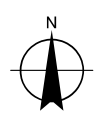
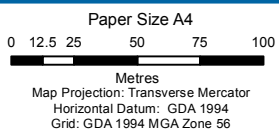
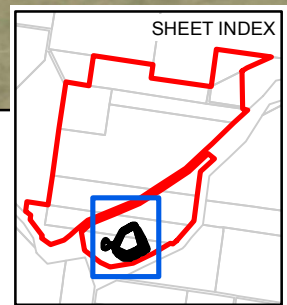


© Land and Property Information 2015

**LEGEND**

- |             |                            |   |
|-------------|----------------------------|---|
| Study area  | Existing access            | Rehabilitation - local provenance native vegetation       |
| Cadastre    | Site access                | Rehabilitation - topsoiled and planted to grazing species |
| Watercourse | Site office / weigh bridge |   |
| Waterbody   | Disturbance area           |   |
| 5m contours |                            |   |



Glen Innes Severn Council  
 Wattle Vale Quarry  
 Flora and Fauna Impact Assessment

Job Number | 22-18380  
 Revision | A  
 Date | 08 Nov 2016

**Landscape context and connectivity** **Figure 3-1**

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 T 61 2 4979 9999 F 61 2 4979 9988 E [entmail@ghd.com](mailto:entmail@ghd.com) W [www.ghd.com.au](http://www.ghd.com.au)  
 G:\22\18380\GIS\Maps\Deliverables\SouthernQuarryEIS\FloraFauna\2218380\_SQFFA002\_LandscapeContext\_A.mxd  
 ©2016. Whilst every care has been taken to prepare this map, GHD, GISSC and LPI make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.  
 Data source: LPI: DCDB & DTDB, 2012, Aerial Imagery, 2016; GISSC: Aerial Imagery / Quarry Data, 2016. Created by: fmackay, tmorton

# 4. Methods

## 4.1 Desktop assessment

### 4.1.1 Threatened Biota Database Searches

A desktop assessment was undertaken to identify threatened flora and fauna species, populations and ecological communities listed under the TSC Act and FM Act, and MNES listed under the EPBC Act that may be affected by the proposal. Database records pertaining to the study area and locality (i.e. within a 10 km radius of the study area) were reviewed prior to field investigations and included:

- The Commonwealth Department of the Environment (DotE) Protected Matters Search Tool (PMST), for all MNES online database selected for a 10 km radius of the scheme envelope (DotE, 2016a), database queried on 11 August 2016.
- DotE online species profiles and threats database (DotE 2016b).
- Office of Environment and Heritage (OEH) Wildlife Atlas database (licensed) for records of threatened species, populations and threatened ecological communities listed under the TSC Act that have been recorded within the locality (OEH 2016a), data supplied by OEH on 11 August 2016.
- OEH threatened biota profiles for descriptions of the distribution and habitat requirements of threatened biota (OEH 2016b).
- Department of Primary Industries (DPI) online protected species viewer for records of threatened aquatic species in the locality (DPI, 2016a), database queried 11 August 2016.
- The NSW DPI 'Threatened Fish and Marine Vegetation – Find a Species by Geographic Region' online search tool (DPI 2016b).
- Noxious weed declarations for the Glen Innes Severn Council control area (DPI 2016c).

Following collation of database records and species and community profiles, a 'likelihood of occurrence' assessment was prepared with reference to the broad habitats contained within the study area. This was further refined following field surveys and assessment of habitat present (see Sections 5.2 and 5.3). The results of this assessment are presented in Appendix A.

### 4.1.2 Likelihood of occurrence of threatened biota

Following collation of database records and species and community profiles a 'likelihood of occurrence' assessment was prepared with reference to the broad habitats contained within the proposal footprint. This was further refined following field surveys, as described below. The likelihood of threatened and migratory biota occurring in the proposal footprint was assessed based on presence of records from the locality since 1980, species distribution and habitat preferences, and the suitability of potential habitat present in the proposal footprint. The results of this assessment are provided in Appendix A. Table 4-1 provides a key to the likelihood of occurrence in the proposal footprint of threatened biota known or likely to occur in the locality.

**Table 4-1 Key to likelihood of occurrence for threatened species**

Likelihood	Definition
Present	Recorded in the study area during current surveys.
Likely	Species previously recorded within a 10 kilometre radius of the study area and suitable habitat occurs within the study area.
Possible	Species previously recorded within a 10 kilometre radius of the study area and only marginal or limited habitat occurs within the study area. Species with potential habitat within the study area, but no records from the locality in the last 30 years.
Unlikely	Species previously recorded within a 10 kilometre radius of the study area but no suitable habitat recorded. Species not recorded within a 10 kilometre radius of the study area and only marginal or limited habitat occurs within the study area.
Nil	Species not previously recorded within a 10 kilometre radius of the study area and suitable habitat not recorded within the study area, and/or study area outside species known distribution.

## 4.2 Field Surveys

Field surveys were conducted by two ecologists across two days/ one -night in winter (August) 2016.

