Community 6 – Native Grassland

Native Grassland or Natural Temperate Grassland is present at one location within the Project Site as an interrupted strip of less than 5m width present above an eroding gully (**Figure 4.16**). The community is diverse and includes mostly grassland species such as Kangaroo Grass and Spear Grass suggesting that the community may have been within a woodland / grassland mosaic.

The total area of the Native Grassland is small and Gaia (2010) consider that the community is not viable due to the fact that it is an interrupted, elongate strip at the top of an eroding slope.

Community 7 – Native-dominated Pasture

The majority of the Project Site supports Native-dominated Pasture of low-diversity with species such as Weeping Grass and Snow Grass in association with exotic pasture species. It is noted that this community forms a continuum with the Native Grassland Community and the Exotic-dominated Pasture and that sections with higher and lower species diversity were observed.

Community 8 Exotic-dominated Pasture

Areas of Exotic-dominated Pasture include common pasture species such as Phalaris, Clovers and Ryegrass with a very low incidence of native species.

Community 9 – Largely Disturbed Land

Past mining activities and subsequent erosion have resulted in areas of disturbed land, generally associated with creeks and gullies. These areas are either devoid of vegetation or support a sparse vegetative cover.

Community 10 – River Peppermint Open Forest

A small remnant of open forest dominated by River Peppermint occurs adjacent to the northern boundary of the Project Site. The understorey is dominated by Weeping Grass with weeds and exotic pasture species.

Endangered Ecological Communities

Gaia (2010) state that none of the identified vegetation communities conform with the classification of any vegetation community classified as an Endangered Ecological Community (EEC) under the TSC Act.

It is noted, however, that a the NSW Scientific Committee has made a Preliminary Determination to support a proposal to list the Tablelands Frost Hollow Grassy Woodlands in the South Eastern Highlands, Sydney Basin, South East Corner and NSW South western Slopes Bioregions as an EEC. Gaia (2010) state that the Ribbon Gum - Snow Gum grassy open forest has an affinity with that community. However, it is also noted that the preliminary determination waon public exhibition during the final stages of preparation of this document and that no date has been set for the making of a Final Determination.

Finally, Gaia (2010) note that the Native Grassland community has an affinity with the Natural Temperate Grasslands of the Southern Tablelands listed and an EEC under the Commonwealth EPBC Act.

4.3.4.4 Fauna Species Identified

The Ecology Assessment identified 151 species of vertebrate including two fish, seven frog, seven reptile, 117 bird and 18 mammal species within the Project Site. **Table 4.12** presents a summary of the species identified. A complete list of all species identified is included in Appendix 2 of Gaia (2010).

Table 4.12
Summary of Fauna Detected During the Survey

Vertebrate group	Species detected during survey
Fish	2
Frog	7
Reptile	7
Bird	117 (six exotic)
Mammal - non flying	11 (3 exotic)
Mammal - bats	7
Total	**151**
Source: Gaia (2010) – Table 7	

Table 4.13 presents the TSC Act or EPBC Act listed species observed within the Project Site. It is noted that the Gang-gang Cockatoo was observed to nest within the Project Site during a survey on 19 November 2007 and has been observed by employees of the Proponent in remanent vegetation at regular intervals since that date. The approximate location of the nest site is provided in **Figure 4.16.**

Table 4.13
Listed Species Observed within the Project Site

Common Name	Scientific Name	Source
Little Eagle	*Hieraaetus morphnoides*	B. James
Gang-gang Cockatoo	*Callocephalon fimbriatum*	B. James, G. Daly
Scarlet Robin	*Petroica boodang*	B. James
Flame Robin	*Petroica phoenicea*	B. James, G. Daly
Source: Gaia (2010) – Table 10		

4.3.5 Management and Mitigation Measures

The Proponent would implement the following management and mitigation measures to minimise the potential for adverse Project-related impacts on flora, fauna or ecological communities within or surrounding the Project Site.

- Ensure that, with the exception of minor disturbance associated with, installation of water pipelines and management of existing tracks, no surface disturbing activities are being undertaken within areas of Ribbon Gum Forest and Fragmented Ribbon Gum Forest. No vegetation over 3m high would be removed.
- Avoid the use of phosphate-based fertiliser in pasture areas to encourage the regeneration of native grasses.
- Manage grazing operations, including stocking rates and fencing, in a manner to sustain and facilitate the spread of native grass species.
- Fence all areas of Ribbon Gum Forest and Fragmented Ribbon Gum Forest and exclude stock from those areas.

- Ensure that areas of habitat suitable for the Majors Creek Leek Orchid are appropriately identified and fenced and access restricted. Ensure no disturbance occurs within the fenced areas.
- Prepare a management plan to ensure that Common Wombat are not harmed during establishment of the tailings storage facility. This plan may include the following.
  - Mark all wombat burrows prior to the commencement of ground disturbing activities.
  - Commence ground disturbing activities on the upper slopes of creek banks a few days before disturbing the identified hollows to allow individual wombats time to vacate their burrows at night when equipment is not operating.
  - Inspect all burrows to ensure that common wombats have vacated the proposed area of disturbance. Any remaining wombats would be relocated in consultation with local wombat experts.
- Continue the existing weed and pest control program, with particular focus on managing Broom and Blackberry within the southern section of the Project Site.
- Ensure that dead fallen and standing timber are not removed or disturbed to preserve fauna habitat.
- Implement fully the Biodiversity Strategy described in Section 2.15, including ensuring that the strategy would be implemented in perpetuity.
- Prepare a *Biodiversity Management Plan* in consultation with the relevant government agencies and surrounding community within 12 months of receipt of the project approval. That plan would:
  - specify biodiversity-related actions to be undertaken during the life of the Project and for several years after the site has been decommissioned;
  - incorporate the above commitments;
  - describe management of the proposed biodiversity area;
  - describe the proposed revegetation and amelioration program, including identification of areas to be revegetated/ameliorated and the species to be used; and
  - involve, where practicable, local community groups in management of biodiversity with in the Project Site.

