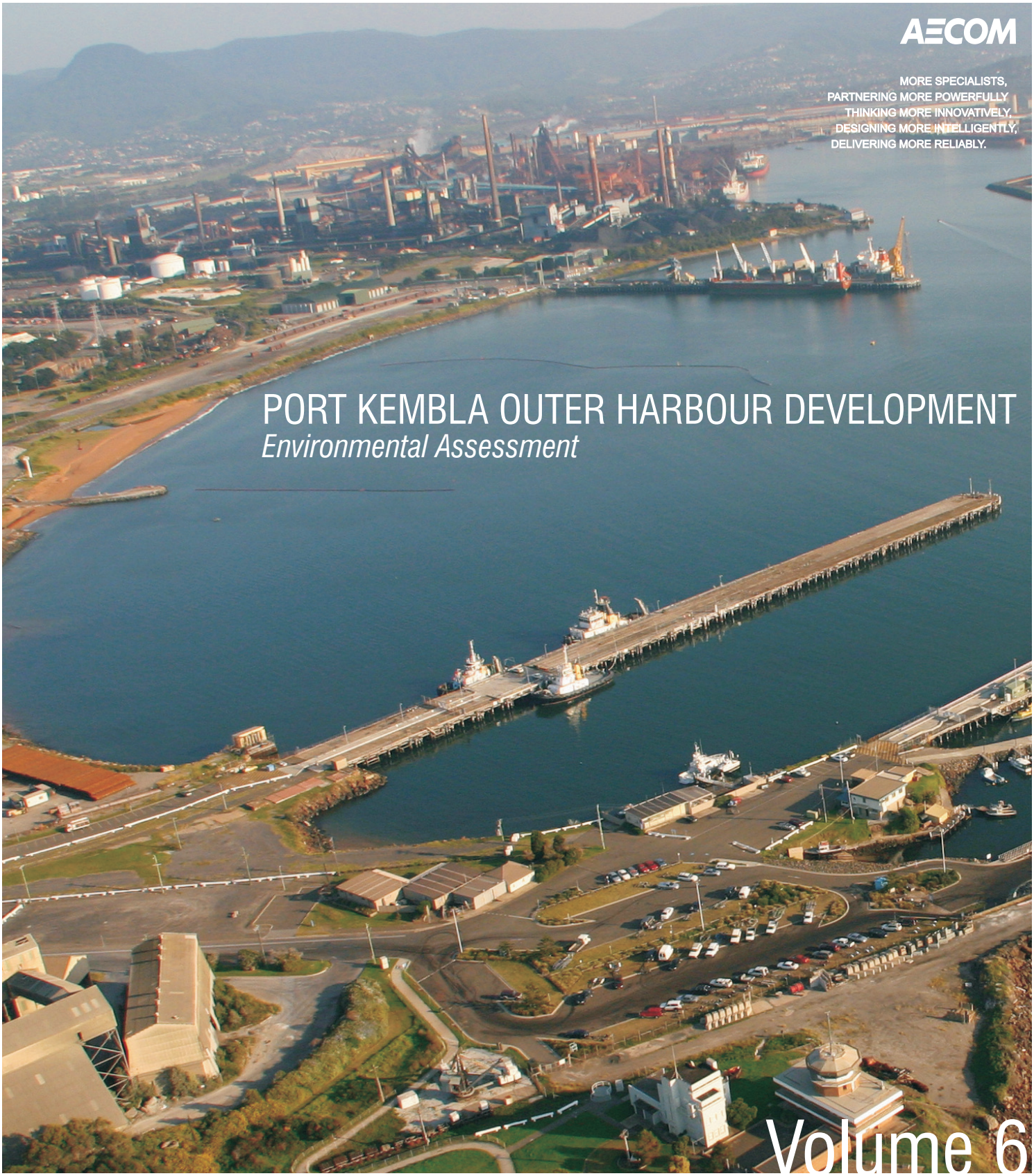


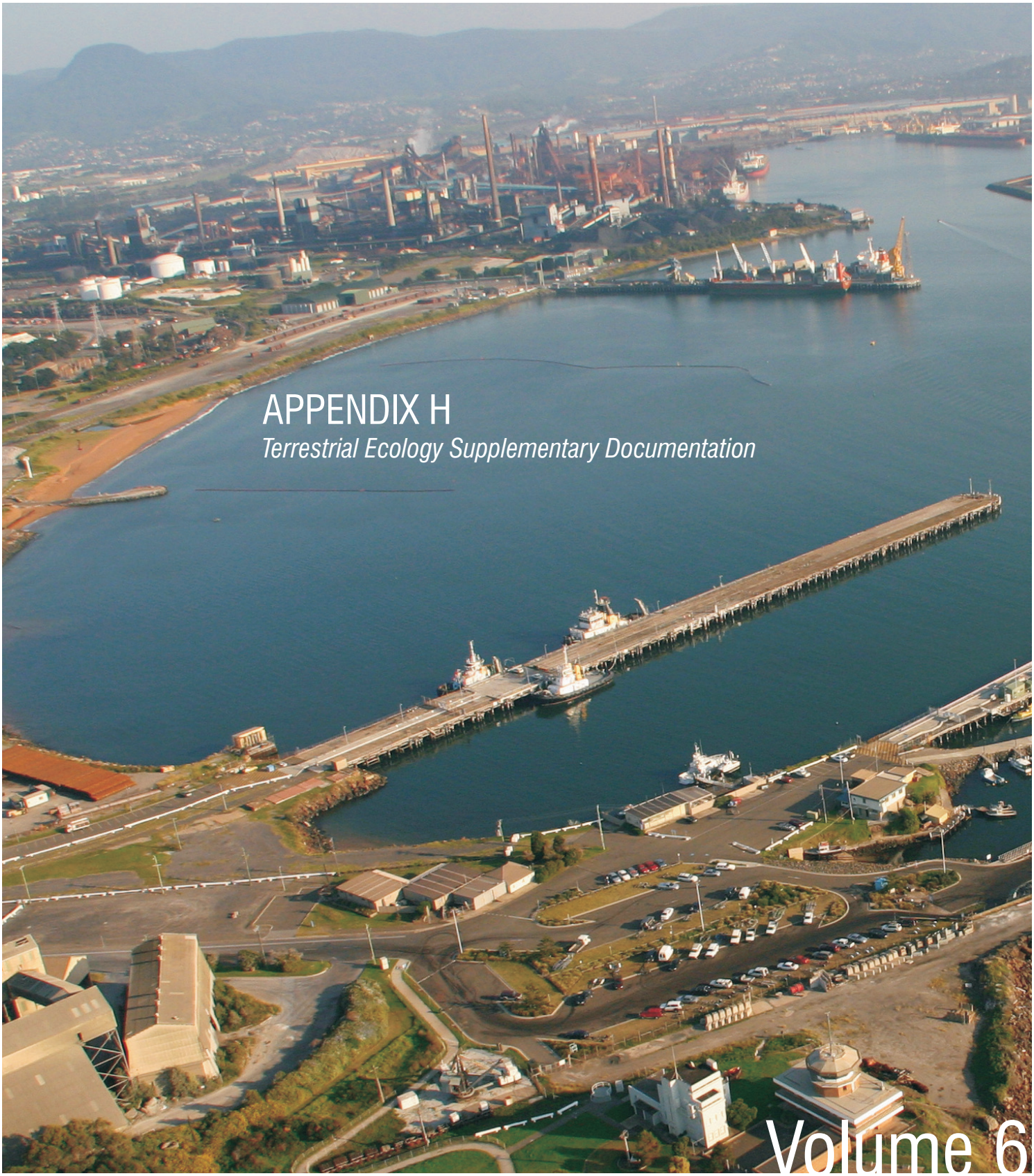

# PORT KEMBLA OUTER HARBOUR DEVELOPMENT

*Appendix H: Terrestrial Ecology Supplementary Documentation*
*Appendix I: Traffic and Transport*
*Appendix J: Noise and Vibration*
*Appendix K: Air Quality*

Prepared for
Port Kembla Port Corporation

March 2010

PORT KEMBLA
PORT CORPORATION



# APPENDIX H

*Terrestrial Ecology Supplementary Documentation*

Volume 6

# Terrestrial Ecology Assessment Supplementary Documentation

The information provided in this section has been prepared to supplement the terrestrial ecology assessment and, as such, should be read in conjunction with the main report.