### 4.2.1 Flora survey

Vegetation within the study area was surveyed with reference to the BioBanking Assessment Methodology (BBAM) (DECC, 2008a) and the DEC (2004) *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities*. Surveys involved mapping of vegetation types occurring in the study area, followed by BioBanking plot-transect surveys and opportunistic threatened flora surveys.

The flora survey involved the following techniques, which are described in detail below:

- Vegetation surveys and mapping
- Plot-transect surveys
- Threatened flora searches

Survey sites were selected using air photo interpretation and field habitat assessment. The locations of quadrat surveys completed during the flora survey are displayed in Figure 4-1.

#### *Vegetation surveys and mapping*

Vegetation within the study area was assessed against identification criteria for State and Commonwealth listed TECs (i.e. Critically Endangered Ecological Communities (CEECs) and Endangered Ecological Communities (EECs)). Vegetation and habitats were compared with descriptions provided in OEH (2016b) and DotE (2016b) TEC profiles.

Plot and transect surveys were conducted on site in accordance with the BBAM. The site value was determined by assessing the following ten site condition attributes against benchmark values:

1. Native plant species richness
2. Native overstorey cover
3. Native midstorey cover
4. Native ground cover (grasses)
5. Native ground cover (shrubs)

6. Native ground cover (other)
7. Exotic plant cover (calculated as percentage of total ground and mid-storey cover)
8. Number of trees with hollows
9. Proportion of over-storey species occurring as regeneration
10. Total length of fallen logs

Benchmarks are quantitative measures of the range of variability in condition in vegetation with relatively little evidence of alteration, disturbance or modification by humans since European settlement. Cover abundance data was also collected for each species within the 20 metre x 20 metre portion of each plot/transect.

Plots were distributed between vegetation zones (i.e. OEH (2013c) Vegetation Types Database and condition classes identified in the survey) according to the DECC (2008) methodology. A total of six plots were sampled within the study area as shown on Figure 4-1.

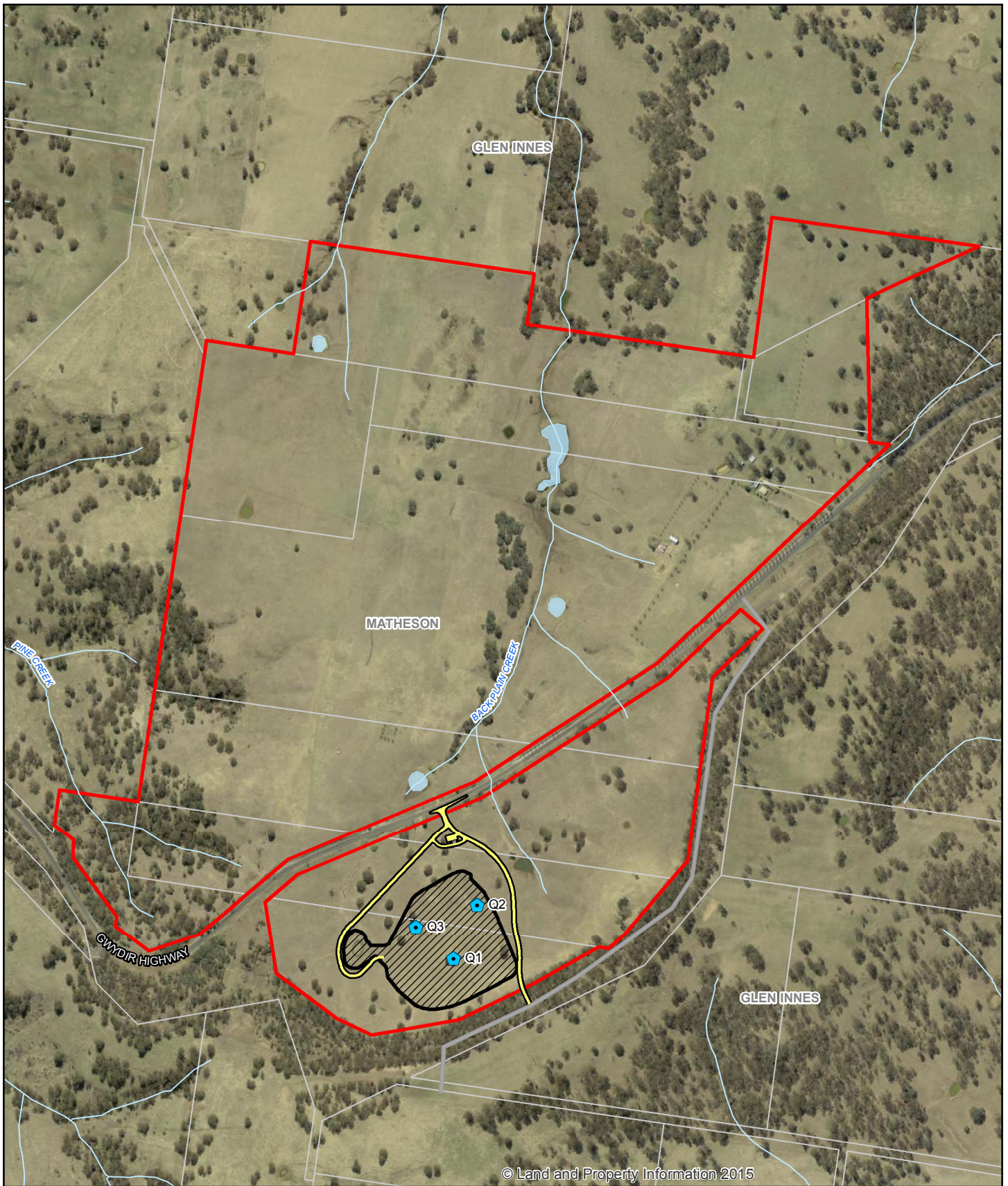
Opportunistic and incidental observations of additional flora species were recorded at all times during field surveys in order to compile a list of the dominant species present within the study area. Casual identification of potential habitat for threatened flora species was also undertaken throughout the course of the flora survey and while incidentally traversing the study area. This included identification of known associated species, identification of particular micro-climate conditions that may favour or enable threatened species to occur, as well as visual observations of threatened species if encountered. All observations of threatened flora or potential habitat for threatened flora species were recorded along with a waypoint captured with a hand-held GPS.