4.3.6 Impact Assessment

4.3.6.1 Introduction

This sub-section presents an assessment of the anticipated Project-related impacts on listed fauna, flora and ecological communities within and surrounding the Project Site. In order to ensure that the assessment has considered all appropriate species, a preliminary impact assessment is provided. That assessment focuses on those listed species that may potentially use the available habitat within the Project Site. For those species that are likely to use habitat within the Project Site, separate detailed assessments are provided the TSC Act and EPBC Act. Finally, this sub-section concludes with an assessment of the likely impacts associated with the Project upon Koala habitat.

4.3.6.2 Impacts on Vegetation Communities

Figure 4.17 presents the vegetation communities identified within the Project Site, overlain on the proposed site layout. The figure also presents the areas of each community within the Project Site that would be disturbed.

In summary, the following vegetation communities would not be disturbed or would be disturbed in a manner that would have a negligible impact.

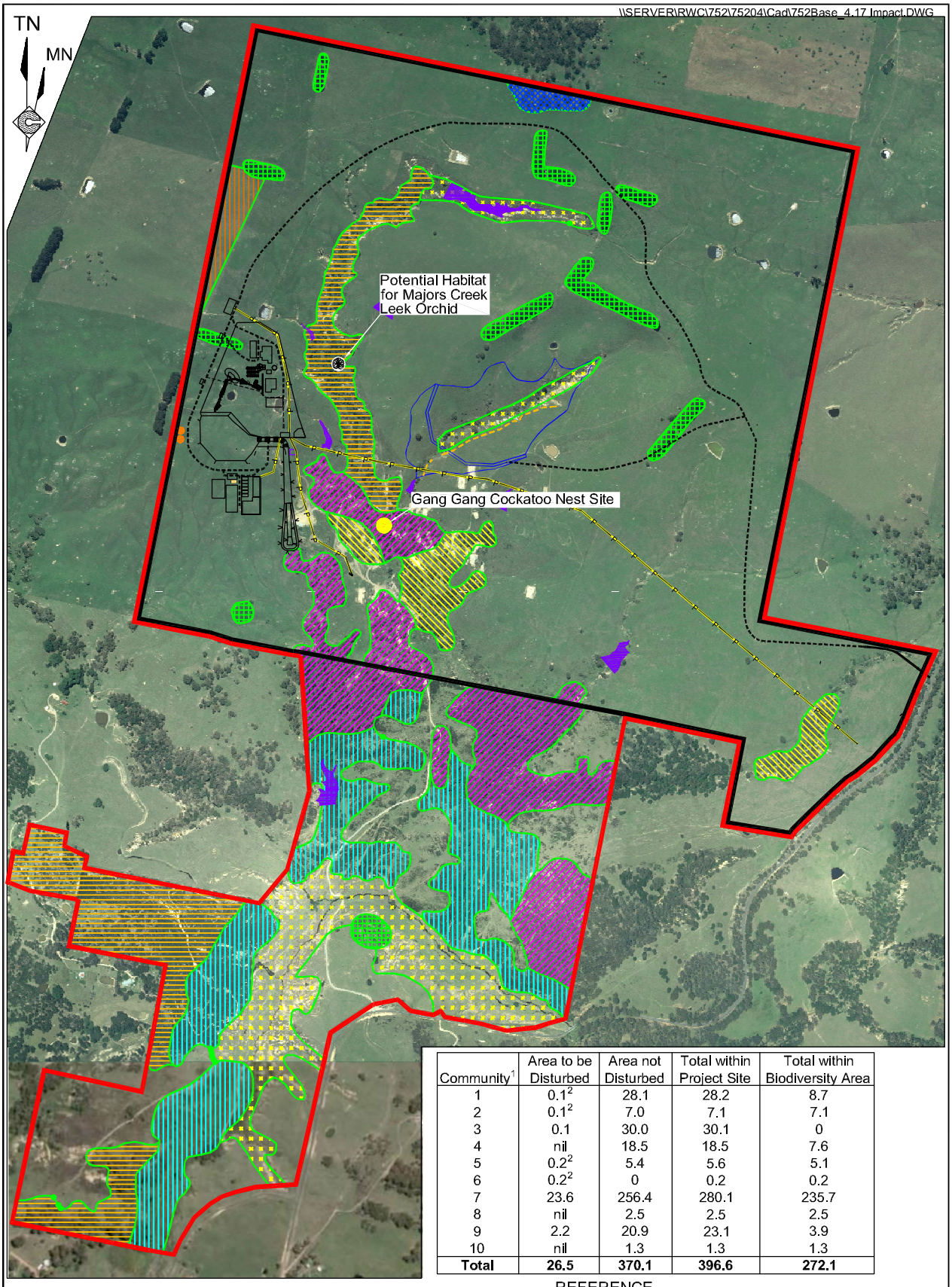
- Ribbon Gum forest.
- Fragmented Ribbon Gum forest.
- Woody weeds Shrubland.
- Regenerating wattles.
- Exotic vegetation.
- Exotic-dominated pasture.
- River Peppermint open forest.

The following vegetation communities would be disturbed. The area of disturbance is presented in parenthesis.

- Native Grassland (0.2ha). It is noted that Gaia (2010) state that this community is less than 5m wide and is considered to be non-viable.
- Native-dominated Pasture (23.7ha).
- Largely Disturbed Land (2.2ha).

4.3.6.3 TSC Act Preliminary Impact Assessment

Table 4.14 provides a preliminary assessment of the likelihood of species or communities listed under the TSC Act occurring within the Project Site. A detailed assessment of those species identified as requiring further assessment is provided in Section 4.3.6.4.



