease area in the long term has the potential of improving the condition of the grasslands and woodlands by reducing grazing pressure and managing fire and weeds.
6.3 **WEEDS AND DISEASES**

There are statutory management plans for the two declared weed species which was recorded at the site (gorse and slender thistle). The plans outline management measures for these weed species in the Northern Midlands municipality. For the purposes of this management plan the spread of gorse and slender thistle from the municipality must be prevented.

No signs of disease was recorded from the site.

7 **RECOMMENDATIONS**

The following recommendations are made with regard to the proposal.

1. Disturbance to areas of potential fauna habitat (Poa tussocks, native vegetation, trees with hollows, fallen logs) in grasslands and woodlands should be kept to a minimum. All areas identified for clearing for construction of the access road, crushing plant and quarry should be appropriately marked and impacts associated with construction should be confined to these areas where ever possible.

2. Management of the lease areas outside the construction site should focus on the reduction of grazing and burning to allow for the recovery of native vegetation.

3. A weed and disease management plan should be developed for both the construction and operation of the quarry. Weed management should focus on preventing the spread of gorse and slender thistle within and from the property. Construction machinery should be cleaned prior to first entry to the site as well as when leaving the site and any weed material and soil should be removed to prevent the spread of weeds and diseases. Construction machinery should be cleaned as described in DPIWE 2004 Washdown Guidelines for Weed and Disease Control Edition 1.4.

4. Dust caused through the operation of the quarry and crushing plant has the potential to impact on surrounding vegetation. Management of dust emissions should be implemented so that this does not occur.

5. A rehabilitation plan should be developed for the construction and operational phase of the quarry and should aim to restore the native vegetation on the site.
8 REFERENCES


9  **APPENDIX 1-FLORA SPECIES RECORDED FROM THE STUDY AREA**

**Status Codes**

i – introduced,
D - declared weed WM Act

<table>
<thead>
<tr>
<th>Name</th>
<th>Common name</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DICOTYLEDONAE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>AMARANTHACEAE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ptilotus spathulatus</td>
<td>pussytails</td>
<td></td>
</tr>
<tr>
<td><strong>ASTERACEAE</strong></td>
<td></td>
<td></td>
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<tr>
<td>Arctotheca calendula</td>
<td>capeweed</td>
<td>i</td>
</tr>
<tr>
<td>Carduus pycnocantha</td>
<td>slender thistle</td>
<td>D</td>
</tr>
<tr>
<td>Chryscephalum apiculatum</td>
<td>common everlasting</td>
<td></td>
</tr>
<tr>
<td>Cirsium vulgare</td>
<td>spear thistle</td>
<td>i</td>
</tr>
<tr>
<td>Euchiton sp.</td>
<td>cudweed</td>
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</tr>
<tr>
<td>Hypochoeris radicata</td>
<td>rough catsear</td>
<td>i</td>
</tr>
<tr>
<td>Leontodon taraxacoides subsp. taraxacoides</td>
<td>hairy hawkbit</td>
<td>i</td>
</tr>
<tr>
<td>Leptorhynchos squamatus subsp. squamatus</td>
<td>scaly buttons</td>
<td></td>
</tr>
<tr>
<td>Logfia gallica</td>
<td>narrow cudweed</td>
<td>i</td>
</tr>
<tr>
<td>Silybum marianum</td>
<td>variegated thistle</td>
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</tr>
<tr>
<td>Solenogyne gunnii</td>
<td>hairy flat-herb</td>
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</tr>
<tr>
<td>Sonchus asper</td>
<td>prickly sowthistle</td>
<td>i</td>
</tr>
<tr>
<td>Taraxacum officinale</td>
<td>common dandelion</td>
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<tr>
<td><strong>CAMPANULACEAE</strong></td>
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<tr>
<td>Wahlenbergia multicaulis</td>
<td>bushy bluebell</td>
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<tr>
<td><strong>CARYOPHYLLACEAE</strong></td>
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<tr>
<td>Cerastium fontanum subsp. vulgare</td>
<td>common mouse-ear</td>
<td>i</td>
</tr>
<tr>
<td>Cerastium glomeratum</td>
<td>sticky mouse-ear</td>
<td>i</td>
</tr>
</tbody>
</table>