All vascular plants (i.e. not mosses, lichens or fungi) observed were recorded on proforma field data sheets. Each species list was accompanied by a detailed biophysical description, including vegetation structure, soils, geology and geomorphology, habitat and fire and disturbance history. Plant specimens that could not be identified rapidly in the field were collected and subsequently identified using standard botanical texts. Structural vegetation communities were described according to classifications made by Specht (1970). Plant identifications were made according to nomenclature in Harden (1990-93) and Royal Botanic Gardens Trust (2013). Plant specimens which were difficult to identify (either insufficient sample collected or buds/fruiting bodies were not available at the time of the survey) were identified to genus level.

### ***Threatened flora searches***

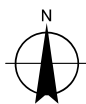
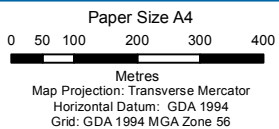
The habitat requirements for threatened flora predicted to occur by the desktop assessment were identified prior to the field survey. Those requirements were then compared with those habitats present within the site during the field survey and an assessment of the likelihood of occurrence was completed based on consideration of known distributions, previous records in the locality and habitat requirements for each species. Searches for threatened plants in areas of suitable habitat were conducted during all traverses across the study area, typically when walking between quadrats or similar, however no detailed targeted threatened flora surveys at appropriate seasonal times were undertaken for all potentially occurring threatened flora species as part of this assessment. The timing of field surveys (August 2016) was not ideal for the detection/identification of some cryptic species such as *Thesium australe* which tends to 'die-off' in winter.

The habitat assessment conducted for the study area allowed for identification of habitat resources for cryptic species, in order to make an assessment of their likelihood of occurring within the proposal footprint. As such, the survey was not designed to detect all species, rather to provide an overall assessment of the ecological values within the study area in order to predict potential impacts of the proposal, with particular emphasis on threatened biota and their habitats. The field survey aimed to identify areas of suitable habitat for cryptic species where possible.



**LEGEND**

-  Study area
-  Cadastre
-  Watercourse
-  Waterbody
-  Disturbance area
-  Biobank quadrats
-  Site access
-  Existing access



Glen Innes Severn Council  
Wattle Vale Quarry  
Flora and Fauna Impact Assessment

Job Number | 22-18380  
Revision | A  
Date | 08 Nov 2016

Survey effort

**Figure 4-1**

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 T 61 2 4979 9999 F 61 2 4979 9988 E ntmal@ghd.com W www.ghd.com.au

©2016. Whilst every care has been taken to prepare this map, GHD, LPI and GISSC make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.

Data source: LPI: DCDB & DTDB, 2012, Aerial Imagery, 2016; GISSC: Quarry data, 2016. Created by: fmackay, tmorton

## 4.2.2 Fauna survey

### *Fauna habitat assessment*

Habitat assessments were conducted to help describe the suite of native fauna likely to occur in the study area. Particular attention was paid to habitat features and resources considered diagnostic of threatened species.

Habitat assessments included searches for and inspection of:

- Vegetation patch size, age, disturbance and structural diversity (important for many threatened birds and mammals).
- Quality of substrate for sheltering frogs and reptiles including rocks, logs, debris, peeling bark, leaf litter and native grassland.
- Presence of winter-flowering eucalypts (important for the Swift Parrot (*Lathamus dicolor*) and Regent Honeyeater (*Anthochaera phrygia*) and feed trees of the Koala (*Phascolarctos cinereus*).
- Koala scats in accordance with the Spot Assessment Technique (SAT) methodology.
- Hollow-bearing trees and logs which provide refuge, nest and den sites for a range of threatened fauna species.
- Stags and other roost sites for raptors and owls.
- Wetlands, moist grassland and other foraging habitat for waterbirds (including migratory birds) and frogs.
- Mammal scats at the base of trees or along tracks and runways.
- Tracks in soft substrate.
- Nest/den sites within logs, tree bases or tree trunks.
- Guano or moth remains at the base of hollow-bearing trees (diagnostic of the presence of tree-roosting bats).
- Scratches on tree trunks (diagnostic of Koalas, gliders or goannas) and worn bark around tree hollows (diagnostic of active use of hollows).
- Owl pellets, whitewash or animal remains beneath trees (diagnostic of owl or raptor roosts).