Community[1]	Area to be Disturbed	Area not Disturbed	Total within Project Site	Total within Biodiversity Area
1	0.1[2]	28.1	28.2	8.7
2	0.1[2]	7.0	7.1	7.1
3	0.1	30.0	30.1	0
4	nil	18.5	18.5	7.6
5	0.2[2]	5.4	5.6	5.1
6	0.2[2]	0	0.2	0.2
7	23.6	256.4	280.1	235.7
8	nil	2.5	2.5	2.5
9	2.2	20.9	23.1	3.9
10	nil	1.3	1.3	1.3
Total	**26.5**	**370.1**	**396.6**	**272.1**

Figure 4.17
VEGETATION COMMUNITY
AREAS OF DISTURBANCE

Table 4.14
Preliminary Assessment – TSC Act Species

Threatened Species / Ecological Community	Habitat Preference in region	Habitat Assessment Survey results	Further Assessment Required? (Section 4.3.6.4)
Fauna			
Koala	Ribbon Gum Forest.	Habitat present within Project Site but species not detected.	No
Squirrel Glider	Woodlands, especially those with Black wattle	Habitat present within Project Site. Species not detected.	No
Yellow-bellied Glider	Associated with Brown Barrel tall open forests and Ribbon Gum Forest	Site isolated and of insufficient size to support a troupe.	No
Spotted-tailed Quoll	Variety of habitat types which range from closed forest to heathland	Habitat not present within Project Site.	No
White-footed Dunnart	Variety of habitat types including open forests, woodlands and heathlands with dense shrublayer	Habitat not present within Project Site.	No
Eastern Pygmy Possum	Woodland/Heathlands with dense shrublayer plus tall open forest	Habitat not present within Project Site.	No
Grey-headed Flying Fox	Variety of habitat types including open forests, woodlands, tall open forest and closed forest, usually below 200 m AHD in temperate Australia.	Not expected to occur at this altitude.	No
Eastern False Pipistrelle	Associated with mature tall open forest at altitude above 100m. Roosts in tree hollows.	Habitat present within Project Site but no forest to be removed.	Yes
Eastern Bentwing Bat	In winter roosts in select caves but during spring/summer forages over a range of forest types.	Habitat present within Project Site but no forest to be removed.	Yes
Greater Broad-nosed Bat	Found in a variety of forests. Often coastal at higher latitudes and forages beside creeks. Roosts in tree hollows.	Habitat present within Project Site but no forest to be removed.	Yes
Golden-tipped Bat	Closed riparian forests usually with Yellow-throated Scrubwren as they roost in unused nests.	Habitat not present within Project Site.	No
Large-footed Myotis	Riparian habitats with hollow trees, bridges or caves.	Habitat present within Project Site but no forest to be removed.	Yes
Yellow-bellied Sheathtail-bat	Seasonal migrant found in a wide range of forest types	Habitat present within Project Site.	Yes
Smoky Mouse	Heath on ridge tops and slopes in sclerophyll forest, heathland and open-forest	Habitat not present within Project Site.	No
Australian Painted Snipe	Inhabits inland and coastal temporary or infrequently filled freshwater wetlands.	Habitat not present within Project Site.	No
Swift Parrot	Iox-ironbark forests and woodlands inland of the Great Dividing Range	Habitat not present within Project Site.	No

Table 4.14 (Cont)
Preliminary Assessment – TSC Act Species

Threatened Species / Ecological Community	Habitat Preference in region	Habitat Assessment Survey results	Further Assessment Required? (Section 4.3.6.4)
Fauna			
Little Eagle	Occupies habitats rich in prey within open eucalypt forest, woodland or open woodland.	Habitat present within Project Site.	Yes
Square-tailed Kite	Seasonal summer breeding migrant that inhabits coastal and subcoastal forests.	Habitat present within Project Site but no forest to be removed.	Yes
Brown Treecreeper	Occupies eucalypt woodlands, particularly open woodland lacking a dense understorey.	Habitat present within Project Site but no forest to be removed.	Yes
Regent Honeyeater	Occurs in temperate *Eucalyptus* woodlands and open forest.	Habitat present within Project Site but no forest to be removed.	Yes
Diamond Firetail	Occupies eucalypt woodlands, forests and mallee where there is a grassy understorey.	Habitat present within Project Site but no forest to be removed.	Yes
Hooded Robin	Prefers woodlands with a variety of shrub species.	Habitat present within Project Site but no forest to be removed.	Yes
Scarlet Robin	Breeds in drier eucalypt forests and temperate woodlands, often on ridges and slopes, within an open understorey of shrubs and grasses and sometimes in open areas.	Habitat present within Project Site. Previously detected.	Yes
Flame Robin	Breeds in upland moist eucalypt forests and woodlands, often on ridges and slopes, in areas of open understorey. It migrates in winter to more open lowland habitats such as grassland with scattered trees and open woodland on the inland slopes and plains	Habitat present within Project Site. Previously detected.	Yes
Pink Robin	Occurs in tall open eucalypt forests and closed forests	Habitat present within Project Site but no forest to be removed.	Yes
Barking Owl	Occurs in eucalypt woodland, open forest, swamp woodlands and riverine timber. In region detected in tall open forest	Habitat present within Project Site but no forest to be removed.	Yes
Powerful Owl	In region detected in tall open forests (Brown Barrel) with an abundance of arboreal mammals.	Habitat present within Project Site but no forest to be removed.	Yes
Gang-gang Cockatoo	Prefers various mature eucalypt forests.	Habitat present within Project Site. Species detected.	Yes
Glossy Black-Cockatoo	Prefers woodland and open forest with an abundance of Black Oak.	Habitat not present within Project Site.	No

