# 7. Conclusion

## 7.1 Summary of key findings

### 7.1.1 Survey methods and effort

The scope of the current investigation included supplementary field surveys within the MR5a study area and re-assessment of impacts on native biota based on revisions to the project. Supplementary survey effort included:

- Flora quadrats (five additional quadrats and one transect including EPBC Box-Gum Grassy Woodland quadrats) and area searches, fauna habitat assessments and targeted threatened flora surveys over adjoining accessible portions of the study area.
- Revised vegetation mapping.
- Anabat echolocation survey (4 nights at 4 sites)
- Harp trapping for microbats (4 nights at 2 sites)
- Diurnal bird surveys (30 minutes  each at 8 at additional sites)
- Call playback for forest owls and arboreal fauna (an additional 2 sites)
- Spotlighting for nocturnal fauna (an additional 2 locations, 8 hours covering a distance of about 2 kilometres).

### 7.1.2 Vegetation and habitat removal

Estimates of vegetation removal obtained through GIS analysis suggest that construction of the project (including access track and electricity easement) would result in the permanent clearing of 12.32 hectares of native vegetation and 6.47 hectares of non-native vegetation. The post-construction landform in cleared areas would be allowed to regenerate to grassland approximately equivalent to its pre-disturbance condition and would provide equivalent habitat value (and grazing land) for native biota in the medium to long term.

The 12.32 hectares of native vegetation removed during construction would be converted to a 10 metre wide strip of derived grassland along the final pipeline route. This is a small proportion (1.7 %) of the conservative estimated total of about 690.81 hectares of native vegetation in the study area and is likely to comprise a minor impact on populations of native biota.

### 7.1.3 Threatened species

No threatened flora species were recorded and none are likely to be removed. There is however, potential habitat for the vulnerable *Thesium australe* within a patch of derived native grassland dominated by Kangaroo Grass. Although the proposal would remove 0.2 hectares of derived native grassland from within this patch, the impacts would only be temporary due to the rehabilitation of the grassland following construction.

Supplementary MR5a surveys confirmed the presence of three additional species of threatened fauna:

- Eastern Bentwing Bat
- Little Lorikeet
- Varied Sittella

The eastern subspecies of the Brown Treecreeper was also recorded in the MR5a route. It was also recorded during the EA surveys.

The subject site is likely to provide known habitat for at least seven threatened fauna species that were recorded within the study area, as well as a number of other fauna species considered likely to occur (at least on occasion). Impacts on fauna would include potential displacement or mortality of individuals and removal of habitat resources. Clearing will have additional negative effects on the quality of habitats in the broader locality through edge effects and incremental fragmentation of habitat.

### 7.1.4 Threatened ecological communities

The native vegetation to be permanently removed during construction includes 4.42 hectares of TSC Act Box-Gum Woodland and 2.79 hectares of EPBC Box-Gum Grassy Woodland.

Vegetation qualifying as Box Gum Woodland (TSC Act) and Box-Gum Grassy Woodland (EPBC Act) was identified within the MR5a study area. However, most of these patches exist on the margins of the existing cleared access road.

### 7.1.5 Avoidance and mitigation measures

Measures to mitigate permanent unavoidable biodiversity loss arising from the proposed pipeline construction have been identified according to the hierarchy of 'avoid –mitigate – offset' impacts according to the guidelines for Part 3A projects (DEC and DPI 2005). A key measure in the avoidance of biodiversity loss has been the alignment of the final pipeline along existing cleared roadsides and private properties and impacts will be further mitigated through micro-realigning of the construction corridor where native vegetation, creek crossings and wetlands occur.

A Flora and Fauna Management Plan (FFMP) and a Biodiversity Offset Strategy are currently being prepared in consultation with Council, OEH and DSEWPaC. The FFMP will include details of how to avoid and mitigate impacts before, during and after construction.

A biodiversity offset strategy would be developed prior to construction to compensate for residual impacts on threatened biota, including TSC Act and EPBC Act matters. A range of offset options have been considered by Council during the preparation of the PPR and these have been discussed with OEH and DSEWPaC. Council have identified a suitable offset site and a preliminary assessment of the vegetation and habitats contained within the site has been completed. Further details on the condition of habitats, presence of threatened species habitats, and presence of TECs and EPBC Act matters will be provided in the offsets strategy, as well as the proposed management regime and preferred mechanism for securing the site.

Proposed mitigation and offsetting actions for terrestrial ecology will be included in the Final Statement of Commitments in the PPR and if Project Approval is granted under Part 3A of the EP&A Act, would form part of the Conditions of Consent.

## 7.2 Key thresholds

According to the DEC and DPI (2005) assessment guidelines for Part 3A projects, a justification of the preferred option based on the following key thresholds must be included. The application of these thresholds to the Project has been reassessed according to the amendments presented in this report.

***Whether or not the proposal, including actions to avoid or mitigate impacts or compensate to prevent unavoidable impacts would maintain or improve biodiversity values.***

The project design includes measures to avoid, minimise, mitigate and offset impacts on biodiversity values associated with construction of the final pipeline. The final route has been selected to avoid significant adverse effects on biodiversity values by positioning the majority of the pipeline corridor adjacent to existing cleared areas including roadside reserves, cleared paddocks and existing cleared access tracks. Impacts would be further reduced through micro-alignment of the final pipeline route to avoid hollow bearing trees, threatened ecological communities and other constraints where possible.

Specific impact mitigation and environmental management measures will be developed for specific threatened species and EECs and included in a Flora and Fauna Management Plan (FFMP) (refer Section 6).

Despite the application of avoidance and mitigation measures the project would result in residual impacts on biodiversity values. Construction of the final pipeline would require the permanent removal of approximately 12.32 hectares of native vegetation, of which approximately 4.42 hectares is consistent with the endangered ecological community of Box Gum Woodland. A biodiversity offset strategy would be developed in consultation with OEH and DSEWPaC to compensate for these residual impacts and to ensure that biodiversity values are maintained in the long-term (refer section 6.5).

***Whether or not the proposal is likely to reduce the long-term viability of a local population of any threatened species, population or ecological community.***

The project would have a relatively minor negative impact on the long-term viability of populations of threatened biota. This conclusion is based largely on the nature and condition of the habitats to be removed, the narrow width of the construction corridor and the extent of undisturbed vegetation and alternative habitats in the locality. Retained vegetation would remain intact and contiguous with large areas of surrounding native vegetation that contain areas of known and potential habitat for threatened biota e.g. Mullion Range State Conservation Area.

The project would remove 4.42 hectares of TSC Act Box-Gum Woodland. This represents a conservative estimate of about three per cent of this community known to occur within a 500 metre radius of the subject site. The proposed construction would also remove potential habitat for threatened flora and fauna species, including seven threatened fauna species recorded during the field surveys. Mitigation measures implemented prior to, during and post-construction would minimise the severity of potential impacts on threatened species.

Based on the extent of direct impacts and implementation of mitigation and offset measures, the project is not likely to reduce the long-term viability of any local populations of threatened biota or ecological communities.

***Whether or not the proposal is likely to accelerate the extinction of any species, population or ecological community or place it at risk of extinction.***

The project is highly unlikely to accelerate the extinction of any native biota based on the following considerations:

- The proposed construction is highly unlikely to remove an ecologically significant proportion of any native flora populations given the limited extent of vegetation clearing in

comparison to the extent of native vegetation in the total study area and the surrounding locality.

- The proposed construction is highly likely to cause the injury, displacement or mortality of an ecologically significant proportion of any native fauna populations given the limited extent of habitat to be directly affected and the proposed pre-clearing surveys and other measures to mitigate impacts.
- The proposed environmental management and impact mitigation measures are likely to limit impacts to the immediate disturbance footprint and the proposed operation of the project would not result in any additional impacts on native biota.
- The project is not likely to result in significant impacts on local populations of any threatened biota or any other identified species that may be at increased risk of extinction.
- Alternative habitat within and adjacent to the pipeline corridor is likely to be sufficient to maintain populations of native biota and the extent of clearing proposed is unlikely to fragment any populations or isolate any areas of habitat.
- The project would not result in any permanent barriers, significant gaps in habitat or otherwise inhibit the movement of migratory or nomadic fauna along recognised corridors or linkages in the locality or region.

***Whether or not the proposal will adversely affect critical habitat.***

No listed critical habitat will be removed or adversely affected as a result of the project.

### Summary

The project has been designed to minimise environmental impact to the largest extent possible and where impacts are unavoidable, minimising impacts and development of mitigation measures are proposed that would further reduce impacts on native biota and in particular threatened species and ecological communities. Construction along the final pipeline route would result in lesser impacts than those presented in the EA, reflecting the avoidance of impacts through amended design and through the realignment of the first four kilometres of the pipeline route, which results in a reduced construction footprint and hence reduced clearing of native vegetation.

No threatened species are likely to be significantly affected by the project. No vegetation or habitat would be isolated or substantially further fragmented by the project. A Biodiversity Offset Strategy is currently being developed in consultation with OEH and DSEWPaC that would complement the specific mitigation measures incorporated into the project and compensate for residual impacts on biodiversity. The plan would ensure that biodiversity values equivalent to those being permanently removed from the construction corridor are protected and managed in perpetuity and that a ‘maintain or improve’ biodiversity outcome is achieved for the project.

## 7.3 Matters of National Environmental Significance

The project would result in direct negative impacts on Box-Gum Grassy Woodland. A Referral to DSEWPaC was prepared in 2011. The project was deemed a controlled action under the EPBC Act based on the following Matters of National Environmental Significance:

- Listed threatened species and communities.

- Ramsar wetlands.
- Listed migratory species.

Due to the impacts the proposal would have on the Superb Parrot and Box-Gum Grassy Woodland, significance assessments were completed for both matters of NES. The EA concludes that impacts on both the Superb Parrot and Box Gum Woodland were likely to be significant. Therefore, with the changes to the proposed alignment, these conclusions were reconsidered as part of the current assessment.

In reconsidering the Superb Parrot assessment it was concluded that there is unlikely to be a significant impact on the Superb Parrot based on the following considerations:

- A reduction in the number of hollow-bearing trees to be removed by about 49 per cent
- The total loss of habitat reduced by 1.75 hectares
- The locality not supporting an important population of the species
- The species being at the eastern edge of its distribution and not being recorded during field surveys despite surveys at appropriate times of year in three seasons (spring, summer and autumn).

In reconsidering the Box-Gum Grassy Woodland assessment it was concluded there is unlikely to be a significant impact on the community due to the relatively small removal of 2.79 hectares of the community in a study area that contains an additional 43.31 hectares as a minimum. In addition, the proposal would not cause significant fragmentation of the community or isolate any areas of habitat for the community or component species.

No additional species, either threatened or migratory, populations or TEC's are likely to be significantly impacted as a result of the project in the EA.