# 1.0 Threatened Fauna Species

## *1.1* Green and Golden Bell Frog *Litoria aurea*

The Green and Golden Bell Frog (GGBF) *Litoria aurea* is listed as Endangered under the TSC Act and Vulnerable under the EPBC Act.

GGBF often inhabit marshes, dams and stream-sides, particularly those containing Bullrushes (*Typha* spp.) or Spikerushes (*Eleocharis* spp.) which are unshaded, free of predatory fish species such as Plague Minnow *Gambusia holbrooki* , have a grassy area nearby and diurnal sheltering sites available. The species is active by day and tend to forage in areas with low groundcover (Pyke and White 1996; 2001). Some sites, particularly in the greater Sydney region occur in highly disturbed areas.

The species is known to travel considerable distances and is capable of significant migratory movements, of at least 1 km a day (Pyke and White, 2001). Drainage lines are frequently used for these movements.

The species breeds opportunistically and responds to certain types of habitat disturbance that includes changes to water depth, salinity or amounts of aquatic vegetation. The GGBF breeding season is during the spring and summer months (mostly summer) when conditions are warm and wet (Pyke and White, 2001).

The Port Kembla population has been listed as a key population within the Illawarra region (DEC, 2005). Based on population size and area of distribution, this population has consequently been identified as the most significant in the region (Gaia Research, 2008). An assessment of habitat, dispersal corridors and management actions to conserve the Port Kembla Key Population has been undertaken by Gaia Research (2008) on behalf of DECC.

**How is the proposal likely to affect the lifecycle of a threatened species and/or population?**
Gaia Research has identified a number of populations of GGBF in close proximity to the proposed Port Kembla Outer Harbour (PKOH) works. Populations have been recorded within the Brick and Block site, (Site 15) adjacent to Port Kembla Port Corporation (PKPC) rail corridor and the Pacific National rail line near Battery Point. This is the main breeding site for the Port Kembla sub-population. This area will not be affected by the proposed activities associated with the Concept Plan. The area is fenced and monitored regularly thus construction activities are not considered likely to affect the lifecycle of this population.

The old rail corridor at the southern end of the eastern breakwater is known foraging habitat for the GGBF as demonstrated through a series of documented sightings in 2007 and 2008 (Site 18).This area is in close proximity to the proposed access road from Darcy Road to the boat harbour. The proposed mitigation measures are considered sufficient to minimise any disruptions to population movements through this corridor area. Measures proposed include frog exclusion fencing, targeted searches and education programs prior to construction.

Known breeding habitats are not considered likely to be affected by the proposed development. The proposed works are also not considered likely to isolate or fragment habitat areas from potential breeding sites. Hence, it is considered unlikely that the proposed development will have a significant adverse effect on the lifecycle of the species such that a viable local population of this species is likely to be placed at risk of extinction.

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

The Brick and Block site is currently the prime breeding site used by the Port Kembla population (Gaia, 2008). Additional potential GGBF habitat has been identified further upstream of Salty Creek, on the northern side of the rail line between Port Kembla North and Port Kembla Rail Stations (Gaia Research, 2007).

The access road from Darcy Road to the boat harbour will remove potential foraging habitat for the GGBF. Mitigation measures such as retaining and/or enhancing shelter, foraging and movement habitat along this corridor will be investigated further during the detailed design phase in order to avoid the potential loss or fragmentation of foraging habitat at this location.

An extension of the rail yard during Stage 1 of the Concept Plan will require the removal of potential foraging habitat surrounding an artificial concrete-lined drain to allow for a rail siding approximately 120 m in length. The vast majority of the area is currently covered by gravel with minimal vegetation. Only the final few metres of the siding would affect potential GGBF habitat.