Table 4.14 (Cont)
Preliminary Assessment – TSC Act Species

Threatened Species / Ecological Community	Habitat Preference in region	Habitat Assessment Survey results	Further Assessment Required? (Section 4.3.6.4)
Fauna			
Striped Legless Lizard	Occurs in temperate grasslands.	Habitat very marginal within Project Site and outside known range.	No
Broad-headed Snake	Sandstone outcrops in woodland within 200km of Sydney	Habitat not present within Project Site.	No
Giant Burrowing Frog	Occurs in heathland and woodland particularly beside non-perennial creeks	Habitat not present within Project Site.	No
Littlejohn's Tree Frog	Occurs in woodland and heathland and occasionally in open forest	Habitat not present within Project Site.	No
Southern Bell Frog	Occurs beside creeks with secondary billabongs that have Cumbungi and little canopy species	Habitat not present within Project Site.	No
Flora			
Araluen Gum	Grows near rivers, in grassy or shrubby woodland or in wet sclerophyll forest on moderately fertile sandy soil on granite.	Not located on site.	No
Small-leaved Gum	Grows mainly in grassy woodlands around the edges of broad, flat headwater valleys at altitudes of 800 – 1200 m AHD.	Not located on site.	No
Araluen Zieria	Araluen Zieria grows in shrubland on a rocky granite hillside at a single site near Araluen south of Braidwood.	Not located on site.	No
Austral Toadflax	Found in damp sites in association with Kangaroo Grass in grassland or grassy woodland.	Not located on site.	No
Dense Cord-rush	Commonly found in swamps or depressions in sandy alluvium, sometimes growing with sphagnum moss.	Not located on site.	No
Mauve Burr Daisy	Found in montane or natural temperate grassland and Snow Gum Woodlands on the Monaro and Shoalhaven area.	Not located on site.	No
Michelago Parrot-Pea	Occurs on exposed patches of clay or on rocky outcrops in eucalypt woodland.	Not located on site.	No
Monaro Golden Daisy	Grows on basalt, granite and sedimentary substrates usually in natural Temperate Grassland.	Not located on site.	No
Horay Sunray	Cabbage Gum woodland.	Not located on site.	No
Tangled Bedstraw	Moist gullies of tall forest, coastal Banksia shrubland, and *Allocasuarina nana* heathland.	Not located on site.	No

Table 4.14 (Cont)
Preliminary Assessment – TSC Act Species

Threatened Species / Ecological Community	Habitat Preference in region	Habitat Assessment Survey results	Further Assessment Required? (Section 4.3.6.4)
Flora			
Thick-lipped Spider-orchid	Generally found in grassy sclerophyll woodland on clay loam or sandy soils, though the population near Braidwood is in low woodland with stony soil.	Not located on site. No further assessment required.	No
Majors Creek Leek Orchid	Currently only known from one site (cemetery) at Majors Creek	Not located on site.	Yes
Pale Golden Moths	Grown in open grassy woodland	Not located on site.	No
Small Snake Orchid	Often on peaty soils in moist areas	Not located on site.	No
Endangered Ecological Communities			
Tablelands Frost Hollow Grassy Woodlands in the South Eastern Highlands, Sydney Basin, South East Corner and NSW South western Slopes Bioregions[1]	Ribbon Gum - Snow Gum Grassy Open Forest has affinity with this community. However, only a negligible area (0.2ha) would be disturbed and no vegetation over 3m high would be removed.		No
Natural Temperate Grasslands of the Southern Tablelands (NSW and ACT) (EPBC community)	Grassy vegetation dominated by moderately tall (25–50 cm) to tall (50–100 cm), dense to open tussock grasses.	Narrow, restricted area located but considered to be non-viable.	No
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (EPBC community)		Not located on site.	No
Note 1: Preliminary listing only			
Source: Gaia (2010) – After Table 12.			

4.3.6.4 TSC Act Detailed Impact Assessment

This sub-section provides a detailed assessment of the anticipated Project-related impacts on species and ecological communities listed under the TSC Act and identified in Section 4.3.6.3 as requiring further assessment. This assessment takes into account the commitments made in Section 4.3.5. In determining whether anticipated Project-related impacts would be significant this assessment refers to the matters identified in Section 5A of the *Environmental Planning and Assessment Act 1979*. To avoid repetition, each of the matters identified in that Section are presented in full in *italics* and an overview of the assessment prepared by Gaia (2010) for each species is presented. Where appropriate, those species with similar habitat requirements are assessed together. Full descriptions of the habitat requirements for each species are presented in Section 6.3 of Gaia (2010).

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

Eastern Bentwing Bat, Eastern False Pipistrelle, Greater Broad-nosed Bat, and Yellow-bellied Sheathtail Bat

There would be no direct impacts on these species as no hollow-bearing trees would be removed and foraging and potential roost sites do not occur within or in the immediate vicinity of the Project Site. The indirect impacts on these species would include an altered noise regime and areas of night-time lighting which may attract insects and provide additional feeding opportunities.

Large-footed Myotis

Targeted harp trapping totalling six trap nights did not identify this species, suggesting the species does not occur in the vicinity of the Project Site. There would be no direct impacts on this species as no hollow-bearing trees would be removed and foraging and potential roost sites do not occur within or in the immediate vicinity of the Project Site. The indirect impacts on this species would include an altered noise regime and areas of night-time lighting which may attract insects and provide additional feeding opportunities.

Gang-gang Cockatoo

The Ribbon Gum Forest within the Project Site provides foraging and nesting habitat for this species. No hollow-bearing trees would be removed and the loss of approximately 0.2ha of foraging habitat would not have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

The indirect impacts on this species would include an altered noise regime and areas of night-time lighting. It is noteworthy that nesting birds were observed approximately 50m from drilling operations in 2007 and did not appear to be perturbed. During the February 2010 survey, approximately 20 individuals were observed over three days, indicating that at that time the species was locally abundant. The birds were foraging within 50m of drilling operations and truck movements and the drilling areas were illuminated at night. These observations indicate that loud even noise and localised night-time illumination is tolerated by this species.