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# Appendices

# Appendix A Flora list

* Introduced species

✓ Species present

All numbers are per cent cover

r  Less than one per cent cover, few individuals

+ Less than one per cent cover, numerous individuals

**Bold** indicates threatened species

| Scientific Name | Common Name | Biosis surveys 2012 | GHD surveys 2012 | | | | |
|---|---|---|---|---|---|---|---|
| | | | Q1 | Q2 | Q3 | Q4 | Q5 | Incidentals |
| *Acacia buxifolia* subsp. *buxifolia* | Box-leaved Wattle | ✓ | | | | | | |
| *Acacia dealbata* subsp. *dealbata* | Silver Wattle | ✓ | | | | | | ✓ |
| *Acacia decora* | Western Silver Wattle | | | | | r | | |
| *Acacia doratoxylon* | Currawang | | | | | | | ✓ |
| *Acacia implexa* | Hickory Wattle | ✓ | | r | | | | |
| *Acaena echinata* | Sheep's Burr | ✓ | | | | | | |
| *Acaena novae-zelandiae* | Bidgee-widgee | ✓ | | | | | | ✓ |
| *Acaena ovina* | Acaena | ✓ | | | | | | |
| *Acetosella vulgaris** | Sheep Sorrel | ✓ | | | | | | ✓ |
| *Aira cupaniana** | Silvery Hairgrass | | r | | | r | + | |

| Scientific Name | Common Name | Biosis surveys 2012 | GHD surveys 2012 | | | | |
|---|---|---|---|---|---|---|---|
| | | | Q1 | Q2 | Q3 | Q4 | Q5 | Incidentals |
| *Alternanthera denticulata* | Lesser Joyweed | | r | | | | | |
| *Anagallis arvensis** | Scarlet Pimpernel | ✓ | 5 | + | + | + | + | |
| *Apium* sp. | | ✓ | | | | | | |
| *Arctotheca calendula** | Capeweed | | + | | | | | |
| *Aristida ramosa* | Purple Wiregrass | ✓ | | 5 | 1 | 1 | | |
| *Aristida vagans* | Threeawn Speargrass | ✓ | | | | | | |
| *Arthropodium milleflorum* | Pale Vanilla-lily | | | | | r | | |
| *Arthropodium minus* | | | | ✓ | + | + | r | |
| *Asperula conferta* | Common Woodruff | ✓ | | | | | | ✓ |
| *Aster subulatus** | Wild Aster | ✓ | | | | | | |
| *Austrodanthonia sp.* | A Wallaby Grass | ✓ | | | | 1 | 1 | |
| *Austrostipa bigeniculata* | Yanganbil | ✓ | | | | | | |
| *Austrostipa densiflora* | | | | | + | | | |
| *Austrostipa ramosissima* | Stout Bamboo Grass | ✓ | | | | | | |
| *Austrostipa scabra* | Speargrass | ✓ | | | | | | |
| *Austrostipa scabra* subsp. *falcata* | A Speargrass | | | 2 | r | 1 | | |
| *Austrostipa scabra* subsp. *scabra* | Rough Speargrass | ✓ | | | | | | |
| *Avena* sp.* | Oats | ✓ | | | | | | |

| Scientific Name | Common Name | Biosis surveys 2012 | GHD surveys 2012 | | | | |
|---|---|---|---|---|---|---|---|
| | | | Q1 | Q2 | Q3 | Q4 | Q5 | Incidentals |
| *Avena fatua** | Wild Oats | ✓ | 2 | | | | | |
| *Bothriochloa macra* | Red Grass | ✓ | | | | | 1 | |
| *Brachychiton populneus* | Kurrajong | | ✓ | r | | r | | |
| *Brachyloma daphnoides* | Daphne Heath | ✓ | | | | r | | |
| *Brassica* sp.* | Brassica | ✓ | | | | | | |
| *Brassica rapa** | Field Mustard | | 3 | | | | | |
| *Briza maxima** | Quaking Grass | ✓ | | | | | | |
| *Briza minor** | Shivery Grass | ✓ | r | | | | 1 | |
| *Bromus catharticus** | Prairie Grass | ✓ | | | | | | |
| *Bromus diandrus** | Great Brome | | 8 | | | | | |
| *Bromus hordeaceus** | Soft Brome | ✓ | | | | | | |
| *Bromus molliformis** | Soft Brome | | | | | | 1 | |
| *Bursaria spinosa* | Blackthorn | | | | | | | ✓ |
| *Callitris endlicheri* | Black Cypress Pine | ✓ | | + | | | | |
| *Calotis lappulacea* | Yellow Burr-daisy | ✓ | | | | | | ✓ |
| *Capsella bursa-pastoris** | Shepherd's Purse | | r | | | | | |
| *Carduus nutans** | Nodding Thistle | | 2 | | | | | |
| *Carduus tenuiflorus** | Winged Slender Thistle | ✓ | | | | | | |

| Scientific Name | Common Name | Biosis surveys 2012 | GHD surveys 2012 | | | | |
|---|---|---|---|---|---|---|---|
| | | | Q1 | Q2 | Q3 | Q4 | Q5 | Incidentals |
| *Carex appressa* | Tall Sedge | ✓ | | | | | | ✓ |
| *Carthamus lanatus** | Saffron Thistle | | | | | | 1 | |
| *Cassinia arcuata* | Sifton Bush | ✓ | | | | | | |
| *Cassinia uncata* | Sticky Cassinia | | | | | | | ✓ |
| *Casuarina cunninghamiana* subsp. *cunninghamiana* | River Sheoak | ✓ | ✓ | | | | | |
| *Centaurium erythraea** | Common Centaury | ✓ | | | | | | |
| *Cerastium glomeratum** | Mouse-ear Chickweed | | 1 | | | | | |
| *Cheilanthes austrotenuifolia* | Rock Fern | ✓ | | + | + | r | r | |
| *Cheilanthes sieberi ssp. sieberi* | Rock Fern | ✓ | | | | | | |
| *Chloris divaricata* | Slender Chloris | | | r | | | | |
| *Chrysocephalum apiculatum* | Common Everlasting | ✓ | | | | | | |
| *Cirsium vulgare** | Spear Thistle | ✓ | + | | | | | |
| *Conium maculatum** | Hemlock | ✓ | | | | | | |
| *Convolvulus erubescens* | Blushing Bindweed | ✓ | | | | | | |
| *Conyza* sp. | A Fleabane | ✓ | | | | | | |
| *Conyza bonariensis** | Flaxleaf Fleabane | ✓ | | | | | | ✓ |
| *Conyza sumatrensis** | Tall Fleabane | | | | | | r | |
| *Crataegus monogyna** | Hawthorn | ✓ | | | | | | |

| Scientific Name | Common Name | Biosis surveys 2012 | GHD surveys 2012 | | | | |
|---|---|---|---|---|---|---|---|
| | | | Q1 | Q2 | Q3 | Q4 | Q5 | Incidentals |
| *Cryptandra amara* | Bitter Cryptandra | | | | | r | r | |
| *Cupressus* sp.* | | ✓ | | | | | | |
| *Cymbonotus lawsonianus* | | ✓ | | r | | | r | |
| *Cymbopogon refractus* | Barbed Wire Grass | | | r | 1 | 3 | | |
| *Cynodon dactylon* | Couch | ✓ | 5 | | | | | |
| *Cynoglossum australe* | | | | 1 | r | | | |
| *Cyperus* sp. | | ✓ | | | | | | |
| *Cyperus eragrostis** | | ✓ | + | | | | | |
| *Dactylis glomerata** | Cocksfoot | ✓ | | | | | | |
| *Daucus glochidiatus* | Native Carrot | | r | | | | | |
| *Daviesia* sp. | | ✓ | | | | | | |
| *Daviesia leptophylla* | | ✓ | | | | | | |
| *Desmodium varians* | Slender Tick-trefoil | ✓ | | | | | | |
| *Dianella longifolia var. longifolia* | A Blue Flax Lily | ✓ | | | | | | ✓ |
| *Dianella revoluta var. revoluta* | A Blue Flax Lily | ✓ | | | | | | ✓ |
| *Dichelachne* sp. | A Plumegrass | ✓ | | | | | | ✓ |
| *Dichondra repens* | Kidney Weed | ✓ | | 10 | + | 1 | 1 | |
| *Dichopogon fimbriatus* | Nodding Chocolate Lily | ✓ | | | | | | ✓ |

| Scientific Name | Common Name | Biosis surveys 2012 | GHD surveys 2012 | | | | |
|---|---|---|---|---|---|---|---|
| | | | Q1 | Q2 | Q3 | Q4 | Q5 | Incidentals |
| *Dichopogon strictus* | Chocolate Lily | | | | | r | | |
| *Dillwynia phylicoides* | | | | | r | | | |
| *Dipodium variegatum* | | ✓ | | | | | | |
| *Dodonaea viscosa* subsp. *angustissima* | Narrow-leaved Hopbush | | | | r | | | |
| *Dodonaea viscosa* subsp. *cuneata* | Wedge-leaf Hop-bush | | | | | | | ✓ |
| *Drosera spatulata* | | ✓ | | | | | | |
| *Echinopogon* sp. | A Hedgehog Grass | ✓ | | | | | | |
| *Echinopogon ovatus* | Forest Hedgehog Grass | ✓ | | | | | | |
| *Echium plantagineum** | Paterson's Curse | ✓ | | | | | | ✓ |
| *Echium vulgare** | Vipers Bugloss | | 2 | | | | | |
| *Einadia nutans* | Climbing Saltbush | ✓ | | | | | | ✓ |
| *Elymus scaber var. scaber* | Common Wheatgrass | ✓ | | | | | | |
| *Epilobium hirtigerum* | | | | | | | | ✓ |
| *Eragrostis* sp. | | | | | | | | ✓ |
| *Eucalyptus albens* | White Box | ✓ | | 3 | | 1 | | |
| *Eucalyptus blakelyi* | Blakely's Red Gum | ✓ | | 1 | ✓ | 1 | | |
| *Eucalyptus bridgesiana* | Apple Box | ✓ | | | | | | |
| *Eucalyptus goniocalyx* | Long-leaved Box | ✓ | | | | | | ✓ |

| Scientific Name | Common Name | Biosis surveys 2012 | GHD surveys 2012 | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Q1 | Q2 | Q3 | Q4 | Q5 | Incidentals |
| *Eucalyptus macrorhyncha* | Red Stringybark | ✓ | | | ✓ | | | |
| *Eucalyptus melliodora* | Yellow Box | ✓ | | | | | | ✓ |
| *Eucalyptus nicholii* | Narrow-leaved Black Peppermint | ✓ | | | | | | |
| *Eucalyptus rossii* | Inland Scribbly Gum | | | | ✓ | | | ✓ |
| *Eucalyptus rubida* | Candlebark | ✓ | | | | | | ✓ |
| *Eucalyptus rubida* subsp. *rubida* | | ✓ | | | | | | |
| *Eucalyptus viminalis* | Ribbon Gum | ✓ | | | | | | |
| *Euchiton* sp. | | ✓ | | | | | | |
| *Euchiton gymnocephalus* | Creeping Cudweed | ✓ | | | | | | |
| *Euchiton involucratus* | Star Cudweed | ✓ | | | | | | |
| *Euphorbia peplus** | Petty Spurge | ✓ | | | | | | |
| *Foeniculum vulgare** | Fennel | | 2 | | | | | |
| *Fumaria* sp.* | Fumitory | ✓ | | | | | | |
| *Fumaria muralis** | Wall Fumitory | | 1 | | | | | |
| *Galium* sp.* | | ✓ | | | | | | |
| *Galium aparine** | Cleavers | | 5 | | | | | |
| *Galium gaudichaudii* subsp. *gaudichaudii* | Rough Bedstraw | ✓ | | | | + | | |

| Scientific Name | Common Name | Biosis surveys 2012 | GHD surveys 2012 | | | | |
|---|---|---|---|---|---|---|---|
| | | | Q1 | Q2 | Q3 | Q4 | Q5 | Incidentals |
| *Geranium retrorsum* | Common Cranesbill | ✓ | + | | | | | |
| *Geranium solanderi var. solanderi* | Native Geranium | ✓ | r | | | | | |
| *Glossodia major* | Waxlip Orchid | | | | | | | ✓ |
| *Glycine clandestina* | Twining glycine | ✓ | | + | + | r | | |
| *Glycine tabacina* | Variable Glycine | ✓ | | | | | | ✓ |
| *Gonocarpus tetragynus* | Poverty Raspwort | ✓ | | r | r | r | r | |
| *Goodenia* sp. | | ✓ | | | | | | |
| *Goodenia bellidifolia* | | ✓ | | | | | | |
| *Goodenia fascicularis* | | | | | | | | ✓ |
| *Goodenia hederacea* subsp. *hederacea* | Forest Goodenia | ✓ | | | 1 | r | | |
| *Grevillea ramosissima* subsp. *ramosissima* | Fan Grevillea | ✓ | | | | | | |
| *Hardenbergia violacea* | False Sarsaparilla | ✓ | | | | | | |
| *Hedera helix** | English Ivy | ✓ | | | | | | |
| *Hibbertia* sp. | | ✓ | | | | | | |
| *Hibbertia acicularis* | | | | 2 | + | 1 | | |
| *Hibbertia obtusifolia* | Hoary Guinea Flower | | | | 1 | | | |
| *Holcus lanatus** | Yorkshire Fog | ✓ | | | | | | |
| *Hordeum leporinum** | Barley Grass | | 2 | | | | | |