The vegetation within this area consists of scattered native shrubs (Acacia sp.) with a weedy understorey. Understorey species include Blackberry, Crofton Weed and exotic grasses such as Kikuyu Grass. Potential habitat exists within South Yard and Port Kembla Railway Stations in the form of wetland areas containing riparian vegetation. *Typha* spp. and *Phragmites* sp. occur where a drainage line enters the area. These areas will not be affected.

The redirection of Salty Creek and Darcy Road Drain through the reclamation area will occur during Stage 1 of the Concept Plan. This may affect potential habitat downstream through impacts on water quality as a result of the proposed works. This is not considered likely to have a significant adverse impact any GGBF population that may be present in these locations as erosion and sediment control measures are proposed to prevent any substantial alteration to current surface water quality.

Drainage lines along the Port Kembla railway line have the potential to function as refuge and/or dispersal areas for GGBF (Gaia Research, 2008). The proposed works will involve reclamation up to the mouth of Salty Creek and Darcy Drain outlets during Stage 1. The vegetation along Salty Creek is dominated by exotic vegetation such as Lantana, Bitou Bush and exotic grasses such as Kikuyu and Couch. Native sedges occur and trees (Acacia sp.) lie along the edges. The vegetation of Darcy Creek is dominated by Acacia trees with an understorey consisting of exotic grasses such as Couch and Kikuyu.

These drainage channels are unlikely to be potential foraging habitat for the GGBF due to the tidal influence and saline environment. Furthermore, they are separated from other potential habitat areas by cleared areas of Foreshore Road and railway lines.

A small portion of potential foraging and shelter habitat may be disturbed amongst the foreshore area adjacent to Old Port Road during Stage 1 of the Concept Plan. This area consists largely of exotic grasses and Bitou Bush. This area is not considered to be suitable or preferred foraging habitat for the

GGBF due to disruptions in the landscape. The use of herbicides to control Bitou Bush along the foreshore also means it is likely to be unsuitable for GGBF.
Dispersal avenues to other areas of potential foraging habitat are interrupted by roads and large areas of industrial land consisting of hard paved areas.

The area of potential foraging habitat likely to be modified by the proposed works is unlikely to be preferred habitat for the GGBF as they are separated from other habitat areas and adequate dispersal avenues are not available.

**Does the proposal affect any threatened species or populations that are at the limit of its known distribution?**
The GGBF former distribution has contracted to only four known locations identified in the draft GGBF Recovery Plan as key populations in the Illawarra Region (DECC, 2007).

These include the following populations:

- Woonona, north of Wollongong
- Dunmore/Killalea, south of Wollongong
- Minnamurra Headland/Springs Creek, near Kiama
- Port Kembla

There are 43 remaining populations of the GGBF known to exist and only 12 of these are within conservation reserves (DEC, 2005). A sub-population of the species is found at North Port Kembla (adjacent to the Outer Harbour) (AECOM, 2008). This is the most well known and considered the most significant population in the Illawarra region (DEC, 2005).

The extent of habitat to be removed or modified by the proposed Outer Harbour development is not considered likely to have a significant negative impact on the Port Kembla population of GGBF.

**How is the proposal likely to affect disturbance regimes?**
Threats identified for the GGBF include:

- Natural predators such as wading birds, snakes and eels.
- Foxes and cats.
- Exotic fish, i.e. the Plague Minnow, eat the larvae.
- Fungal pathogens.
- Changes to water quality and drainage patterns.
- Herbicides

The proposed works are not considered likely to modify the habitats of the study area in such a way as to encourage the establishment of any additional invasive fauna species that may compete with, parasitise or prey upon the GGBF or increase the impact of existing species such as the European Red Fox.

A number of invasive fauna species exist within the study area. Of these species, only the Plague Minnow *Gambusia holbrooki* and the European Red Fox *Vulpes vulpes* are considered to be likely to affect the GGBF. With the use of equipment in wet environments in several locations within the Outer Harbour development area, there is a risk that juvenile Plague Minnow could be spread in wet mud. With the implementation of the proposed mitigation measures, the spread of this species is however unlikely.