Little Eagle

The Ribbon Gum Forest within the Project Site provides foraging and nesting habitat for this species. No hollow-bearing trees are to be removed and the loss of approximately 0.2ha of foraging habitat would not have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

The indirect impacts on this species would include an altered noise regime and areas of night-time lighting. The impact of noise and illumination on nesting birds is unknown.

Square-tailed Kite

The loss of approximately 0.2ha of Ribbon Gum Forest would not have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Brown Treecreeper, and Regent Honeyeater

The Ribbon Gum Forest within the Project Site provides foraging and nesting habitat for these species. No hollow-bearing trees would be removed and the loss of approximately 0.2ha of foraging habitat would not have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction. In addition, these species are not expected to occur within the Project Site as suitable habitat is small and fragmented.

Diamond Firetail

Diamond Firetail are expected to occur within the Project Site. The loss of approximately 0.2ha of foraging habitat would not have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction. It is noted, however, that removal of broom and blackberry as part of the Proponent's weed management program may remove some potential nest sites.

Hooded Robin

This species is not expected to occur within the Project Site as the available habitat is small and fragmented. No hollow-bearing trees would be removed and the loss of approximately 0.2ha of foraging habitat would not have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Scarlet Robin, and Flame Robin

Individuals of this species may, on occasion, pass through the Project Site as they migrate. In addition, the species is volar and forages over very large home ranges. As a result, the loss of approximately 0.2ha of foraging habitat would not have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

The indirect impacts on these species would include an altered noise regime and areas of night-time lighting. The impact of noise and illumination on nesting birds is unknown.

Pink Robin

The loss of approximately 0.2ha of foraging habitat would not have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

The indirect impacts on this species would include an altered noise regime and areas of night-time lighting. The impact of noise and illumination on nesting birds is unknown.

Barking Owl and Powerful Owl

The Ribbon Gum Forest within the Project Site provides foraging and nesting habitat for this species. No hollow-bearing trees would be removed and the loss of approximately 0.2ha of foraging habitat would not have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

The indirect impacts on these species would include an altered noise regime and areas of night-time lighting. The impact of noise and illumination on nesting birds is unknown.

Majors Creek Leek Orchid

Potential habitat for Majors Creek Leek Orchid within the Project Site is limited to a small, restricted remnant of Swamp Gum with a grassy understorey of native and exotic species (**Figure 4.17**). Given that the species is 'apparently highly susceptible to grazing', it is unlikely that Majors Creek Leek Orchid would be present within the Project Site. The Proponent has committed to fence and restrict access to the area of potential habitat and ensure that no further disturbance occurs. As a result, the Project would not result in impacts that would place a viable local population of the species at risk of extinction.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

No endangered populations were identified within the Project Site.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

No TSC Act endangered ecological communities or critically endangered ecological communities were identified within the Project Site.

(d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

The extent of habitat alteration associated with the Project is the loss of approximately 0.2ha of Ribbon Gum Forest/fragmented Ribbon Gum Forest. This is not considered to be significant.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

The Project would not further fragment existing forest habitat

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

Vegetation within the Project Site is not critically important to the long-term survival of threatened species.

For forest dependant birds such as the Gang-gang Cockatoo, Little Eagle, Scarlet Robin and Flame Robin, the loss of approximately 0.2ha of Ribbon Gum forest is not critically important as the loss will be within fragmented forest and would not involve the loss of hollow-bearing trees. These species have large home ranges and the loss of this area is small in comparison to those ranges.

For microbats such as the Eastern Bent-wing Bat, Eastern False Pipistrelle, Greater Broad-nosed Bat, Yellow-bellied Sheathtail Bat and Large-footed Myotis, the loss of approximately 0.2ha of Ribbon Gum forest is not critically important as the loss will be within fragmented forest and not involve the loss of hollow-bearing trees that may be used as roost sites. These species have large home ranges and the loss of this area of potential foraging habitat is small in comparison to those ranges.

Potential habitat for Majors Creek Leek Orchid within the Project Site would be fenced and protected from grazing and further disturbance. Potential habitat for the species would therefore not be removed, modified, fragmented or isolated.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

The Project would not have an adverse effect on critical habitat.

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

A recovery plan has not been prepared for the Gang-gang Cockatoo, Little Eagle, Scarlet Robin, Flame Robin or any species of microbat. However, any action to remove potential, foraging or dispersal habitat would not be consistent with the objectives or actions within any recovery plan, should one be developed. Actions such as the proposed Biodiversity Strategy that promote the recovery of a species by the conservation of existing habitat and revegetation works to repair damaged landscapes is considered applicable to objectives or actions in recovery plans.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

The removal of native vegetation is a key threatening process. The vegetation communities to be removed are identified in Section 4.3.6.2.

Conclusion

Based on the above impact assessment, the Project would not have a significant impact on TSC Act-listed threatened species such that viable local populations of species or communities are likely to be placed at risk of extinction.

4.3.6.5 EPBC Act Preliminary Assessment

Part 9 of the EPBC Act identifies that any action that has, or is likely to have, a significant impact on a matter of National Environmental Significance must be referred to and may only progress with the approval of the Commonwealth Minister for the Environment. Relevant matters of national environmental significance include:

- listed threatened species and ecological communities; and
- listed migratory species.

Table 4.15 provides a preliminary assessment of the likelihood of species or communities listed under the EPBC Act occurring within the Project Site. A detailed assessment of those species identified as requiring further assessment is provided in Section 4.3.6.5.