| Scientific Name | Common Name | Biosis surveys 2012 | GHD surveys 2012 | | | | |
|---|---|---|---|---|---|---|---|
| | | | Q1 | Q2 | Q3 | Q4 | Q5 | Incidentals |
| *Hydrocotyle laxiflora* | Stinking Pennywort | ✓ | | 4 | + | + | r | |
| *Hypericum gramineum* | Small St John's Wort | | | 1 | | + | | |
| *Hypericum perforatum** | St John's Wort | ✓ | | | | | 5 | |
| *Hypochaeris glabra** | Smooth Catsear | | | | | | + | |
| *Hypochaeris radicata** | Flatweed | ✓ | | | r | | r | |
| *Isotoma axillaris* | Rock Isotome | | | | | r | | |
| *Juncus* sp. | | ✓ | | | | | | |
| *Juncus usitatus* | | ✓ | | | | | | ✓ |
| *Lactuca serriola** | Prickly Lettuce | ✓ | | | | | | ✓ |
| *Lepidium africanum** | Peppercress | | | | | | | ✓ |
| *Lepidosperma laterale* | Variable Sword-sedge | ✓ | | | | | | |
| *Leptochloa digitata* | Umbrella Canegrass | | 10 | | | 1 | | |
| *Leucopogon* sp. | A Beard-heath | ✓ | | | | | | |
| *Linum marginale* | Native Flax | | | | | r | | |
| *Lissanthe strigosa* | Peach Heath | | | 1 | | 1 | r | |
| *Lolium perenne** | Perennial Ryegrass | ✓ | | | | | | |
| *Lolium rigidum** | Wimmera Ryegrass | ✓ | 5 | | | | | |
| *Lomandra* sp. | | | | | | | | ✓ |

| Scientific Name | Common Name | Biosis surveys 2012 | GHD surveys 2012 | | | | |
|---|---|---|---|---|---|---|---|
| | | | Q1 | Q2 | Q3 | Q4 | Q5 | Incidentals |
| *Lomandra effusa* | Scented Mat-rush | | | | | r | 2 | |
| *Lomandra filiformis* | Wattle Mat-rush | | | 2 | + | + | | |
| *Lomandra longifolia* | Spiny-headed Mat-rush | ✓ | | | | | | ✓ |
| *Lomandra multiflora* subsp. *multiflora* | Many-flowered Mat-rush | ✓ | | | + | | | |
| *Lomandra patens* | Irongrass | | | | | | | ✓ |
| *Ludwigia peploides* | Water Primrose | | | | | | | ✓ |
| *Medicago lupulina** | Black Medic | ✓ | | | | | | |
| *Melichrus urceolatus* | Urn Heath | ✓ | | | | | | ✓ |
| *Microlaena stipoides var. stipoides* | Weeping Grass | ✓ | | | | | | |
| *Microseris lanceolata* | Yam Daisy | | | | | | | ✓ |
| *Modiola caroliniana** | Red-flowered Mallow | ✓ | r | | | | | |
| *Nassella trichotoma** | Serrated Tussock | ✓ | | | | | | |
| *Olearia elliptica* subsp. *elliptica* | | ✓ | | | | | | |
| *Onopordum acanthium** | | ✓ | | | | | | |
| *Opercularia aspera* | Coarse Stinkweed | ✓ | | | | | | |
| *Opuntia aurantiaca** | Tiger Pear | ✓ | | r | + | r | r | |
| *Oxalis sp.* | | ✓ | | | | | | |
| *Oxalis corniculata** | | | r | | | | | |

| Scientific Name | Common Name | Biosis surveys 2012 | GHD surveys 2012 | | | | |
|---|---|---|---|---|---|---|---|
| | | | Q1 | Q2 | Q3 | Q4 | Q5 | Incidentals |
| *Oxalis perennans* | | ✓ | | | | r | r | |
| *Panicum* sp. | | ✓ | | | | r | | |
| *Panicum effusum* | Hairy Panic | | | r | | | | |
| *Paspalum dilatatum** | Paspalum | ✓ | | | | | | ✓ |
| *Paspalum distichum* | Water Couch | ✓ | | | | | | |
| *Persicaria* sp. | Knotweed | ✓ | | | | | | |
| *Petrorhagia nanteuilii** | Proliferous Pink | ✓ | 1 | | | r | | |
| *Phalaris aquatica** | Phalaris | ✓ | | | | | | ✓ |
| *Phalaris paradoxa** | Paradoxa Grass | | 10 | | | | | |
| *Phragmites australis* | Common Reed | | 1 | | | | | |
| *Phytolacca octandra** | Inkweed | ✓ | | | | | | |
| *Pinus radiata** | Radiata Pine | ✓ | | | | | | |
| *Pittosporum* sp. | | | | | | 1 | | |
| *Plantago gaudichaudii* | Narrow Plantain | ✓ | | | | | | |
| *Plantago lanceolata** | Lamb's Tongues | ✓ | | | | | | |
| *Poa labillardierei var. labillardierei* | Tussock | ✓ | | | | | | |
| *Poa sieberiana* | Snowgrass | ✓ | | | | | | ✓ |
| *Poa sieberiana var. hirtella* | | ✓ | | | | | | |

| Scientific Name | Common Name | Biosis surveys 2012 | GHD surveys 2012 | | | | |
|---|---|---|---|---|---|---|---|
| | | | Q1 | Q2 | Q3 | Q4 | Q5 | Incidentals |
| *Poa sieberiana var. sieberiana* | Snowgrass | ✓ | | | | | | |
| *Polygonum aviculare** | Wireweed | | r | | | | | |
| *Populus nigra** | Lombardy Poplar | ✓ | | | | | | |
| *Poranthera microphylla* | Small Poranthera | ✓ | | | | | | |
| *Pteridium esculentum* | Bracken | ✓ | | | | | | |
| *Pultenaea procumbens* | | ✓ | | | | | | ✓ |
| *Pultenaea setulosa* | A Bush Pea | ✓ | | | | | | |
| *Quercus robur** | English Oak | ✓ | | | | | | |
| *Ranunculus* sp.* | | ✓ | | | | | | |
| *Ranunculus lappaceus* | Common Buttercup | ✓ | | | | | | ✓ |
| *Raphanus raphanistrum** | Wild Radish | ✓ | | | | | | ✓ |
| *Rapistrum rugosum** | Turnip Weed | ✓ | | | | | | |
| *Robinia pseudoacacia** | Black Locust | ✓ | | | | | | |
| *Romulea rosea** | Onion Grass | | | | | | | ✓ |
| *Rosa* sp.* | | ✓ | | | | | | |
| *Rubus fruticosus** | Blackberry | ✓ | | | | | 2 | |
| *Rumex* sp.* | | ✓ | | | | | | |
| *Rumex brownii* | Swamp Dock | | | | | | | ✓ |

| Scientific Name | Common Name | Biosis surveys 2012 | GHD surveys 2012 | | | | |
|---|---|---|---|---|---|---|---|
| | | | Q1 | Q2 | Q3 | Q4 | Q5 | Incidentals |
| *Rumex crispus** | Curled Dock | ✓ | + | | | | | |
| *Rytidosperma caespitosum* | Ringed Wallaby Grass | ✓ | | | 1 | | | |
| *Rytidosperma carphoides* | Short Wallaby Grass | ✓ | | | | | | |
| *Rytidosperma pallidumrosa* | Silvertop Wallaby Grass | | | | | | | ✓ |
| *Salix* sp.* | A Willow | | r | | | | | |
| *Salix fragilis var. fragilis** | Crack Willow | ✓ | | | | | | |
| *Schoenus* sp. | | | | | | r | r | |
| *Schoenus apogon* | Fluke Bogrush | ✓ | | | | | | |
| *Scleranthus* sp. | | | | | | r | | |
| *Senecio* sp. | | | | | r | | | |
| *Senecio madagascariensis** | Fireweed | ✓ | | | | | | |
| *Senecio prenanthoides* | | | | r | | | | |
| *Senecio quadridentatus* | Cotton Fireweed | ✓ | | | | r | | |
| *Sida corrugata* | Corrugated Sida | | | | | | | ✓ |
| *Sigesbeckia orientalis* | | ✓ | | | | | | |
| *Silybum marianum** | Variegated Thistle | | + | | | | | |
| *Solanum cinereum* | Narrawa Burr | ✓ | | | | | | ✓ |
| *Sonchus oleraceus** | Common Sowthistle | ✓ | 1 | | | | | |

| Scientific Name | Common Name | Biosis surveys 2012 | GHD surveys 2012 | | | | |
|---|---|---|---|---|---|---|---|
| | | | Q1 | Q2 | Q3 | Q4 | Q5 | Incidentals |
| *Sorghum leiocladum* | Wild Sorghum | ✓ | | | | | | |
| *Stackhousia* sp. | | ✓ | | | | | | |
| *Stackhousia monogyna* | Creamy Candles | | | | | + | | |
| *Stackhousia viminea* | Slender Stackhousia | | | | 1 | | | |
| *Stachys arvensis** | Stagger Weed | | | | | | | ✓ |
| *Stypandra glauca* | Nodding Blue Lily | | | | 2 | 2 | | |
| *Taraxacum officinale** | Dandelion | | | | | | r | |
| *Themeda australis* | Kangaroo Grass | ✓ | | | | | 40 | |
| *Tricoryne* sp. | | ✓ | | | | | | |
| *Tricoryne elatior* | Yellow Autumn-lily | ✓ | | | | | | ✓ |
| *Trifolium* sp.* | | ✓ | | | | | | |
| *Trifolium angustifolium** | Narrow-leaved Clover | ✓ | | | | | | |
| *Trifolium arvense** | Haresfoot Clover | ✓ | | r | | | | |
| *Trifolium campestre** | Hop Clover | | 2 | | | | + | |
| *Trifolium glomeratum** | Clustered Clover | | | + | | | | |
| *Trifolium subterraneum** | Subterranean Clover | | | | | | 1 | |
| *Triptilodiscus pygmaeus* | Common Sunray | | | | | r | | |
| *Urtica incisa* | Stinging Nettle | ✓ | | | | | | |

| Scientific Name | Common Name | Biosis surveys 2012 | GHD surveys 2012 | | | | |
|---|---|---|---|---|---|---|---|
| | | | Q1 | Q2 | Q3 | Q4 | Q5 | Incidentals |
| *Urtica urens** | Small Nettle | | | | | | | ✓ |
| *Verbascum thapsus* subsp. *thapsus** | Great Mullein | ✓ | | | | | | |
| *Verbena* sp.* | | ✓ | | | | | | |
| *Verbena bonariensis** | Purpletop | | + | | | | | |
| *Verbena rigida** | Veined Verbena | ✓ | | | | | | |
| *Veronica* sp. | | | r | | | | | |
| *Veronica calycina* | Hairy Speedwell | ✓ | | | | | | |
| *Veronica persica** | Creeping Speedwell | ✓ | | | | | | |
| *Veronica plebeia* | Trailing Speedwell | ✓ | | | r | r | | |
| *Vicia sp.** | Vetch | ✓ | | | | | | |
| *Vicia tetrasperma** | Slender Vetch | ✓ | | | | | | |
| *Viola betonicifolia* subsp. *betonicifolia* | | ✓ | | | | | | |
| *Vittadinia cuneata* | A Fuzzweed | ✓ | | | | | r | |
| *Vittadinia gracilis* | Woolly New Holland | ✓ | | | | | | |
| *Vulpia* sp.* | | ✓ | | | | | | |
| *Vulpia bromoides** | Squirrel Tail Fescue | ✓ | 8 | | | | 2 | |
| *Wahlenbergia communis* | Tufted Bluebell | ✓ | | | | | | |
| *Wahlenbergia gracilis* | Sprawling Bluebell | | | 1 | 1 | 1 | | |

| Scientific Name | Common Name | Biosis surveys 2012 | Q1 | GHD surveys 2012 | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Q2 | Q3 | Q4 | Q5 | Incidentals |
| *Wahlenbergia luteola* | | | | 1 | + | | r | |
| *Wahlenbergia stricta* | Australian Bluebell | | | | | | | ✓ |
| *Wurmbea dioica* | Early Nancy | | | r | | r | r | |
| *Xanthium spinosum** | Bathurst Burr | | | | | | | ✓ |
| *Xerochrysum bracteatum* | Golden Everlasting | | | | | | | ✓ |