**CASUARINACEAE**
Allocasuarina verticillata
drooping sheoak

CONVOLVULACEAE

Convolvulus angustissimus var. angustissimus
blushing bindweed

Dichondra repens
kidneyweed

CRASSULACEAE

Crassula sieberiana subsp. sieberiana
rock stonecrop

EPACRIDACEAE

Astroloma humifusum
native cranberry

Lissanthe strigosa
peach berry

FABACEAE

Medicago polymorpha
burr medick

Melilotus sp.
Bokhara clover

Trifolium dubium
suckling clover

Trifolium sp.
clover

Trifolium subterraneum
subterranean clover

Ulex europaeus
gorse

GENTIANACEAE

Centaurium erythraea
common centaury

GERANIACEAE

Erodium botrys
long heronsbill

Erodium cicutarium
common heronsbill

Erodium sp.
storks bill

VIOLACEAE

Melicytus dentatus
spiky violet bush

MIMOSACEAE

Acacia mearnsii
black wattle

MYRTACEAE

Eucalyptus ovata var. ovata
black gum

OXALIDACEAE

Oxalis corniculata subsp. corniculata
yellow wood sorrel

PITTOSPORACEAE

Bursaria spinosa subsp. spinosa
prickly box

PLANTAGINACEAE
Plantago coronopus  buckshorn plantain  
Plantago coronopus subsp. coronopus  slender buckshorn plantain  
Plantago lanceolata  ribwort plantain  
Plantago varia  variable plantain  

**POLYGONACEAE**

Acetosella vulgaris  sheep sorrel  

**ROSACEAE**

Acaena novae-zelandiae  common buzzy  
Acaena sp.  sheep's burr  
Rosa rubiginosa  sweet briar  
Sanguisorba minor subsp. muricata  salad burnet  

**SCROPHULARIACEAE**

Veronica gracilis  slender speedwell  

**THYMELAEACEAE**

Pimelea humilis  dwarf riceflower  

**MONOCOTYLEDONAE**

**Cyperaceae**

Carex iynx  tussock sedge  
Lepidosperma gunnii  narrow sword sedge  
Lepidosperma laterale  variable sword sedge  
Schoenus apogon  common bog sedge  
Schoenus sp.  bog sedge  

**Liliaceae**

Arthropodium milleflorum  pale vanilla-lily  

**Poaceae**

Agrostis capillaris  brown top bent grass  
Aira caryophyllea  silvery hairgrass  
Anthoxanthum odoratum  sweet vernalgrass  
Austrodanthonia caespitosa  common wallaby grass  
Austrodanthonia setacea  bristly wallaby grass  
Austrodanthonia sp.  Wallaby grass  
Austrostipa stiposa  corkscrew spear grass
Austrostipa sp. speargrass
Briza minor lesser quaking-grass
Bromus catharticus prairie grass
Bromus diandrus great brome
Bromus hordeaceus soft brome
Cynosorus cristatus crested dogtail
Dactylis glomerata cocksfoot
Ehrharta stipoides weeping grass
Elymus scaber rough wheatgrass
Hordeum murinum subsp. murinum shortflower barleygrass
Lolium perenne perennial ryegrass
Lolium sp. ryegrass
Poa rodwayi velvet tussockgrass
Poa labillardieri silver tussockgrass
Rytidosperma dimidiatum variable wallabygrass
Themeda triandra kangaroo grass
Vulpia sp. fescue

XANTHORHOEACEAE
Lomandra longifolia sagg

PTERIDOPHYTA

ADIANTACEAE

Cheilanthes austrotenuifolia green rockfern
Cheilanthes sieberi subsp. sieberi narrow rockfern