Table 4.15
Preliminary Assessment – EPBC Act Species

Common Name	Status[1]	Habitat Preference	Further Assessment Required?
White-bellied Sea Eagle	M	Coastal fringes and large rivers	No
Rainbow Bee-eater	M	Large rivers with sandy banks	No
Clamorous Reed-Warbler	M	Dense reed beds beside rivers and wetlands	No
White-throated Needletail	M	Aerial – follows summer storm fronts but on occasion may land on trees	Yes
Wanderer Butterfly	M	Woodlands and disturbed areas	Yes
Great Egret	M	Dams, billabongs and rivers	Yes
Cattle Egret	M	Open paddocks with cattle	Yes
Latham's Snipe	M	Dams, wetlands and mud flats	No
Painted Snipe	M	Temporary or infrequently filled wetlands	No
Black-faced Monarch	M	Tall open forest and closed forest	Yes
Satin Flycatcher	M	Woodlands and open forest	Yes
Rufous Fantail	M	Tall open forest and closed forest	Yes
Regent Honeyeater	M, E	Box woodlands	Yes
Fork-tailed Swift	M	Arial, over a variety of habitats	Yes
Grey-headed Flying Fox	V	Range of native vegetation at low altitude	No
Smoky Mouse	E	Heath on ridge tops and slopes in sclerophyll forest, heathland and open-forest	No
Swift Parrot	E	Over-wintering habitat on the mainland is the box-ironbark forests and woodlands.	Yes
Striped Legless Lizard	V	Native temperate grasslands	Yes
Broad-headed Snake	V	Sandstone escarpments within 200km of Sydney	No
Giant Burrowing Frog	V	Heath and woodland on sandstone	No
Littlejohn's Tree Frog	V	Heath and woodland over 10m asl	No
Southern Bell Frog	V	Creeks with secondary billabongs that have Cumbungi	Yes
Macquarie Perch	E	Clear creeks at low altitude	No
Australian Grayling	V	Clear creeks running through native vegetation	No
Araluen Gum	V	Grows near rivers, in grassy or shrubby woodland or in wet sclerophyll forest on moderately fertile sandy soil on granite.	No
Austral Toadflax	V	Damp sites in association with Kangaroo Grass in grassland or grassy woodland.	No
Thick-lipped Spider-orchid	V	Grassy sclerophyll woodland on clay loam or sandy soils, though the population near Braidwood is in low woodland with stony soil.	No
Note 1: M = Migratory, V = Vulnerable, E = Endangered			
Source: Gaia (2010) – After Tables 13 and 14.			

4.3.6.6 EPBC Act Detailed Assessment

Table 4.16 presents a detailed assessment of the anticipated impacts on EPBC Act-listed species identified in **Table 4.15** as likely to occur with or in the vicinity of the Project Site.

Table 4.16
EPA Impact Assessment

Natural heritage element	Likely impact	Reasoning
Fauna	Negligible	The Gang-gang Cockatoo, Flame Robin and Monarch Flycatcher were observed during the ecology assessment. In addition, the Project Site supports habitat for the White-throated Needletail, Wanderer Butterfly, Great Egret, Cattle Egret, Fork-tailed Swift, Satin Flycatcher, Rufous Fantail, Regent Honeyeater, Swift Parrot, Black-faced Monarch, Striped Legless Lizard and Southern Bell Frog. An assessment of the impact of the threatened species using the EPBC guidelines indicates that the proposed development would not: • lead to a long-term decrease in the size of a population; • potentially disrupt the breeding cycle of a population; • reduce the area of occupancy of the species; • modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline; or • interfere with the recovery of the species.
Flora		No species listed on the EPBC Act likely to occur within the Project Site.
EEC[1]	Negligible	Natural Temperate Grasslands of the Southern Tablelands exists as a small, non-viable fragmented strip beside an eroding creek edge.
Source: Gaia (2010) – Table 15. Note 1: EEC = Endangered Ecological Community		

In light of the anticipated impacts on EPBC-listed species being negligible, Gaia (2010) state that a referral to the Commonwealth Minister for the Environment is not required.

4.3.6.7 SEPP 44 – Koala Assessment

State Environmental Planning Policy 44 – Koala Habitat Protection (SEPP 44) requires that a Plan of Management be developed for any development that will affect core Koala habitat within Local Government Areas identified within Schedule 1 of the Policy. "Core Koala Habitat" is defined as an area of land with a resident population of Koala. "Potential Koala Habitat" is defined as habitat where more than 15% of the trees are Koala feed tree species defined in Schedule 2 of the SEPP.

The proportion of Ribbon Gum within vegetated sections of Project Site constitute more than 15% of the total number of trees in the upper strata. As a result, vegetated sections of the Project Site may be classified as 'Potential Koala Habitat.' However, no Koala scats or scratches were identified.

Gaia (2010) state that as a result of previous clearing within the Project Site, Koala are unlikely to occur. As a result, SEPP 44 does apply to the Project.

4.3.6.8 Assessment of the Biodiversity Strategy

Section 2.15 presents a summary of the proposed Biodiversity Strategy. In summary, the strategy would result in:

- fencing of areas of existing native vegetation;
- ameliorative plantings;
- soil stabilisation;
- ongoing weed and feral animal control; and
- appropriate management of agricultural operations to ensure that the biodiversity value of the grassland / pasture within the Biodiversity Area is improved over time.

The strategy would be documented in a Property Vegetation Plan under the Native Vegetation Act 2003. That plan would be prepared in consultation with the Southern Rivers Catchment Management Authority and the DECCW. The strategy secured in perpetuity.

Gaia (2010) has undertaken an assessment of the proposed Biodiversity Strategy based on the thirteen principles presented in Appendix 2 of the document *Guidelines for Biodiversity Certification of Environmental Planning Instruments* published in April 2007 by the then Department of Environment and Climate Change. The following provides an overview of that assessment.