# Appendix B Fauna list

* Introduced species

✓ Species present

**Bold** indicates threatened species

| Common name | Scientific name | Biosis survey 2012 | GHD survey 2012 | |
|---|---|---|---|---|
| | | | Targeted survey | Incidental |
| ***Birds*** | | | | |
| Australasian Grebe | *Tachybaptus novaehollandiae* | ✓ | | |
| Australian King Parrot | *Alisterus scapularis* | ✓ | | ✓ |
| Australian Magpie | *Gymnorhina tibicen* | ✓ | ✓ | |
| Australian Owlet-nightjar | *Aegotheles cristatus* | | ✓ | |
| Australian Raven | *Corvus coronoides* | ✓ | | ✓ |
| Australian Wood Duck | *Chenonetta jubata* | ✓ | | |
| Azure Kingfisher | *Alcedo azurea* | ✓ | | |
| Black-faced Cuckoo-shrike | *Coracina novaehollandiae* | ✓ | ✓ | |
| Brown Songlark | *Cincloramphus cruralis* | | | ✓ |
| Brown Thornbill | *Acanthiza pusilla* | ✓ | | ✓ |
| **Brown Treecreeper** | ***Climacteris picumnus victoriae*** | ✓ | ✓ | |
| Brush Cuckoo | *Cacomantis variolosus* | ✓ | | |
| Chestnut-rumped Thornbill | *Acanthiza uropygialis* | | ✓ | |
| Common Blackbird | *Turdus merula** | ✓ | | |
| Common Bronzewing | *Phaps chalcoptera* | ✓ | ✓ | |
| Common Koel | *Eudynamys scolopacea* | ✓ | | |
| Common Myna | *Acridotheres tristis** | ✓ | | |
| Common Starling | *Sturnus vulgaris** | ✓ | | |
| Crested Pigeon | *Ocyphaps lophotes* | ✓ | | |
| Crimson Rosella | *Platycercus elegans* | ✓ | | |
| Diamond Dove | *Geopelia cuneata* | | ✓ | |
| **Diamond Firetail** | ***Stagonopleura guttata*** | ✓ | | |
| Dollarbird | *Eurystomus orientalis* | ✓ | | |
| Dusky Woodswallow | *Artamus cyanopterus* | ✓ | ✓ | |

| Common name | Scientific name | Biosis survey 2012 | GHD survey 2012 | |
|---|---|---|---|---|
| | | | Targeted survey | Incidental |
| Eastern Rosella | *Platycercus eximius* | ✓ | ✓ | |
| Eastern Spinebill | *Acanthorhynchus tenuirostris* | ✓ | ✓ | |
| Eastern Yellow Robin | *Eopsaltria australis* | | ✓ | |
| Eurasian Coot | *Fulica atra* | ✓ | | |
| Fairy Martin | *Petrochelidon ariel* | ✓ | | ✓ |
| Fan-tailed Cuckoo | *Cacomantis flabelliformis* | ✓ | ✓ | |
| Galah | *Eolophus roseicapillus* | ✓ | ✓ | |
| Golden-headed Cisticola | *Cisticola exilis* | ✓ | | |
| Golden Whistler | *Pachycephala pectoralis* | | ✓ | |
| Grey Butcherbird | *Cracticus torquatus* | ✓ | | |
| Great Cormorant | *Phalacrocorax carbo* | ✓ | | |
| Grey Fantail | *Rhipidura albiscapa* | ✓ | ✓ | |
| Grey Shrike-thrush | *Colluricincla harmonica* | ✓ | ✓ | |
| House Sparrow | *Passer domesticus** | ✓ | | |
| Laughing Kookaburra | *Dacelo novaeguineae* | ✓ | ✓ | |
| Leaden Flycatcher | *Myiagra rubecula* | ✓ | ✓ | |
| Lewin's Honeyeater | *Meliphaga lewinii* | ✓ | | |
| Little Black Cormorant | *Phalacrocorax sulcirostris* | | | ✓ |
| Little Friarbird | *Philemon citreogularis* | | ✓ | |
| **Little Lorikeet** | ***Glossopsitta pusilla*** | | ✓ | |
| Little Pied Cormorant | *Phalacrocorax melanoleucos* | ✓ | | |
| Little Wattlebird | *Anthochaera chrysoptera* | ✓ | | |
| Magpie-lark | *Grallina cyanoleuca* | ✓ | | ✓ |
| Masked Woodswallow | *Artamus personatus* | | ✓ | |
| Mistletoebird | *Dicaeum hirundinaceum* | ✓ | ✓ | |
| Nankeen Kestrel | *Falco cenchroides* | ✓ | | |
| Noisy Friarbird | *Philemon corniculatus* | ✓ | ✓ | |
| Noisy Miner | *Manorina melanocephala* | ✓ | | |
| Olive-backed Oriole | *Oriolus sagittatus* | ✓ | ✓ | |
| Pacific Black Duck | *Anas superciliosa* | ✓ | | |

| Common name | Scientific name | Biosis survey 2012 | GHD survey 2012 | |
|---|---|---|---|---|
| | | | Targeted survey | Incidental |
| Pallid Cuckoo | *Cuculus pallidus* | ✓ | | |
| Peaceful Dove | *Geopelia striata* | ✓ | ✓ | |
| Pied Butcherbird | *Cracticus nigrogularis* | ✓ | ✓ | |
| Pied Cormorant | *Phalacrocorax varius* | ✓ | | |
| Pied Currawong | *Strepera graculina* | ✓ | ✓ | |
| **Powerful Owl** | ***Ninox strenua*** | ✓ | | |
| Red-browed Finch | *Neochmia temporalis* | ✓ | ✓ | |
| Red-capped Robin | *Petroica goodenovii* | | | ✓ |
| Red-rumped Parrot | *Psephotus haematonotus* | ✓ | | ✓ |
| Red Wattlebird | *Anthochaera carunculata* | ✓ | ✓ | |
| Restless Flycatcher | *Myiagra inquieta* | | ✓ | |
| Richard's Pipit | *Anthus novaeseelandiae* | ✓ | | ✓ |
| Rock Dove | *Columba livia** | ✓ | | |
| Rooster (domestic fowl) | *Gallus domesticus** | ✓ | | |
| Rufous Fantail | *Rhipidura rufifrons* | ✓ | | |
| Rufous Songlark | *Cinclorhamphus mathewsi* | ✓ | ✓ | |
| Rufous Whistler | *Pachycephala rufiventris* | ✓ | ✓ | |
| Sacred Kingfisher | *Todiramphus sanctus* | ✓ | | ✓ |
| Shining Bronze-Cuckoo | *Chrysococcyx lucidus* | ✓ | | |
| Silvereye | *Zosterops lateralis* | ✓ | | |
| Silver Gull | *Larus novaehollandiae* | ✓ | | |
| Southern Boobook | *Ninox novaeseelandiae* | ✓ | | |
| Spotted Pardalote | *Pardalotus punctatus* | ✓ | ✓ | |
| Straw-necked Ibis | *Threskiornis spinicollis* | ✓ | | |
| Striated Pardalote | *Pardalotus striatus* | ✓ | ✓ | |
| Striated Thornbill | *Acanthiza lineata* | ✓ | ✓ | |
| Stubble Quail | *Coturnix pectoralis* | ✓ | | |
| Sulphur-crested Cockatoo | *Cacatua galerita* | ✓ | | |
| Superb Fairy-wren | *Malurus cyaneus* | ✓ | ✓ | |
| **Varied Sittella** | ***Daphoenositta chrysoptera*** | | ✓ | |

| Common name | Scientific name | Biosis survey 2012 | GHD survey 2012 | |
|---|---|---|---|---|
| | | | Targeted survey | Incidental |
| Wedge-tailed Eagle | *Aquila audax* | ✓ | | ✓ |
| Weebill | *Smicrornis brevirostris* | | ✓ | |
| Welcome Swallow | *Hirundo neoxena* | ✓ | ✓ | |
| Western Gerygone | *Gerygone fusca* | | ✓ | |
| White-browed Scrubwren | *Sericornis frontalis* | ✓ | ✓ | |
| White-browed Woodswallow | *Artamus superciliosus* | | ✓ | |
| White-cheeked Honeyeater | *Phylidonyris nigra* | ✓ | | |
| White-eared Honeyeater | *Lichenostomus leucotis* | ✓ | | |
| White-faced Heron | *Egretta novaehollandiae* | ✓ | | |
| White-naped Honeyeater | *Melithreptus lunatus* | ✓ | ✓ | |
| White-plumed Honeyeater | *Lichenostomus penicillatus* | | ✓ | |
| White-throated Gerygone | *Gerygone olivacea* | ✓ | | |
| White-throated Treecreeper | *Cormobates leucophaeus* | ✓ | ✓ | |
| White-winged Chough | *Corcorax melanorhamphos* | ✓ | | |
| Willie Wagtail | *Rhipidura leucophrys* | ✓ | ✓ | |
| Yellow-faced Honeyeater | *Lichenostomus chrysops* | ✓ | | ✓ |
| Yellow-rumped Thornbill | *Acanthiza chrysorrhoa* | ✓ | | |
| Yellow Thornbill | *Acanthiza nana* | | ✓ | |
| ***Mammals*** | | | | |
| Cat | *Felis catus** | ✓ | | |
| Chocolate Wattled Bat | *Chalinolobus morio* | ✓ | | |
| Common Brushtail Possum | *Trichosurus vulpecula* | ✓ | ✓ | |
| Common Ringtail Possum | *Pseudocheirus peregrinus* | ✓ | | |
| Common Wallaroo | *Macropus robustus* | ✓ | | ✓ |
| Common Wombat | *Vombatus ursinus* | ✓ | | |
| Dog | *Canis familiaris** | ✓ | | |
| **Eastern Bentwing-bat** | **Miniopterus schreibersii oceanensis** | Possible | | |
| **Eastern False Pipistrelle** | ***Falsistrellus tasmaniensis*** | Probable | | |
| Eastern Grey Kangaroo | *Macropus giganteus* | ✓ | | ✓ |

| Common name | Scientific name | Biosis survey 2012 | GHD survey 2012 | |
|---|---|---|---|---|
| | | | Targeted survey | Incidental |
| (scat) | | | | |
| Fallow Deer | *Dama dama** | ✓ | | |
| Fox | *Vulpes vulpes** | ✓ | | |
| Freetail bat | *Mormopterus sp. 3* | ✓ | | |
| Goat (feral) | *Capra hircus** | ✓ | | ✓ |
| Gould's Wattled Bat | *Chalinolobus gouldii* | ✓ | | |
| Greater Glider | *Petauroides volans* | ✓ | | |
| Hare | *Lepus capensis* | ✓ | | |
| House Mouse | *Mus musculus** | ✓ | | |
| **Large-eared Pied Bat** | ***Chalinolobus dwyeri*** | Definite | | |
| Large Forest Bat | *Vespadelus darlingtoni* | ✓ | | |
| Little Broad-nosed Bat | *Scotorepens greyii* | ✓ | | |
| Little Forest Bat | *Vespadelus vulturnus* | ✓ | ✓ | |
| Long-eared bat | *Nyctophilus* sp. | ✓ | | |
| Rabbit (scat) | *Oryctolagus cuniculus** | ✓ | | ✓ |
| Red Fox | *Vulpes vulpes** | ✓ | ✓ | |
| Red-necked Wallaby | *Macropus rufogriseus* | ✓ | | ✓ |
| Short-beaked Echidna | *Tachyglossus aculeatus* | | ✓ | |
| Southern Freetail Bat | *Mormopterus* species 4 | ✓ | | |
| **Southern Myotis** | ***Myotis macropus*** | Possible | | |
| Swamp Wallaby | *Wallabia bicolor* | ✓ | | |
| White-striped Freetail Bat | *Tadarida australis* | ✓ | ✓ | |
| Wild Pig | *Sus scrofa** | | | ✓ |
| Yellow-footed Antechinus | *Antechinus flavipes* | ✓ | | |
| ***Reptiles*** | | | | |
| Bearded Dragon | *Pogona barbata* | ✓ | | |
| Copper-tailed Skink | *Ctenotus taeniolatus* | ✓ | | |
| Cunningham's Skink | *Egernia cunninghami* | ✓ | | |
| Eastern Blue-tongue | *Tiliqua scincoides scincoides* | | | ✓ |
| Eastern Brown Snake | *Pseudonaja textilis* | ✓ | | ✓ |