Locations of important habitat features were captured with a handheld GPS unit.

### *Feed tree assessments*

In order to determine the availability of potential foraging habitat for threatened species with specific feed tree requirements (such as the Koala, Regent Honeyeater and Swift Parrot), an assessment of the relative cover abundance of dominant canopy tree species was undertaken. This assessment was undertaken in conjunction with the biobanking plot-transects surveys described in section 4.2.1. As part of these plot-transects, the percentage foliage cover is usually estimated for the canopy and midstorey layers every five metres along a 50m transect. For this assessment, the percentage foliage cover of each component canopy species was recorded as well as the overall cover at each point along the transect.

### **Hollow-bearing tree assessments**

Counts of hollow-bearing trees were undertaken within plot-transects in accordance with the BBAM, in order to provide an indication of the density of hollow-bearing trees within each vegetation type. Additional information was collected on the tree species, height, diameter at breast height, evidence of use and number, size and location of hollows for all hollow-bearing trees within the plot-transects. Any hollow-bearing trees encountered during other surveys were also inspected for signs of use, and their location recorded using a handheld GPS unit.

### **Diurnal bird surveys**

Diurnal bird surveys were performed in the early morning within the study area. Area searches of at least 60 minutes' duration were undertaken at a number of locations across all vegetation types to compile a list of native birds present. Species were identified by sight and call. Incidental observations made outside the targeted survey period were also recorded.

### **Frog searches**

Drainage lines within the study area were inspected to see if any frogs were calling from leaf litter or fringing riparian vegetation. Any frogs heard calling were identified by call or by visual inspection where possible.

### **Opportunistic observations**

Opportunistic and incidental observations of fauna species were recorded at all times during the field survey. Survey effort was concentrated on suitable areas of habitat throughout the course of the survey, for instance burrows and diggings were noted, fallen timber or rocks were scanned and lifted to search for frogs and reptiles, and mature trees were scanned for roosting birds.

## **4.2.3 Survey effort**

Fauna survey effort was determined based on threatened fauna species that were considered to have the potential to occur in the study area. GHD survey effort is provided in Table 4-2 below.

**Table 4-2 Survey methods and effort (GHD 2013)**

Date	Survey Method	Comment
3-4 August 2016	Habitat assessments	2 persons over 2 days
	Biobanking plot-transects (including feed tree and hollow-bearing tree assessments)	3 plot-transects
	Opportunistic surveys	2 persons over 2 days
	Birds	2 mornings

## **4.2.4 Survey conditions**

Weather observations for the survey period are provided below in Table 4-3.



**Table 4-3 Weather details**

Date	Survey dates	Minimum temp (Deg Celsius)	Max temp (Deg Celsius)	Max wind gust and direction	Rainfall (mm)
1/08/2016	No	0.0	18.0	NW 31	0.0
2/08/2016	No	3.0	16.0	W 48	0.0
3/08/2016	Yes	6.0	9.0	SSE 48	13.2
4/08/2016	Yes	4.5	12.5	SE 65	18.8
5/08/2016	No	1.5	14.2	SE 54	0.0
6/08/2016	No	0.0	14.0	WNW 24	0.0

\*Temperature and rainfall observations are from Glen Innes Ag Research Stn (station 056013).

#### 4.2.5 Survey limitations

The cold, wet conditions during the survey period were less than ideal for the detection of many flora and fauna species. The survey was undertaken outside the optimal survey period for cryptic threatened flora species such as Austral Toadflax (*Thesium australe*) which reduced the chance of the species (if present) being detectable above ground. The conditions also reduced the likelihood of detection of many fauna species such as arboreal mammals, which tend to be inactive during wet nights with low temperatures. Few trees or shrubs were flowering at the time of the field survey. This may further reduce the diversity and abundance of nectarivorous birds present within the study area.

Given these limitations it is likely that some species that utilise the proposal footprint (permanently, seasonally or transiently) were not detected during the survey. These species may include annual, ephemeral or cryptic flora species; or fauna which may occur at other times of year. Some fauna species are also mobile and transient in their use of resources and it is likely that not all species were recorded during the survey period. The habitat assessment conducted for the study area allows for identification of habitat resources for such species, in order to make an assessment of their likelihood of occurring within the proposal footprint. As such, the survey was not designed to detect all species, rather to provide an overall assessment of the ecological values within the study area in order to predict potential impacts of the proposal, with particular emphasis on threatened biota and their habitats.