1. **Impacts must be avoided first by using prevention and mitigation measures.**

   The Project has been designed to ensure that the minimum area is disturbed. Measures that have been implements include the following.

   – Designing the proposed mining operations as an underground mine rather than an open cut to minimise the area.
   – Redesigning and relocating the box cut and other infrastructure in the vicinity of the Project Site to ensure that no hollow-bearing trees would be disturbed.
   – Locating the tailings storage facility at the top of an ephemeral drainage line to ensure that the facility occupies the minimum area possible.

2. **All regulatory requirements must be met.**

   The Proponent states that all regulatory requirements for the Project would be complied with.

3. **Offsets must never reward ongoing poor performance.**

   The Proponent contends that its existing environmental record is of a high standard. Examples of good environmental management include the following.

   – Management of weeds within the northern section of the Project Site. It is noted that the southern section of the Project Site was purchased by the Proponent in 2010 and ongoing weed management programs will be extended to those lands.
   – Management of exploration operations in a manner that ensure that the resident population of Gang-gang Cockatoo have remained within the Project Site.

4. Offsets will complement other government programs.

The Biodiversity Strategy would complement existing NSW Government conservation objectives as the Biodiversity Area would preserve an area of native-dominated pasture which would be managed in a manner that would ensure the re-establishment of native grasses. In addition, an area of native vegetation with a known population of threatened species would be fenced and managed for biodiversity purposes.

Majors Creek Landcare has conducted revegetation and fenced off one eroded gully in the recently acquired land. The proposed actions would also complement that program.

5. Offsets must be underpinned by sound ecological principles.

The proposed Biodiversity Strategy:

– reflects the requirement to re-establish areas of native grasslands within the area surrounding the Project Site;

– would permit the ongoing beneficial use of the Biodiversity Area, ensuring that resources remain available in perpetuity to manage the land in an appropriate manner; and

– would protect those sections of the Biodiversity Area that are currently forested and would, through the exclusion of stock, ensure that the understory and shrub layers within those section are permitted to regenerate.

6. Offsets should aim to result in a net improvement in biodiversity over time.

The Biodiversity Strategy would, through appropriate land management, encourage the re-emergence of native grassland within cleared sections of the Project Site while facilitating the re-establishment of groundcover and shrub layers within areas of Ribbon Gum Forest. This would result in net improvement in biodiversity over time. In addition, continued land stabilisation works would result in the stabilisation of areas of active erosion within the subject site.

7. Offsets must be enduring and they must offset the impact of the development for the period that the impact occurs.

The Proponent proposes to secure the Biodiversity Strategy in perpetuity.

8. Offsets should be agreed prior to the impact occurring.

The Proponent proposes to prepare a *Property Vegetation Plan* in consultation with DECCW and the Southern Rivers Catchment Management Authority within 12 months of the receipt of project approval, should it be granted.

9. Offsets must be quantifiable and the impacts and benefits must be reliably estimated.

Figure 4.17 presents the areas that would be disturbed by the Project and those that would be preserved within the Biodiversity Area.

10. Offsets must be targeted.

The Biodiversity Strategy would preserve and protect similar habitat to the habitat that would be disturbed.

11. Offsets must be located appropriately.

The Biodiversity Area is entirely within the Project Site and surrounds the areas of proposed disturbance.

12. Offsets must be supplementary.

The Biodiversity Area is not protected by existing covenants or other measures and not funded by other schemes. With the exception of limited funds provided to assist with creek bank stabilisation, there have been no incentive funds provided under previous management.

13. Offsets and their actions must be enforceable through development consent conditions, licence conditions, conservation agreements or a contract.

The Proponent anticipates that the project approval, should it be granted, would include a requirement to implement the proposed Biodiversity Strategy, including securing the biodiversity area to the satisfaction of the DECCW. In addition, the Proponent would undertake internal audits and monitoring of the biodiversity offset strategy and areas to determine that the proposed actions are leading to positive biodiversity outcomes.

In the event that the Proponent sells the land within the biodiversity area, subsequent purchasers would be bound by the *Property Vegetation Plan* that the Proponent would prepare.

4.3.7 Monitoring

The Proponent would ensure that the following ecology-related monitoring is undertaken during the life of the Project. The results of the monitoring program would be reported in each Annual Environmental Management Report prepared for the Project.

- Ensure that searches for Major's Creek Leek Orchid are undertaken during the flowering period for the orchid, both within suitable habitat areas within the Project Site and within the Majors Creek Cemetery.
- Ensure that all areas undergoing rehabilitation are be monitored on a 6 monthly basis to determine the success or otherwise of the management, mitigation and ameliorative measures and the rehabilitation programs.
- Establish a set of photographic reference points and ensure that photographs are taken at six monthly intervals to document activities within the Project Site, including weed control and revegetation actions.

4.4 GROUNDWATER

4.4.1 Introduction

The DGRs issued by the Department of Planning require that the *Environmental Assessment* include an assessment of "**soil and water** – *including … a detailed groundwater model.*"

Based on the risk assessment undertaken for the Project (see Section 3.3), specific groundwater-related impacts that may result as a consequence of the Project (without the implementation of the safeguards, controls and mitigation measures presented in this section) include the following.

- Reduced availability of water for beneficial use.
- Reduction in groundwater levels.
- Reduced yields of local groundwater bores.
- Reduced surface water flows.

The groundwater assessment was undertaken by Australasian Groundwater and Environmental Consultants Pty Ltd (AGE). This section of the *Environmental Assessment* provides a summary of the assessment report which is presented in full as Part 3 (Volume 1) of the *Specialist Consultant Studies Compendium* and referred to hereafter as "AGE (2010)".

The assessment was managed by Mr Errol Briese (B.Sc (Hons), Grad Dip (Management)) of AGE.