| Common name | Scientific name | Biosis survey 2012 | GHD survey 2012 | |
|---|---|---|---|---|
| | | | Targeted survey | Incidental |
| Eastern Water Dragon | *Physignathus lesueurii* | ✓ | | |
| Garden Skink | *Lampropholis guichenoti* | ✓ | | |
| Jacky Lizard | *Amphibolurus muricatus* | | | ✓ |
| Lace Monitor | *Varanus varius* | ✓ | | |
| Nobbi Dragon | *Amphibolurus nobbi coggeri* | ✓ | | ✓ |
| Red-bellied Black Snake | *Pseudechis porphyriacus* | ✓ | | |
| Shingleback | *Trachydosaurus rugosus* | ✓ | | |
| ***Amphibians*** | | | | |
| Common Eastern Froglet | *Crinia signifera* | ✓ | ✓ | |
| Eastern Banjo Frog | *Limnodynastes dumerilii* | ✓ | | |
| Eastern Sign-bearing Froglet | *Crinia parinsignifera* | | | ✓ |
| Peron's Tree Frog | *Litoria peronii* | ✓ | | |
| Smooth Toadlet | *Uperoleia laevigata* | ✓ | | |
| Spotted Marsh Frog | *Limnodynastes tasmaniensis* | ✓ | ✓ | |
| Stoney Creek Frog | *Litoria wilcoxii* | ✓ | | |
| Verreaux's Frog | *Litoria verreauxii* | ✓ | | ✓ |

# Appendix C NSW Part 3A assessments of significance

### *White Box Yellow Box Blakely's Red Gum Woodland (Box-Gum Woodland)*

**i) How is the project likely to affect the lifecycle of a threatened species and/or population?**

**a) displaces or disturbs threatened species and/or populations**

**b) disrupts breeding cycle**

**c) disturbs the dormancy period**

**d) disrupts roosting behaviour**

**e) changes foraging behaviour**

**f) disrupts pollination cycle**

**g) disturbs seedbanks**

**h) disrupts recruitment (i.e. germination and establishment of plants);**

**i) i) affects the interaction between threatened species and other species in the community (e.g.. Pollinators, host species, microrrhizal associations); and j) affects migration and dispersal ability**

N/A to the assessment of this EEC.

**ii) How is the project likely to affect the habitat of a threatened species, population or ecological community?**

**a) disturbs any permanent, semi-permanent or ephemeral water bodies**

Construction of the final pipeline may remove riparian and in-stream vegetation and interrupt flow within a number of water bodies with the magnitude of impacts dependent upon construction techniques at specific waterway crossings as outlined in the EA (2012). There are no water bodies within the 4.42 hectares of Box-Gum Woodland that would be directly affected by construction. Further, this community is not dependent upon any habitat resources that may be affected by construction impacts on water bodies. Therefore impacts of the project on water bodies would have a negligible effect on Box-gum Woodland.

**b) degrades soil quality**

Soil quality along the proposed pipeline alignment would be initially degraded through disturbance of topsoil by earthworks and removal of vegetation. This would affect 4.42 hectares of Box-Gum Woodland within the study area. Standard mitigation measures that would be employed during construction, including sediment control and the retention and re-spreading of topsoil, are likely to avoid negative effects on adjacent areas of the community

**c) clears or modifies native vegetation**

The project would permanently remove 4.42 hectares of Box-Gum Woodland within the study area. The project would also remove a further 6.51 hectares of other native vegetation communities which may support component species of Box-Gum Woodland. This magnitude of clearing is unlikely to have a significant negative effect on the community due to the relatively small proportion (three per cent) of the community to be removed in a study area that contains about 127.76 hectares of the community.

Standard mitigation measures within the remainder of the construction corridor, including sediment control and weed management are likely to avoid the modification of any additional areas of the EEC or other native vegetation.

**d) introduces weeds, vermin or feral species or provides conditions for them to increase and/or spread**

The majority of the proposed pipeline corridor occurs through grazed agricultural land containing high levels of weeds such as pasture grasses, herbaceous and woody weeds and contains a number of noxious weeds. Fragmented small stands of remnant Box-Gum Woodland within the pipeline corridor featured moderate weed infestation. Moderate to severe infestations of weeds occurred around the margins of woodland patches adjoining disturbed or cleared land.

The proposed activity would involve the permanent removal of about 4.42 hectares of native vegetation consistent with Box-Gum Woodland, to be permanently maintained as a cleared easement. It is likely that weed infestation would increase within the maintained area of easement, as well as the potential for some weed invasion through edge effects on adjacent areas of vegetation. Standard environmental management measures would mitigate the risk of weed invasion to a degree.

Given the limited direct disturbance footprint, proposed mitigation and the degree of existing weed infestation in the EEC and adjoining areas, the project would make a minor contribution to the negative effect of exotic species.

**e) removes or disturbs key habitat features such as trees with hollows, caves and rock crevices, foraging habitat**

N/A for EEC assessment

**f) affects natural revegetation and recolonisation of existing species following disturbance**

Clearing of Box-Gum Woodland for the proposed pipeline will occur as a variable six to 10 metre wide strip. This strip is to be permanently maintained free of canopy and mid-storey vegetation and will not be allowed to regenerate naturally. Pollination and seed dispersal of the majority of plant species within this EEC is likely to continue across this gap. Similarly, the majority of fauna species would readily traverse such a gap in habitat. Natural revegetation and recruitment taking place within adjacent areas of this EEC are likely to remain unaffected by the proposed works, apart from short term changes along the disturbance edge, where increased light and exposure to wind and water loss may alter regeneration in the short to medium term

**iii) Does the project affect any threatened species or populations that are at the limit of its known distribution?**

N/A for EEC assessment

**iv) How is the proposal likely to affect current disturbance regimes?**

**a) modifies the intensity and frequency of fires**

The project is not predicted to directly affect the intensity and frequency of fires in a significant way. However, the proposed clearing would potentially offer a broader firebreak across the landscape between larger remnant patches of vegetation in some areas, which may act as a fire break in the event of a localised fire event

**b) modifies flooding flows**

Box-Gum Woodland is not ecologically dependent upon flooding flows. Secondary impacts resulting from changes to flooding flows are also unlikely given the following considerations: waterway crossing are to be designed such that they will not significantly alter the flow of any waterway from existing

regimes (GHD 2012); environmental management measures would mitigate the impacts of temporary removal of vegetation during construction; and permanent modification of vegetation is likely to have a minor impact on flood regimes given the limited disturbance footprint and extent of existing clearing in the pipeline corridor.

**v) How is the project likely to affect habitat connectivity?**

**a) creates a barrier to fauna movement**

Clearing of Box-Gum Woodland for the proposed pipeline will occur as a variable six to 10 metre wide strip. The majority of component fauna species within this EEC are likely to readily traverse such a gap in habitat.

**b) removes remnant vegetation or wildlife corridors**

The proposed construction would permanently remove approximately 4.42 hectares of remnant native vegetation consistent with Box-Gum Woodland and convert it to a variable six to 10 metre wide strip of derived grassland. This magnitude of clearing would not completely remove or significantly interrupt a wildlife corridor. There are an additional 127.76 hectares of woodland conforming to the definition of this community in the study area that form part of 690.81 hectares of remnant native vegetation in the study area. Where possible the pipeline alignment has been designed to traverse cleared land and to minimise the removal of native vegetation.

The Mullion Range State Conservation Area exists to the west of the project site and forms part of a vegetation corridor running east to west through the study area. Due to the design of the pipeline alignment in predominantly cleared areas and the rehabilitation of the construction corridor to grassland, corridors are unlikely to be removed by the project.

**c) modifies remnant vegetation or wildlife corridors**

The proposed construction would modify or temporarily disturb 10.1 hectares of remnant native vegetation within the construction corridor. There are an additional 690.81 hectares of native vegetation occurring in the study area. Clearing of Box-Gum Woodland for the proposed pipeline will occur as a variable six to 10 metre wide strip. This strip is to be permanently maintained free of canopy and mid-storey vegetation and will not be allowed to regenerate naturally. Pollination and seed dispersal of the majority of component plant species within this EEC is likely to continue across this gap. Similarly, the majority of fauna species would readily traverse such a gap in habitat. There would be a minor effect on natural revegetation and recruitment taking place within adjacent areas of this EEC along the disturbance edge, where increased light and exposure to wind and water loss may alter regeneration in the short to medium term.

Overall this would comprise a minor effect on the local population of the EEC and on remnant native vegetation and wildlife corridors in surrounding areas

**vi) How is the project likely to affect habitat connectivity?**

There is no listed critical habitat for Box-Gum Woodland or of relevance to this assessment.

**Conclusion – Box Gum Woodland**

Negative impacts arising from the project will directly affect 4.42 hectares of Box-gum Woodland, comprising about three per cent of the community in the study area. The disturbance footprint would be restricted to a variable six to 10 metre wide strip through the EEC and adjoining areas of native vegetation and would not significantly fragment or isolate any areas of habitat for the EEC or component species. Standard environmental management measures are likely to mitigate against any additional impacts. Therefore the Project is not likely to have a significant negative impact on Box-Gum Woodland.

### *Superb Parrot*

**i) How is the project likely to affect the lifecycle of a threatened species and/or population?**

**a) displaces or disturbs threatened species and/or populations**

The Superb Parrot was not recorded during field surveys for MR5a or previous surveys for the EA despite surveys being conducted during appropriate survey periods over three seasons (spring, summer and autumn). A search of the NSW Wildlife Atlas for records of the species throughout NSW identified that records are concentrated to the west of the state from Orange, which is on the eastern extent of the species known range, with few records located in the east of the state. The proposed pipeline alignment is located to the west of Orange, with the nearest record of the species over three kilometres south-west of the southern section of the alignment. No records occur within the MR5a section of the alignment, which contains potential foraging habitat for this species.

It is unlikely that the study area provides important breeding or foraging habitat for the species given the lack of records within the study area, however the proposed construction may disturb or displace individuals if they are within or near the disturbance area. This disturbance would only likely affect a small proportion of the population of Superb Parrots given the project would remove 11.43 hectares of suitable habitat within a study area that contains 690.81 hectares of similar or higher quality woodland habitat. This is a relatively small proportion (one per cent) of potential habitat for the Superb Parrot in the study area with high quality habitat available in other parts of the study area and outside the study area, such as the Box-Gum Woodland within the northern section of the alignment.

**b) disrupts breeding cycle**

Superb Parrots breed in Box-Gum Woodland in the hollows of large trees and may use the study area for breeding due to the presence of suitable hollow-bearing trees. The project would remove 128 hollow-bearing trees along a 40 kilometre linear length. The removal of these trees has the potential to disrupt the breeding cycle of the Superb Parrot; however there are large areas of potential breeding habitat in other parts of the study area and locality, which would provide alternative habitat for the species, including over 120 hollow-bearing to be retained by the project due to the selection of the MR5a route in preference to the route in the EA. This is a reduction in the removal of hollow-bearing trees by almost 50 per cent and the removal of these trees would be unlikely to represent a significant loss of potential breeding habitat. In addition, the study area is unlikely to represent preferred breeding habitat for the species due to the lack of records of the species. There are no breeding records of this species in the subject site or study area.