# 5. Results

## 5.1 Database searches

### 5.1.1 State-listed threatened biota

Database searches identified one threatened flora species; Austral Toadflax (*Thesium australe*) and one threatened fauna species; Koala (*Phascolarctos cinereus*), which are listed under the TSC Act and potentially occur in the locality of the study area. Of these, only Austral Toadflax (*Thesium australe*) is considered to have the potential to occur within the study area, based on the presence of suitable habitat.

One state listed ecological community was identified within the study area; *Mountain Gum – Ribbon Gum Open Forest of Drainage Lines of the Southern New England Tablelands Region*.

### 5.1.2 Federally listed threatened biota

The database searches identified four TECs, 10 threatened flora species, 19 threatened fauna species and 7 migratory species listed under the EPBC Act as potentially occurring in the locality of the study area. Of these, habitat was identified within the study area for one threatened flora species (*Thesium australe*) and two threatened fauna species (Regent Honeyeater and Swift Parrot). None of these species were identified during field surveys. These species are further discussed in Section 5.5.

No other MNES (such as World or National Heritage Properties or Wetlands of International Importance) occur within the locality (DotE 2016a).

## 5.2 Flora and vegetation

### 5.2.1 Flora species

As described in Section 4.2.1, the survey aimed to identify the dominant flora species present in the study area. A total of 37 species of flora from 16 families were recorded, comprising 22 natives and 15 exotic species. The Asteraceae family was the most diverse family recorded (9 species), followed by the Poaceae (5 species) and Caryophyllaceae (4 species). A flora species inventory is presented in Appendix B. The diversity of species present in the study area is likely to be greater than this list (i.e. cryptic nature of some species means detection is only possible at certain times of year).

Flora species are discussed below in relation to the vegetation communities occurring within the study area. Noxious weeds are discussed in Section 5.2.5.

No threatened flora species were recorded within the study area; however habitat for one threatened flora species; Austral Toadflax (*Thesium austral*) was identified (see Section 5.5.2).

### 5.2.2 Vegetation types

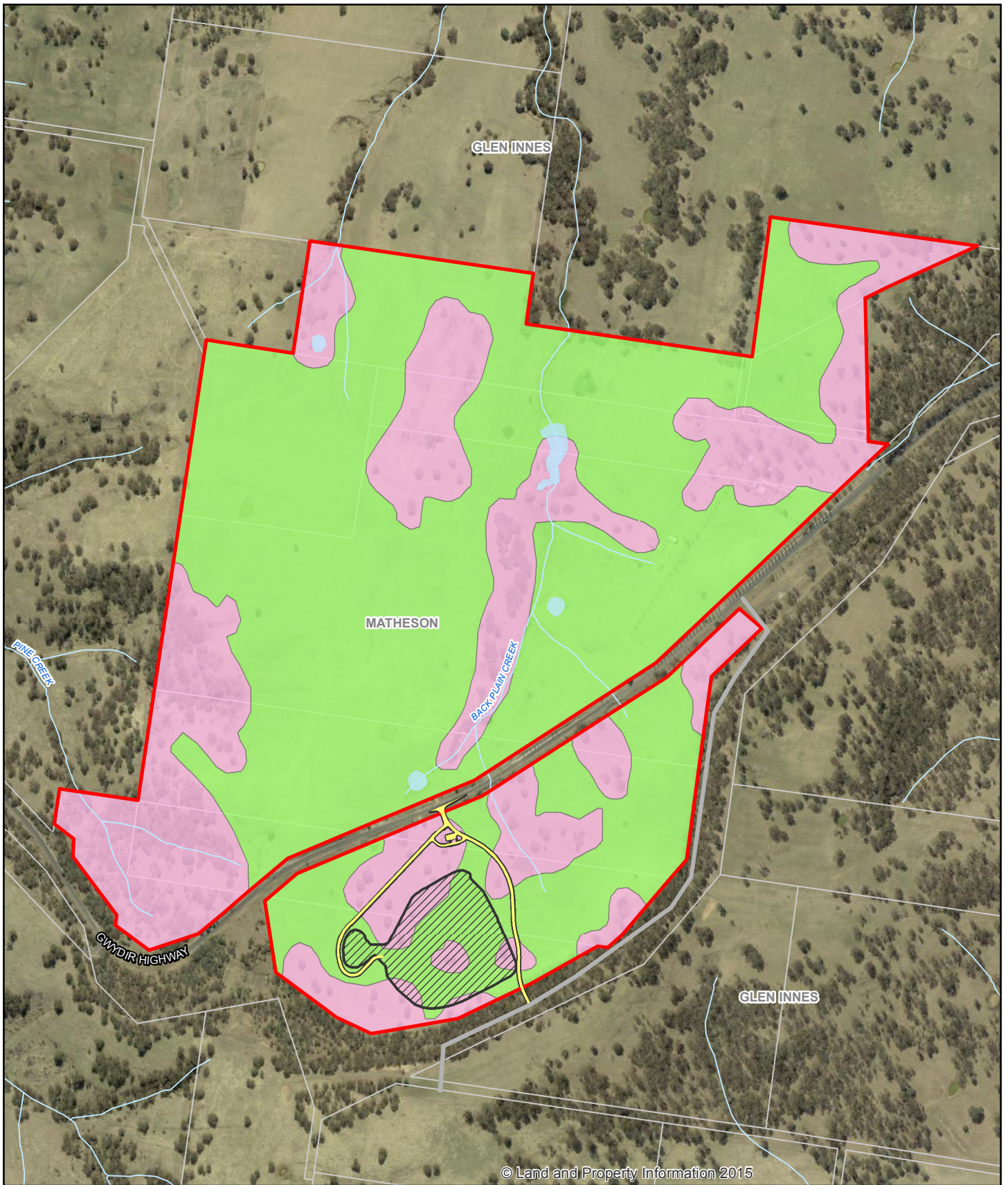
Vegetation within the study area was linked to landscape position and topography, with two vegetation types identified:

- Low condition – Ribbon Gum – Mountain Gum Grassy Woodland EEC (71.35 ha).
- Low condition – Ribbon Gum – Mountain Gum derived native grasslands and exotic grasslands (141.09 ha).

Vegetation across the study area has been previously disturbed and modified, with much of the study area being cleared leaving few mature remnant trees. There is evidence of heavy grazing by cattle and pasture improvement (i.e. presence of legumes such as *Trifolium* species). Notwithstanding the disturbed nature of vegetation of the site, the mature canopy trees may provide limited foraging habitat resources for native fauna species such as woodland birds.

Vegetation within the study area was in low condition, as a result of historical and ongoing disturbances associated with land clearing, cattle grazing and pasture improvement. The study area had relatively low floristic diversity, as evidenced by the low number of species recorded overall. There were very few groundcover species that would normally be present in moderate/good condition grassy woodland.

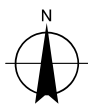
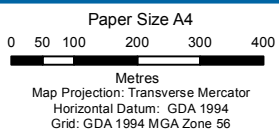
Table 5-1 details the vegetation of the site and provides a list of dominant species in all strata. Figure 5-1 shows the location and extent of vegetation types within the study area. Appendix D provides photographs of mature trees and other habitat features.



© Land and Property Information 2015

**LEGEND**

- ▭ Study area
- Cadastre
- ~ Watercourse
- Waterbody
- Disturbance area
- Low condition - Ribbon Gum/  
Mountain Gum Derived Grassland  
EEC and exotic grassland
- Low condition - Ribbon Gum/  
Mountain Gum Grassy Woodland EEC
- Site access
- Existing access



Glen Innes Severn Council  
Wattle Vale Quarry  
Flora and Fauna Impact Assessment

Job Number | 22-18380  
Revision | A  
Date | 30 Nov 2016

Vegetation within the study area

Figure 5-1

G:\2218380\GIS\Maps\Deliverables\SouthernQuarryEIS\FloraFauna\2218380\_SQFFA004\_Vegetation\_A.mxd

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 T 61 2 4979 9999 F 61 2 4979 9988 E ntmal@ghd.com W www.ghd.com.au

©2016. Whilst every care has been taken to prepare this map, GHD, LPI and GISSC make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.

Data source: LPI: DCDB & DTDB, 2012, Aerial Imagery, 2016; GISSC: Quarry data, 2016. Created by: fmackay, tmorton

**Table 5-1 Vegetation within the study area**

Vegetation Type (OEH, 2013d)	Vegetation PCT ID (OEH, 2016d)	Condition	Area within study area (ha)	Conservation Significance	Description
Mountain Gum – Ribbon Gum Open Forest of Drainage Lines of the Southern New England Tablelands Region (Woodland form)	PCT 606	Low	141.09	Listed as an EEC under the TSC Act as <i>Ribbon Gum – Mountain Gum Grassy Forest/Woodland of the New England Tablelands Bioregion</i>	<p>This vegetation type was restricted to small scattered patches throughout the study area. Small areas also occur within the proposed extraction area.</p> <p>Canopy species included Rough-barked Apple (<i>Angophora floribunda</i>) and Ribbon Gum (<i>Eucalyptus viminalis</i>). Due to previous land clearing activities, the canopy of the community was largely absent and consisted of several isolated mature trees.</p> <p>Midstorey species included Fern-leaf Wattle (<i>Acacia filicifolia</i>) and Hickory Wattle (<i>Acacia implexa</i>). These species were restricted to small thickets of regrowth around the bases of mature canopy trees.</p> <p>The understorey was largely disturbed due to cattle grazing. Exotic herbs were abundant including Cat’s ear (<i>Hypochaeris radicata</i>), Dandelion (<i>Taraxacum officinale</i>), White Clover (<i>Trifolium repens</i>), Yellow Sucking Clover (<i>Trifolium dubium</i>) Lamb’s Tongues (<i>Plantago lanceolata</i>) and Sheep Sorrel (<i>Acetosella vulgaris</i>). Noxious species were also observed including Spear Thistle (<i>Cirsium vulgare</i>), Saffron Thistle (<i>Carthamus lanatus</i>), Blackberry (<i>Rubus fruticosus</i>) and African boxthorn. A small number of native grasses and herbs were present in less disturbed areas. Other common native herbs included Kidney Weed (<i>Dicondra repens</i>), Native Geranium (<i>Geranium solanderi</i>), Two-flowered Knawel (<i>Scleranthus biflorus</i>), Stinging Nettle (<i>Urtica incissa</i>) and Stinking Pennywort (<i>Hydrocotyle laxiflora</i>).</p>