4.4.2 Existing Environment

4.4.2.1 Introduction

A description of the topographic, drainage and geological setting of the Project Site is provided in Section 4.1. This sub-section provides a description of the regional and Project Site groundwater setting and the surrounding groundwater users that may potentially be impacted by the Project.

4.4.2.2 Regional Groundwater Setting

Three principal classes of aquifers exist within and surrounding the Project Site as follows.

- Fracture-controlled, granodiorite-hosted aquifer

  This aquifer occurs across the entire Project Site and surrounding catchments. As identified in Section 4.1.4, the Project Site is underlain by the Braidwood granodiorite which is cut by a number of fracture systems. As a result, the aquifer may be categorised a hydraulically "tight" massive granodiorite with little or no primary permeability and localised fracture or fault systems which may be open and transmit groundwater flow.

- A regolith aquifer, namely a shallow, weathered aquifer overlying the granodiorite.

  This aquifer occurs across the majority of the Project Site and surrounding catchments and is hosted by weathered granodiorite material. Weathering typically occurs to a depth of approximately 15m.

- A shallow alluvial aquifer associated with the Majors Creek alluvial deposits.

  This aquifer comprises sand and clay with boulders adjacent to and within Majors Creek. The alluvial material has been extensively disturbed during previous alluvial gold mining operations, resulting in piles of alluvial material in sections of the creek and exposed bedrock in other sections (**Plates 4.1** and **4.2**). AGE (2010) indicates that the thickness of in-situ alluvium prior to the commencement of alluvial mining operations was probably between 2m and 3m. **Figure 4.18** presents an overview of the distribution of this aquifer within and surrounding the Project Site. It is noted that AGE (2010) state that the "alluvium" mapped adjacent to the tributaries to Majors Creek is actually colluvium, or material sourced directly from the slopes of the valley through which the tributary flows, and does not form part of the alluvial aquifer.

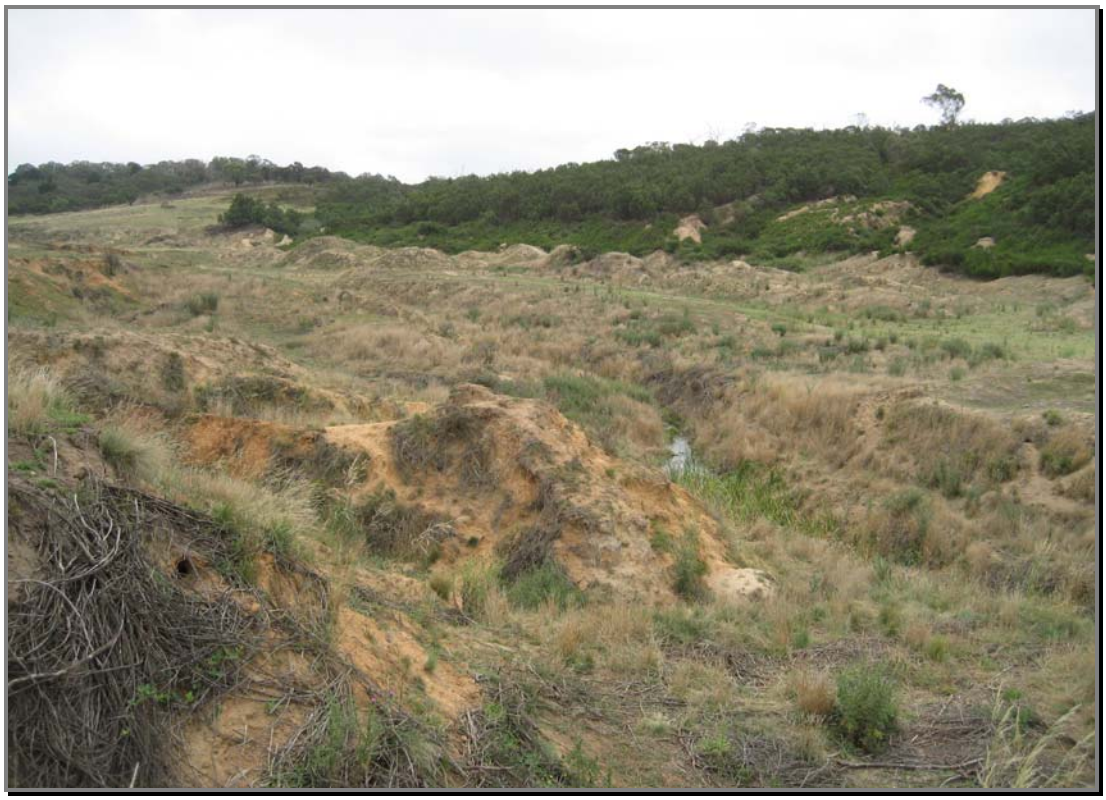


Plate 4.1 View of disturbed alluvium within Majors Creek

Plate 4.2 View of disturbed alluvium within Majors Creek

Source: AGE (2010) – Figure 3

4.4.2.3 Project Site Groundwater Setting

Survey Methodology

In order to establish the Project Site groundwater setting, AGE (2010) constructed 8 monitoring bores and six locations. **Figure 4.18** and **Table 4.17** presents the location and construction details respectively of each of the constructed bores. It is noted that at two locations adjacent to the upper sections of Spring Creek bores were twinned, namely two bores targeting different aquifers were constructed at each site. These twinned bores, namely DRWB01, DRWB02, DRWB03 and DRWB04, were constructed to test the level of interconnection between the regolith and granodiorite aquifers. As indicated in **Table 4.17,** slotted casing was installed in the deeper bore at a depth of more than 60m below surface. The upper section of the bore was then sealed to prevent shallow waters from entering the bore. Slotted casing was installed in the shallower bore at between approximately 10m and 17m below surface.

Section 7.3 of AGE (2010) presents a detailed description of the bore construction methodology. Applications for licences for all bores have been submitted to NSW Office of Water.