**c) disturbs the dormancy period**

N/A to the assessment of the Superb Parrot.

**d) disrupts roosting behaviour**

Superb Parrots are not known to exhibit long-term or ecologically important roosting behaviour that could potentially be affected by the project; however the species may use trees in the study area for roosting. The proposed construction may affect some roosting individuals if they are roosting within or near the disturbance area. This disturbance would be short-term, for the duration of the construction period, is only likely to affect a small proportion of individuals and is unlikely to threaten the persistence of the species at the site. The project would remove 11.43 hectares of potential roosting habitat for the species in the study area, with 690.81 hectares of remaining suitable roosting habitat available within the study area.

**e) changes foraging behaviour**

Superb Parrots may forage on the nectar and pollen of trees during periods of flowering and the grassy understorey and shrubs in the study area. The proposed construction may displace or disturb

some individuals if they are foraging within or near the disturbance area. This disturbance would be short-term, for the duration of the construction period and is only likely to affect a small proportion of the population, given the relatively small removal of 11.43 hectares within the 690.81 hectares of potential habitat in the study area. This disturbance is unlikely to threaten the persistence of the species at the site. Some foraging habitat would be permanently removed (refer criteria ii). The species would have to utilise alternative habitat to compensate for this loss of resources. In the context of the approximately 690.81 hectares of alternative habitat in the study area this would comprise a minor impact.

**f) disrupts pollination cycle**

N/A to the assessment of the Superb Parrot.

**g) disturbs seedbanks**

N/A to the assessment of the Superb Parrot.

**h) disrupts recruitment (i.e. germination and establishment of plants);**

N/A to the assessment of the Superb Parrot.

**i) affects the interaction between threatened species and other species in the community (e.g.. pollinators, host species, microrrhizal associations); and**

**j) affects migration and dispersal ability**

N/A to the assessment of the Superb Parrot.

**ii) How is the project likely to affect the habitat of a threatened species, population or ecological community?**

**g) disturbs any permanent, semi-permanent or ephemeral water bodies**

Construction of the final pipeline may remove riparian and in-stream vegetation (mostly River She-oak – *Casuarina cunninghamii*) and interrupt flow within a number of water bodies with the magnitude of impacts dependent upon construction techniques at specific waterway crossings as outlined in the EA (2012). Superb Parrots do not rely on any specific wetland habitat resources that would be removed by the project.

**h) degrades soil quality**

Soil quality along the proposed pipeline corridor would be initially degraded through disturbance of topsoil by earthworks and removal of vegetation. Standard mitigation measures within the construction corridor, including sediment control and the retention and re-spreading of topsoil would be implemented with soil quality unlikely to be affected outside of the immediate surface disturbance area. This magnitude of degradation is unlikely to result in significant negative effects on any habitat or resources for the species. Further, the majority of soil disturbance is situated within agricultural land dominated by introduced species that provide low quality habitat for Superb Parrots.

**i) clears or modifies native vegetation**

The project would permanently remove 11.43 hectares of native vegetation within the construction corridor that may constitute suitable habitat for the Superb Parrot. The project would also temporarily disturb or modify a further 10.1 hectares of native vegetation.

The removal of this vegetation would affect the Superb Parrot life cycle, remove foraging resources and affect dispersal ability by reducing the area of available habitat. These effects are described in the relevant criteria within this assessment.

The proposed clearing or modification of native vegetation is unlikely to have a significant negative effect on the Superb Parrot due to the relatively small proportion of potential habitat to be removed

(one percent) within the 690.81 hectares of suitable available habitat in the study area. In addition, the total habitat to be removed has been reduced by about 6.63 hectares from the amount in the EA.

**j) introduces weeds, vermin or feral species or provides conditions for them to increase and/or spread**

The majority of the proposed pipeline corridor occurs through grazed agricultural land containing high levels of weeds such as pasture grasses, herbaceous and woody weeds and contains a number of noxious weeds. Moderate to severe infestations of weeds occur around the margins of woodland patches adjoining disturbed or cleared land. Areas of native woodland also contain infestations of weed species.

The study area currently contains feral fauna species. The project is unlikely to lead to conditions conducive for their spread as no additional resources would be created for them to utilise.

Superb Parrots may utilise native understorey species for foraging resources so may be disadvantaged by weed infestations. Native vegetation within the study area contains existing weed infestation with disturbed cleared areas generally severely infested with weeds. Provided the safeguards identified in the EA are implemented, the project would not cause the introduction of weeds to any further extent than that which has previously occurred in the study area.

**k) removes or disturbs key habitat features such as trees with hollows, caves and rock crevices, foraging habitat**

The proposal would remove 11.43 hectares of potential foraging, roosting and movement habitat for the Superb Parrot in the study area. This is a small proportion (one per cent) of the available habitat in the study area, which contains 690.81 hectares of native vegetation. The total area of habitat to be removed by the project has been reduced by 6.63 hectares with the alteration of the alignment to include the MR5a route at the northern section; therefore the total habitat removal for the Superb Parrot has been reduced. Superb Parrots are highly mobile and sufficiently capable of traversing the study area to alternative habitat.

The project would remove 128 hollow-bearing trees, which the species may use as potential nesting habitat. This has been reduced by almost 50 per cent, from 250 hollow-bearing trees, with the alteration of the alignment to include MR5a. The retention of these hollow-bearing trees provides the Superb Parrot with additional potential breeding habitat in the study area with addition hollow-bearing trees available in the wider locality. In addition, the species is unlikely to utilise the study area as preferred breeding habitat due to the lack of previous records in the study area and locality.

**l) affects natural revegetation and recolonisation of existing species following disturbance**

Clearing of vegetation for the proposed pipeline will occur as a six to 10 metre wide strip. This strip is to be permanently maintained free of canopy and mid-storey vegetation and will not be allowed to regenerate naturally; however would be rehabilitated to grassland. Superb Parrots are highly mobile and would readily traverse such a gap in habitat and are therefore recolonisation following disturbance is unlikely to be affected by the project.

**iii) Does the project affect any threatened species or populations that are at the limit of its known distribution?**

A search of the NSW Wildlife Atlas revealed a clustering of the species west of Orange with few records of the species to the east of Orange. The species has however been recorded in Orange and the western surrounds, however there are few records to the east of the subject site and study area. The study area is at the eastern range of the species distribution.

**iv) How is the proposal likely to affect current disturbance regimes?**

**c) Modifies the intensity and frequency of fires**

The project is not predicted to directly affect the intensity and frequency of fires in a significant way. However, the proposed clearing would potentially offer a broader firebreak across the landscape between larger remnant patches of vegetation in some areas, which may act as a fire break in the event of a localised fire event

**d) modifies flooding flows**

Secondary impacts resulting from changes to flooding flows are unlikely given the following considerations: waterway crossing are to be designed such that they will not significantly alter the flow of any waterway from existing regimes; environmental management measures would mitigate the impacts of temporary removal of vegetation during construction; and permanent modification of vegetation is likely to have a minor impact on flood regimes given the limited disturbance footprint and extent of existing clearing in the survey corridor.

**v) How is the project likely to affect habitat connectivity?**

**d) creates a barrier to fauna movement**

Clearing of vegetation for the proposed pipeline will occur as a six to 10 metre wide strip. As described above, Superb Parrots are highly mobile and sufficiently cable of traversing this gap in habitat, therefore the project would not create a barrier to movement for the Superb Parrot, which is known to travel up to 10 kilometres for foraging requirements.

**e) removes remnant vegetation or wildlife corridors**

The proposed construction would permanently remove about 12.32 hectares of remnant native vegetation within the construction corridor. There are an additional 690.81 hectares of native vegetation occurring in the study area. Where possible the pipeline alignment has been designed to traverse cleared land and to minimise the removal of native vegetation.

The Mullion Range State Conservation Area exists to the west of the project site and forms part of a vegetation corridor running east to west through the study area. Due to the design of the pipeline alignment in predominantly cleared areas and the rehabilitation of the construction corridor to grassland, corridors are unlikely to be removed by the project. Superb Parrots are sufficiently mobile to traverse any gaps in habitat that would be created by the proposal.

**f) modifies remnant vegetation or wildlife corridors**

The proposed construction would modify or temporarily disturb 10.1 hectares of remnant native vegetation within the construction corridor. There are an additional 690.81 hectares of native vegetation occurring in the study area. Where possible the pipeline alignment has been designed to traverse cleared land and to minimise the removal of native vegetation.

The Mullion Range State Conservation Area exists to the west of the project site and forms part of a vegetation corridor running east to west through the study area. Due to the design of the pipeline alignment in predominantly cleared areas and the rehabilitation of the construction corridor to grassland, corridors are unlikely to be removed by the project. Superb Parrots are sufficiently mobile to traverse any gaps in habitat that would be created by the proposal.

**vi) How is the project likely to affect critical habitat?**

There is no listed critical habitat for Superb Parrots or of relevance to this assessment.

**Conclusion – Superb Parrot**

Negative impacts arising from the project will directly affect 11.43 hectares of potential Superb Parrot habitat, comprising one per cent of the native vegetation in the study area and 128 hollow-bearing trees. Due to the realignment of the pipeline corridor to include MR5a, the total habitat for Superb Parrots to be removed has been decreased by 6.63 hectares with hollow-bearing tree removal

reduced by about 50 per cent. There is an additional 690.81 hectares of native vegetation in the study area that the Superb Parrot may use as potential habitat with the species sufficiently mobile to traverse any gaps in habitat created by the project. In addition, despite surveys at the appropriate time of year over three seasons, this species was not recorded and is known to be at the eastern limit of its distribution in the study area. Standard environmental management measures are likely to mitigate against any additional impacts. Therefore the project is not likely to have a significant negative impact on the Superb Parrot.

### *Varied Sittella*

**i) How is the project likely to affect the lifecycle of a threatened species and/or population?**

**a) displaces or disturbs threatened species and/or populations**

The Varied Sittella was recorded during field surveys for MR5a in eucalypt woodland at the northern end of the alignment. Previous surveys for the EA did not record the species in the study area.

Trees would provide the species with invertebrate foraging resources with preferred rough-barked tree species available in the woodland. The species may also build nests in the branches of trees in the study area.

The proposed construction may disturb or displace individuals if they are within or near the disturbance area. This disturbance would only likely affect a small proportion of the population of Varied Sittellas given the project would remove 11.44 hectares of suitable woodland habitat within the study area that contains 690.81 hectares of similar or higher quality woodland habitat. This is a relatively small proportion (one percent) of potential habitat for the Varied Sittella in the study area with high quality habitat available in other parts of the study area and outside the study area, such as the Box-Gum Woodland within the northern MR5a section of the alignment and the Mullion Range State Conservation Area, which is within the locality of the project and over 1000 hectares in size.

**b) disrupts breeding cycle**

Varied Sittellas breed in the forks of trees, high in the living canopy. They often reuse the same tree fork in successive years and given that surveys identified the species in the study area, it is likely that the species may be breeding in the trees in the woodland. The project would remove about 11.44 hectares of trees from the study area. The removal of these trees has the potential to disrupt the breeding cycle of the Varied Sittella; however there are large areas of potential breeding habitat in other parts of the study area and locality, which would provide alternative habitat for the species, including 690.81 hectares of additional woodland vegetation in the study area. The removal of trees has been reduced by 6.62 hectares from the route specified in the EA, with the removal of trees unlikely to represent a significant loss of potential breeding habitat.

**c) disturbs the dormancy period**

N/A to the assessment of the Superb Parrot.

**d) disrupts roosting behaviour**

Varied Sittellas are not known to exhibit long-term or ecologically important roosting behaviour that could potentially be affected by the project; however the species may use trees in the study area for roosting. The proposed construction may affect some roosting individuals if they are roosting within or near the disturbance area. This disturbance would be short-term, for the duration of the construction period, is only likely to affect a small proportion of individuals and is unlikely to threaten the persistence of the species at the site. The project would remove 11.44 hectares of potential roosting habitat for the species in the study area, with 690.81 hectares of remaining suitable roosting habitat available within the study area.