### **5.2.3 Threatened flora species**

No threatened flora species were recorded in the study area or on adjacent land during the survey. Based on the habitat assessment undertaken, potential habitat for one threatened flora species exists within the study area; Austral Toadflax (*Thesium australe*).

### **5.2.4 Threatened ecological communities**

One threatened ecological community was identified within the study area. *Ribbon Gum – Mountain Gum Grassy Forest/Woodland of the New England Tablelands Bioregion* listed as an endangered ecological community under the TSC Act (referred to as Ribbon Gum Woodland).

No vegetation consistent with any threatened ecological communities as listed under the EPBC Act were found to occur within the study area.

### **5.2.5 Noxious weeds**

The study area contains two species declared as a Category 4 noxious weeds in the Glen Innes Severn Council control area. These include African boxthorn (*Lycium ferocissimum*), and Blackberry (*Rubus fruticosus*). The control requirements for these species are as follows:

*“The growth of the plant must be managed in a manner that reduces its numbers spread and incidence and continuously inhibits its reproduction and the plant must not be sold propagated or knowingly distributed”.*

No significant infestations or thickets of these species were observed at the time of the field survey. Rather, scattered plants and seedlings occur throughout the study area, suggesting that the species may be being spread via bird droppings.

## **5.3 Fauna and habitat**

### **5.3.1 Fauna species**

A total of 12 native fauna species were recorded in the study area. This comprised 11 bird species and one mammal species. The full species list is included in Appendix B. Species observed at the site are discussed in the following section in terms of their habitat use within the study area.

Conditions during the survey were less than ideal (see Section 4.2.4 and 4.2.5), however the study area was highly degraded and was therefore expected to contain a low diversity of native fauna species. Groups which were under-represented during the surveys in terms of both diversity and abundance included native frogs, reptiles, mammals and nectarivorous birds.

### **5.3.2 Fauna habitat**

Habitat values within the study area were low due to the limited extent of native vegetation present, as a result of extensive historical disturbance. As previously described vegetation within the study area is predominately exotic grassland with scattered mature-age trees

Habitat features identified included the following:

- Myrtaceous trees which would provide potential foraging resources for woodland birds.
- Low density of woody debris (fallen logs) which may provide shelter and foraging habitat for native reptiles and amphibians, and foraging substrate for native insectivorous birds and mammals.

- One dead tree with trunk fissures which may provide potential roost sites for microbats.
- A dam located adjacent to the western boundary of the study area that may provide foraging habitat for native frogs and birds.

These habitat resources are discussed in greater detail below. Habitat features and resources are described in terms of the native fauna they may support with specific reference to species observed during surveys and threatened species potentially present within the study area. The availability of habitat resources for threatened fauna is further discussed in Section 6.4.3.

### **Feed trees**

Myrtaceous species present at the site may provide potential foraging resources, including sap, foliage or nectar for threatened species such as the Regent Honeyeater (*Anthochaera phrygia*) and Swift Parrot (*Lathamus discolor*). Other native nectarivorous birds using these trees may include the Noisy Friarbird (*Philemon corniculatus*), Scarlet Honeyeater (*Myzomela sanguinolenta*) and Lewin's Honeyeater (*Meliphaga lewinii*).

Due to the isolated position of the trees in the landscape, it is unlikely that they would be utilised by arboreal mammals as a foraging resource.

### **Woody and other debris**

Woody debris such as fallen logs and bark provides foraging and shelter substrate for a range of native birds, mammals, reptiles and frogs. General observations at the site indicated that the limited amount of woody debris present showed no evidence of occupancy by fauna species. This may be due to a lack of other important habitat features such as dense shrubs and other habitat refugia.



**Plate 5-1 Woody debris within the study area**

**Table 5-2 Comparison of benchmark and average recorded values for total length of fallen logs occurring within plot/transects within the site**

Vegetation Type	Benchmark value (m)	Average recorded value (m)
PCT 606 Mountain Gum – Ribbon Gum Open Forest of Drainage Lines of the Southern New England Tablelands Region	15	0

**Hollow-bearing trees**

Around 300 vertebrate species use tree hollows and shedding bark for shelter and roosting sites in Australia, and the shelter provided by these habitat features is essential for the survival of many of these species (Gibbons and Lindenmayer 2002). Only one dead stag was recorded within the study area. This tree had vertical fissures within its main stem which may be suitable habitat for microbats and reptiles. This tree occurs within the extraction area and will therefore require removal for the proposal.