**e) changes foraging behaviour**

Varied Sittellas may forage on invertebrates gleaned from trees in the study area. The proposed construction may displace or disturb some individuals if they are foraging within or near the disturbance area. This disturbance would be short-term, for the duration of the construction period and is only likely to affect a small proportion of the population, given the relatively small removal of 11.44 hectares within the 690.81 hectares of potential habitat in the study area. This disturbance is unlikely to threaten the persistence of the species at the site. Some foraging habitat would be permanently removed (refer Criteria ii). The species would have to utilise alternative habitat to compensate for this loss of resources. In the context of the approximately 690.81 hectares of alternative habitat in the study area, of which only one percent would be removed, this would comprise a minor impact.

**f) disrupts pollination cycle**

N/A to the assessment of the Varied Sittella.

**g) disturbs seedbanks**

N/A to the assessment of the Varied Sittella.

**h) disrupts recruitment (i.e. germination and establishment of plants);**

N/A to the assessment of the Varied Sittella.

**i) affects the interaction between threatened species and other species in the community (e.g.. Pollinators, host species, microrrhizal associations); and j) affects migration and dispersal ability**

N/A to the assessment of the Varied Sittella.

**ii) How is the project likely to affect the habitat of a threatened species, population or ecological community?**

**a) disturbs any permanent, semi-permanent or ephemeral water bodies**

Construction of the final pipeline may remove riparian and in-stream vegetation and interrupt flow within a number of water bodies with the magnitude of impacts dependent upon construction techniques at specific waterway crossings as outlined in the EA (2012). Varied Sittellas do not rely on any specific wetland habitat resources that would be removed by the project.

**b) degrades soil quality**

Soil quality along the proposed pipeline corridor would be initially degraded through disturbance of topsoil by earthworks and removal of vegetation. Standard mitigation measures within the construction corridor, including sediment control and the retention and re-spreading of topsoil would be implemented with soil quality unlikely to be affected outside of the immediate surface disturbance area. This magnitude of degradation is unlikely to result in significant negative effects on any habitat or resources for the species. Further, the majority of soil disturbance is situated within agricultural land dominated by introduced species and not woodland vegetation that the species is likely to inhabit.

**c) clears or modifies native vegetation**

The project would permanently remove 11.44 hectares of native woodland vegetation within the construction corridor that may constitute suitable habitat for the Varied Sittella. The removal of this vegetation would affect the Varied Sittella life cycle, remove foraging resources and affect dispersal ability by reducing the area of available habitat. These effects are described in the relevant Criteria within this assessment.

The proposed clearing or modification of native vegetation is unlikely to have a significant negative effect on the Varied Sittella due to the relatively small proportion of potential habitat to be removed

(one percent) within the 690.81 hectares of suitable available habitat in the study area. In addition, the total woodland habitat to be removed has been reduced by 6.62 hectares from the amount in the EA.

**d) introduces weeds, vermin or feral species or provides conditions for them to increase and/or spread**

The majority of the proposed pipeline corridor occurs through grazed agricultural land containing high levels of weeds such as pasture grasses, herbaceous and woody weeds, and contains a number of noxious weeds. Moderate to severe infestations of weeds occur around the margins of woodland patches adjoining disturbed or cleared land. Areas of native woodland also contain infestations of weed species.

The study area currently contains several feral fauna species. The project is unlikely to lead to conditions conducive for their spread as no additional resources would be created for them to utilise.

Varied Sittellas forage in the canopy and branches of trees and so are unlikely to be disadvantaged by weed infestations. Native vegetation within the study area contains existing weed infestation with disturbed cleared areas generally severely infested with weeds. Provided the safeguards identified in the EA are implemented, the project would not cause the introduction of weeds to any further extent than that which has previously occurred in the study area.

**e) removes or disturbs key habitat features such as trees with hollows, caves and rock crevices, foraging habitat**

The proposal would remove 11.44 hectares of potential foraging, roosting, breeding and movement habitat for the Varied Sittella in the study area. This is a small proportion (one percent) of the available habitat in the study area, which contains 690.81 hectares of native woodland vegetation. The total area of habitat to be removed by the project has been reduced by 6.62 hectares with the alteration of the alignment to include the MR5a route at the northern section; therefore the total habitat removal for the Varied Sittella has been reduced. Varied Sittellas are a relatively sedentary species and although trees would be removed from the study area, this is unlikely to prevent the species from moving to alternative habitat. The construction corridor is a relatively minor six to 10 metres wide for the majority of its length; a distance the species is capable of traversing.

The project would remove 128 hollow-bearing trees, which the species may use to build their nests in, although they would not utilise hollows but the branches and forks of the trees. This has been reduced by almost 50 percent, from 250 hollow-bearing trees, with the alteration of the alignment to include MR5a. The retention of these trees provides the Varied Sittella with additional potential habitat in the study area.

**f) affects natural revegetation and recolonisation of existing species following disturbance**

Clearing of vegetation for the proposed pipeline will occur as a six to 10 metre wide strip. This strip is to be permanently maintained free of canopy and mid-storey vegetation and will not be allowed to regenerate naturally; however would be rehabilitated to grassland. Varied Sittellas are a relatively sedentary species and although trees would be removed for the project, this is unlikely to prevent the species from moving throughout the study area. The construction corridor is a relatively minor six to 10 metres wide for the majority of its length; a distance the species is capable of traversing. Therefore recolonisation following disturbance is unlikely to be affected by the project.

**iii) Does the project affect any threatened species or populations that are at the limit of its known distribution?**

Varied Sittellas inhabit most of mainland Australia except for open grasslands and treeless deserts, which are not found in the study area. The species is known to inhabit the study area and was recorded during MR5a surveys. According to the OEH threatened species database the species is not at or near the limit of its known distribution within the site.

**iv) How is the proposal likely to affect current disturbance regimes?**

**a) Modifies the intensity and frequency of fires**

The project is not predicted to directly affect the intensity and frequency of fires in a significant way. However, the proposed clearing would potentially offer a broader firebreak across the landscape between larger remnant patches of vegetation in some areas, which may act as a fire break in the event of a localised fire event

**b) modifies flooding flows**

Secondary impacts resulting from changes to flooding flows are unlikely given the following considerations: waterway crossing are to be designed such that they will not significantly alter the flow of any waterway from existing regimes; environmental management measures would mitigate the impacts of temporary removal of vegetation during construction; and permanent modification of vegetation is likely to have a minor impact on flood regimes given the limited disturbance footprint and extent of existing clearing in the survey corridor.

**v) How is the project likely to affect habitat connectivity?**

**a) creates a barrier to fauna movement**

Clearing of vegetation for the proposed pipeline will occur as a six to 10 metre wide strip. As described above, Varied Sittellas are a relatively sedentary species and the gap in vegetation created is unlikely to prevent the species from moving throughout the study area, with the species capable of traversing the gap. Therefore the project would not create a barrier to movement for the Varied Sittella.

**b) removes remnant vegetation or wildlife corridors**

The proposed construction would permanently remove about 12.32 hectares of remnant native vegetation within the construction corridor. There are an additional 690.81 hectares of native vegetation occurring in the study area. Where possible the pipeline alignment has been designed to traverse cleared land and to minimise the removal of native vegetation.

The Mullion Range State Conservation Area exists to the west of the project site and forms part of a vegetation corridor running east to west through the study area. Due to the design of the pipeline alignment in predominantly cleared areas and the rehabilitation of the construction corridor to grassland, corridors are unlikely to be removed by the project. Varied Sittellas would be capable of traversing the gap in woodland vegetation created by the project.

**c) modifies remnant vegetation or wildlife corridors**

The proposed construction would modify or temporarily disturb 10.1 hectares of remnant native vegetation within the construction corridor. There are an additional 690.81 hectares of native vegetation occurring in the study area. Where possible the pipeline alignment has been designed to traverse cleared land and to minimise the removal of native vegetation.

The Mullion Range State Conservation Area exists to the west of the project site and forms part of a vegetation corridor running east to west through the study area. Due to the design of the pipeline alignment in predominantly cleared areas and the rehabilitation of the construction corridor to grassland, corridors are unlikely to be removed or significantly modifies by the project. Varied Sittellas would be capable of traversing the gap in woodland vegetation created by the project.

**vi) How is the project likely to affect critical habitat?**

There is no listed critical habitat for Varied Sittellas or of relevance to this assessment.

**Conclusion – Varied Sittella**

Negative impacts arising from the project will directly affect 11.44 hectares of native woodland habitat, comprising one per cent of the native vegetation in the study area and 128 hollow-bearing trees. Due to the realignment of the pipeline corridor to include MR5a, the total habitat for Varied Sittellas to be removed has been decreased by 6.62 hectares with hollow-bearing tree removal reduced by about 50 per cent. There are an additional 690.81 hectares of native vegetation in the study area that the Varied Sittella may use as potential habitat with the species capable of traversing the variable six to 10 metre wide gap in habitat created by the project, despite their sedentary nature. Standard environmental management measures are likely to mitigate against any additional impacts. Therefore the Project is not likely to have a significant negative impact on the Varied Sittella.

# Appendix D EPBC significant impact assessment

***White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Box Gum Grassy Woodland)***

**1) Are there any matters of national environmental significance located in the area of the proposed action?**

The following matters of national environmental significance are known or likely to occur in the area of the proposed action:

- Box-Gum Woodland (Critically Endangered)
- Superb Parrot (*Polytelis swainsonii*) (Vulnerable).

**2) Considering the proposed action at its broadest scope, is there potential for impacts on matters of national environmental significance?**

The proposal would remove 12.32 hectares of remnant native vegetation, including 11.43 hectares of suitable Superb Parrot habitat and 2.79 hectares of Box-Gum Woodland. This would not result in the complete removal of vegetation and habitat resources within the project site with 690.81 hectares of native vegetation available within the study area. Box-Gum Woodland to be removed represents about three percent of the community within the study area.

About 128 hollow-bearing trees would be removed from the project site. The removal of these trees has the potential to affect hollow-dependent fauna in the ecological community.

Trees to be removed provide roosting, movement and foraging habitat for a range of fauna species.

The proposal would remove groundcover vegetation and shrubs where the pipeline, powerline and ancillary structures are constructed. This would remove foraging habitat for a range of fauna species.

The proposal would remove woodland that is likely to provide habitat for a matter of national environmental significance, the Superb Parrot and would remove part of the critically endangered ecological community Box-Gum Woodland. The proposal would therefore have impacts on matters of national environmental significance.

**3) Are there any proposed measures to avoid or reduce impacts on matters of national environmental significance?**

Safeguards and mitigation measures have been prepared with the aim of minimising impacts of the proposal on the ecology of the study area including micro-alignments of the pipeline corridor during construction to avoid removal of trees where practicable.

Other safeguards to minimise potential impacts on matters of national environmental significance are detailed in Section 6 of the EA (Biosis 2012).

**4) Are any impacts of the proposed action on matters of national environmental significance likely to be significant impacts?**

**Ecological communities – Box-Gum Woodland**

**An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:**

- **reduce the extent of an ecological community**

Construction of the final pipeline will reduce the extent of Box-Gum Woodland by 2.79 hectares within the study area, which contains 43.31 hectares of the community that is known to conform to the definition of the EPBC Act listed community. This is a reduction in the removal of the community from the amount in the EA by 2.58 hectares. Clearing within the community would occur as a variable six to 10 metre wide strip with groundcover within the pipeline corridor consisting of rehabilitated grassland following construction.

Standard environmental management measures are likely to mitigate against any additional impacts. Therefore the extent of the EEC is not likely to decline further through any secondary effects.

- **fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines**

Construction of the final pipeline will involve the clearing of 2.79 hectares of Box-Gum Woodland comprising a variable six to 10 metre wide strip through the EEC and adjoining areas of native vegetation. This strip is to be permanently maintained free of canopy and mid-storey vegetation, however will rehabilitated to grassland following construction. Pollination and seed dispersal of the majority of component plant species within this EEC is likely to continue across this gap. Similarly, the majority of fauna species would readily traverse such a gap in habitat. There would be a minor effect on natural revegetation and recruitment taking place within adjacent areas of this EEC along the disturbance edge, where increased light and exposure to wind and water loss may alter regeneration in the short to medium term. Overall this would comprise a minor effect on the local population of the EEC and on remnant native vegetation and would not significantly fragment any areas of habitat for the EEC or component species.

- **adversely affect habitat critical to the survival of an ecological community**

Direct negative impacts arising from the project will directly affect 2.79 hectares of Box-Gum Woodland within the study area, which contains 43.31 hectares of the community that is known to conform to the definition of the EPBC Act listed community. The disturbance footprint would be restricted to a variable six to 10 metre wide strip through the EEC and adjoining areas of native vegetation and would not significantly fragment or isolate any areas of habitat for the EEC or component species. Standard environmental management measures are likely to mitigate against any additional impacts. Therefore the total area of habitat to be affected by the project is highly unlikely to be critical to the survival of the ecological community.

- **modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns**

Soil quality along the proposed pipeline corridor would be initially degraded through disturbance of topsoil by earthworks and removal of vegetation. This would affect the 2.79 hectares of Box-Gum Woodland within the study area. Standard mitigation measures employed during consturction, including sediment control and the retention and re-spreading of topsoil are likely to avoid negative effects on adjacent areas of the community.

Secondary impacts resulting from changes to surface or groundwater flows are unlikely. The final pipeline design has been developed to avoid impacts on groundwater flows and waterway crossing have been designed such that they will not significantly alter the flow of any waterway from existing regimes. Environmental management measures would mitigate the impacts of temporary removal of vegetation during construction; and permanent modification of vegetation is likely to have a minor impact on either surface water flows or groundwater levels given the limited disturbance footprint and extent of existing clearing in the survey corridor.

- **cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting**

The project would directly affect component species of the community within the 2.79 hectares of Box-Gum Woodland to be removed. Impacts would be limited to a variable six to 10 metre wide strip, which is highly unlikely to contain an ecologically significant proportion of the population of any functionally important species. The project would not permanently modify the natural environment in any way that would affect the species composition of the community beyond the immediate disturbance footprint.

- **cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:**

  **-- assisting invasive species, that are harmful to the listed ecological community, to become established**

The majority of the proposed pipeline corridor occurs through grazed agricultural land containing high levels of weeds such as pasture grasses, herbaceous and woody weeds and contains a number of noxious weeds. Fragmented small stands of remnant Box-Gum Woodland within the survey corridor featured moderate weed infestation. Moderate to severe infestations of weeds occur around the margins of woodland patches adjoining disturbed or cleared land.

The proposed activity would involve the permanent removal of about 2.79 hectares of native vegetation consistent with EPBC Act listed Box-Gum Woodland, to be permanently maintained as a cleared easement with rehabilitated grassland. It is likely that weed infestation would increase within the maintained area of easement, as well as the potential for some weed invasion through edge effects on adjacent areas of vegetation. Standard environmental management measures would mitigate the risk of weed invasion to a degree.

Given the limited direct disturbance footprint, proposed mitigation and the degree of existing weed infestation in the EEC and adjoining areas; the project would make a minor contribution to the negative effect of exotic species.

**-- causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community**

Standard environmental management measures would substantially reduce the risk of the mobilisation of fuel or any other pollutants during the construction period. The project does not involve the storage or transport of any pollutants through its operational life.

- **interfere with the recovery of an ecological community.**

There is a draft national recovery plan for White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland. Strategy two of the recovery plan aims to 'Increase protection of Box-Gum Grassy Woodland'.

The proposal is not consistent with this strategy. It would have direct impacts on an area of Box-Gum Woodland by the removal of mature trees and groundcover vegetation from within the community.

In addition, the OEH (2012) Threatened Species website identifies a number of actions that need to occur to recover the community, which are relevant to the proposal:

- Leave fallen timber on the ground;
- Encourage regeneration by undertaking supplementary planting;
- Erect on-site markers to alert people to the presence of a high quality remnant or population of a threatened species;
- Undertake weed control (taking care to spray or dig out only target species);
- Protect all sites from further clearing and disturbance; and

- Ensure remnants remain connected or linked to each other; in cases where remnants have lost connective links, re-establish them by revegetating sites to act as stepping stones for fauna, and flora (pollen and seed dispersal).

The proposal would conflict with the recommended recovery actions due to the requirement for removing vegetation within the Box-Gum Woodland ecological community; however the proposed removal of woodland is only a relatively small amount (a maximum of six percent) of the total amount of the community in the study area.

The proposal would also conflict with the recovery actions by contributing to the existing fragmentation of the woodland through the removal of vegetation from the easement and increasing the existing gaps in the vegetation. As discussed above, this is unlikely to be significant.

***Conclusion – Box Gum Grassy Woodland***

The proposal is unlikely to have a significant impact on the critically endangered Box-Gum Woodland community.

### *Superb Parrot*

**An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:**

- **Lead to a long-term decrease in the size of an important population of a species;**

The Box-Gum Woodland in the study area provides potential habitat for the Superb Parrot. No important populations of the species have been identified. There are no separate or distinct populations of the Superb Parrot. All individuals of the species are treated as one population.

The trees, shrubs and groundcover vegetation in the study area provide potential foraging and movement habitat for the Superb Parrot. Hollow-bearing trees in the study area may also provide nesting and breeding habitat for the Superb Parrot, which breeds in Box-Gum Woodland.

Habitat would be removed as described in 2) above.

The proposal would remove 128 hollow-bearing trees, which provide potential breeding habitat for the Superb Parrot. The removal of 11.43 hectares of Box-Gum Woodland would result in a long term (i.e. >100 year) loss of future hollow-bearing trees for this species in the study area. However there are variable ages and stages of recruitment of keystone canopy species occurring in the study area and locality. In addition, the realignment of the pipeline corridor to include MR5a has resulted in the retention of over 120 hollow-bearing trees in the study area that would otherwise have been removed by the project. These trees provide alternative potential breeding resources for the species in the study area.

The proposed removal of woodland may reduce the amount of foraging habitat for Superb Parrots in the study area through the removal of trees, shrubs and groundcover vegetation. The proposal would remove 11.43 hectares of native woodland in the study area, of which 8.94 hectares is suitable Box-Gum Woodland habitat for the species. Groundcover vegetation to be removed is unlikely to provide quality foraging habitat for the species due to its generally degraded and introduced nature.

The proposal would remove a relatively small amount of suitable Box-Gum Woodland habitat for the species (7 per cent), compared to that which is present in the study area. Due to the mobility and relatively large range of Superb Parrots, it is unlikely that the proposal would lead to a long-term decrease in the size of a population of the species.

- **Reduce the area of occupancy of an important population;**

The proposal would not remove areas of habitat to the extent that habitat would be entirely eliminated from the study area. The areas of habitat to be removed are relatively small in relation to the areas of

surrounding habitat in the study area and locality. The proposal would not therefore reduce the area of occupancy of an important population of the Superb Parrot.

- **Fragment an existing important population into two or more populations;**

Fragmentation of the vegetation in the locality has previously occurred through the development of surrounding areas for agriculture, residential expansion, and through the construction of other linear infrastructure (such as roads and power lines). Although these developments have created barriers to movement for some fauna species, they are unlikely to prevent the Superb Parrot from using the study area. This species has been recorded previously in and adjacent to the residential areas of Orange.

The woodland in the study area forms part of a vegetation corridor running east-west between the Mullion Range State Conservation Area and Winburndale Nature Reserve. Vegetation in the study area is also patchily connected to vegetation within Kinross State Forest to the south. The woodland in the study area may facilitate the movement of Superb Parrots.

The removal of vegetation would increase fragmentation in the study area, particularly where the construction corridor traverses woodland habitat, further increasing the gaps in vegetation that the species may use for movement, roosting, foraging and breeding.

Due to the mobility of the Superb Parrot and their large ranges, the proposal is unlikely to create any significant barriers to movement for this species.

The proposal would not therefore fragment a population of this species into two or more populations.

- **Adversely affect habitat critical to the survival of a species;**

Box-Gum Woodland is important to the survival of the Superb Parrot. The habitat to be removed provides quality woodland habitat for this species where it exists as remnant woodland vegetation that may be used for movement and foraging. Isolated paddock trees to be removed provide stepping stone habitat between patches of remnant vegetation that the species may also utilise. Hollow-bearing trees may be used as breeding habitat by the species.

The amount of habitat for this species proposed to be removed is a relatively small proportion of the potential habitat for this species in the study area (about 2.3 percent). High quality habitat for this species is present in other parts of the study area and outside the study area. Given the mobility of this species, it is unlikely that the relatively small area of habitat to be removed would be important to the Superb Parrot.

The project is therefore unlikely to adversely affect habitat critical to the survival of the Superb Parrot.

- **Disrupt the breeding cycle of an important population;**

Superb Parrots in locality are likely to breed in Box-Gum Woodland habitats. Breeding habitat for the Superb Parrot is therefore present within the study area.

The project would remove 128 hollow-bearing trees from the construction corridor. The removal of 128 hollow-bearing trees is unlikely to substantially affect the life cycle of the Superb Parrot due to their removal being spread over a 40 kilometre linear length and the presence of many more habitat trees in the locality. The realignment of the pipeline corridor to include MR5a has resulted in the retention of over 120 hollow-bearing trees that would otherwise have been removed by the project. These trees provide alternative potential breeding resources for the species in the study area and locality.

Due to the removal of a relatively small amount of potential habitat for the species and the availability of additional breeding resources within and outside the study area, the project is unlikely to disrupt the breeding cycle of the Superb Parrot.

- **Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;**

Habitat for the Superb Parrot would be removed as described in 2) above. The amount of habitat for these species proposed to be removed is a relatively small proportion of the potential habitat for this species in the study area (about 2.3 percent). High quality habitat for this species is present in other parts of the study area and due to the realignment of the pipeline corridor to include MR5a, the total amount of potential breeding habitat to be removed has been reduced by almost 50 percent. Given the mobility of this species, it is unlikely that the relatively small area of habitat to be removed would be important to the Superb Parrot. The proposal would therefore be unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that this species is likely to decline.

- **Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;**

The proposal has the potential to facilitate the introduction and spread of weed species. This could occur through general disturbance from machinery and vehicles, and foot traffic. These conditions could lead to the further spread of invasive species such as Tiger Pear, which is relatively common along the MR5a section of the alignment.

The subject site is currently predominately comprised of introduced weed species. The existing presence of weeds in the study area is likely to have occurred through disturbance created by agricultural practices and residential expansion in the southern section of the alignment. Although most of the project site is already affected by the invasion of introduced weeds mitigation measures would be put in place to reduce their spread, particularly for noxious species.

The Superb Parrot would be unlikely to be directly affected by the spread of introduced weed species in the study area, due to the currently degraded state of the groundcover. Due to the species' large range and mobility, the effects of weed introduction to the study area would be unlikely to significantly affect the species.

- **Introduce disease that may cause the species to decline; or**

Hygiene protocols for vehicles and machinery have been recommended in order to prevent the potential spread of disease. The proposal would therefore be unlikely to introduce disease that may cause the Superb Parrot o to decline.

- **Interfere substantially with the recovery of the species.**

Areas of woodland within the study area are unlikely to be important to the future long-term recovery of the Superb Parrot due to the paucity of records of the species in the study area and the relatively small amount of suitable habitat to be removed by the project (2.3 percent). Therefore the project is unlikely to interfere substantially with the recovery of the species.

***Conclusion – Superb Parrot***

*The proposal is unlikely to have a significant impact on the vulnerable Superb Parrot*

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Document Status

| Rev No. | Author | Reviewer | | Approved for Issue | | |
|---|---|---|---|---|---|---|
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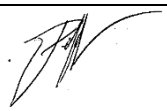
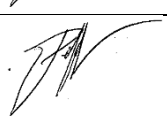
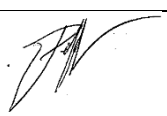
| 1 | M. Cotterill<br>L. Maloney | J. Pepper |  | | | |
| 2 | J Pepper | J Pepper |  | J Pepper |  | 11/02/13 |

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