**Plate 5-2 Dead stag tree within the study area**

**Aquatic habitats**

Aquatic habitats within the study area consist of a single dam located on the western boundary of the southern proposed extraction area. Due to a lack of emergent vegetation, the dam has limited habitat availability and is likely to be utilised by few amphibian species, insects, small fish and microbats.

**5.4 Connectivity**

Due to the effects of land clearing activities, the study area has low connectivity with surrounding vegetation. It is therefore likely that only highly mobile species such as woodland birds and terrestrial mammals would utilise the limited habitat available within the study area.



## 5.5 Conservation significance

### 5.5.1 Threatened ecological communities

One threatened ecological community was identified within the study area; Mountain Gum – Ribbon Gum Open Forest of Drainage Lines of the Southern New England Tablelands Region is listed as an endangered ecological community under the TSC Act. The occurrence of this community in the study area is shown on Figure 5-1.

As noted above, no vegetation within the study area is consistent with any threatened ecological communities as listed under the EPBC Act.

### 5.5.2 Threatened flora species

No threatened flora species were identified within the study area during the field surveys. Potential habitat for Austral Toadflax (*Thesium australe*) was identified within the study area. No threatened flora species listed under the FM Act are likely to occur in the study area, or downstream of the study area.

### 5.5.3 Threatened fauna species

No threatened fauna species were observed during the surveys.

Two threatened fauna species are considered to have potential foraging habitat within the study area; the Regent Honeyeater and the Swift Parrot. Both of these species are typically found in box-ironbark habitats on the inland slopes and plains (Saunders and Heinsohm 2008), but may also forage on nectar-producing eucalypts. Breeding habitat for these species does not occur within the proposal footprint as the Swift Parrot breeds in Tasmania and only occurs on the mainland during the winter non-breeding season. The Regent Honeyeater is only known to breed in two inland areas; Bundarra- Barraba region and the Capertee Valley (Menkhorst et al 1999).

An Assessment of Significance for the Regent Honeyeater and the Swift Parrot has been conducted (Appendix C). These assessments found that no significant impacts to these species are likely to occur as a result of the proposal.

#### *Forest owls and raptors*

No forest owls or raptors were predicted to occur within the proposal footprint or observed during the survey. While minimal foraging habitat may be present due to the largely cleared nature of the site, no breeding habitat is present due to the lack of hollow bearing trees. Additionally, the proposal footprint would only consist of a small area of a much wider foraging range.

#### *Arboreal mammals*

No threatened arboreal mammals were identified within the study area. Due to a lack of canopy vegetation, no suitable habitat for arboreal mammals was present.

#### *Terrestrial mammals*

No threatened terrestrial mammals were identified within the study area. Due to a lack of habitat features such as dense low-lying vegetation or suitable hollow logs, no suitable habitat for threatened terrestrial mammals was present.

### **Bats**

No threatened bat species have been recorded within the locality. Additionally, the study area contains minimal roosting habitat for bat species. One dead stag was identified within the proposed extraction area and will require removal for the proposal.

### **Frogs**

No threatened frog species were identified within the study area. The adjacent dams were found to have a lack of fringing emergent vegetation such as ferns, sedges or grasses. Therefore, there is no suitable habitat for threatened frog species within the study area.

### **Reptiles**

No threatened reptile species were identified within the study area. Due to a lack of habitat features such as rocks or suitable hollow logs, no suitable habitat for threatened reptiles was present.

## **5.5.4 Migratory fauna species**

Results of the desktop review indicate that 7 migratory bird species listed under the EPBC Act are known or predicted from the locality of the study area (Appendix A). Some of these species can be reliably excluded from occurring within the study area, based on their broad habitat requirements, however a total of 5 species have the potential to utilise habitat within the study area on an occasional or transient basis when conditions are favourable.

### **Aerial species**

The Fork-tailed Swift (*Apus pacificus*) and White-throated Needletail (*Hirundapus caudacutus*) breed in the northern hemisphere and are almost exclusively aerial while in Australia during the non-breeding season. These birds may forage and fly over the study area but would be unlikely to land or to be dependent on the habitats present within the study area.

### **Wetland species**

One species of wetland bird; Latham's Snipe (*Gallinago hardwickii*) is predicted to occur within the locality. This species may occur and forage around the edges of dams bordering the study area. This species does not breed in Australia.

### **Woodland species**

Of the 4 migratory woodland species which are modelled to occur within the study area, the Black-faced Monarch (*Monarcha melanopsis*), Satin Flycatcher (*Myiagra cyanoleuca*) and Rufous Fantail (*Rhipidura rufifrons*) tend to prefer moist, densely vegetated habitats, though they may occur in more open habitats while migrating. The Yellow Wagtail (*Motacilla flava*) normally inhabits open country near water, such as wet meadows.

The Yellow Wagtail and Black-faced Monarch, may forage within the drainage lines and dam area just outside the study area.