The proposed works do have some potential to result in the introduction of invasive exotic plant species and plant diseases that may be detrimental to habitat of the GGBF. With the implementation of the proposed measures to minimise the likelihood of spreading weeds and plant diseases, the likelihood of introducing these species is however considered to be low.

Three constructed ponds at the Brick and Block site (prime breeding site) are monitored and managed regularly. Breeding habitat at this location will not be impacted by the proposed works.

PKPC has constructed a breeding pond for the GGBF within Port Kembla Heritage Park. Low cover vegetation such as Mat-rushes and Flax-Lilly sp. have been planted around the pond to provide shelter and breeding habitat.

Mitigation measures such as the creation of additional habitat areas which are planned as part of the Outer Harbour development will further increase connectivity in the landscape. The creation of habitat will improve connectivity in areas where interruptions occur and will ensure GGBF can relocate and colonise to other areas. Mitigation measures such as retaining and/or enhancing shelter, foraging and movement habitat along the old rail corridor area (near the proposed new access road) will be investigated further during the detailed design phase for Stage 2 of the Concept Plan, in order to avoid the potential loss or fragmentation of foraging habitat at this location.

A Draft Recovery Plan has been prepared for the Green and Golden Bell Frog (DECC, 2005). Currently, a Plan of Management (PoM) for the Port Kembla population has been prepared on behalf of DECC by Gaia Research in accordance with the recommendations and guidelines of the Draft Recovery Plan for the species.

A *Draft GGBF Management Plan* for the protection of populations amongst the proposed works area has been prepared and is for guidance only. A Final *GGBF Management Plan* would be prepared by the proponent prior to works commencing on the site. Responsibilities (of PKPC and other stakeholders) for undertaking action items will be identified and assigned during the preparation of the Final *GGBF Management Plan*.

The current site specific management plans provide recommendations to be adopted to conserve the Port Kembla populations and conform to the recommendations of the Draft Green and Golden Bell Frog Recovery Plan and recommendations provided by Gaia Research.

- Program of works and timeline for all key components of the project
- Undertake a conservation assessment ranking for any known or likely GGBF habitats in the study area, including but not limited to, identification and assessment of breeding, shelter, foraging, and movement habitat components.
- Identify any actual or potential threats from construction and operations
- Identify appropriate actions to prevent or minimise actual or potential threats
- Include details of how the proponent will monitor and report on the ongoing effectiveness of the GGBFMP
- A program of works and timeline for planting and landscaping in appropriate areas with vegetation suitable for GGBF foraging and shelter as well as installing structures (such as logs and concrete pieces) to facilitate movement and over wintering habitat.
- A feasibility assessment of retaining and/or enhancing shelter, foraging and movement habitat or potential breeding habitat along the proposed road corridor off Darcy Road.

It is not likely that the proposed works will significantly impede the recovery of the species given that mitigation measures proposed include securing breeding habitat and increasing foraging and shelter habitat by planting suitable species to increase the amount of thick, low vegetation and the retention of corridor habitats. The creation of additional breeding habitats will increase community awareness and promote protection of this species.

**How is the proposal likely to affect habitat connectivity?**
The relatively small amount of clearing proposed is not likely to lead to an increase in fragmentation of an already highly modified environment. With the implementation of the proposed mitigation measures, habitat connectivity is considered likely to be improved for the Port Kembla populations of GGBF.

**How is the proposal likely to affect critical habitat?**
No critical habitat has been listed for the GGBF.

**Conclusion**
In conclusion, the proposed works will not impact on the lifecycle of the species such that the viable population could be placed at risk of extinction or result in the fragmentation of the known local populations. The area to be disturbed as a result of construction activities is not likely to contain any significant habitat of the GGBF.

No significant fragmentation or isolation of habitat is likely to occur as a result of the proposed action due to the impact being located along the foreshore area and separated from other potential habitat areas by roads, cleared road side areas and industrial land.

Enhancing habitat and providing suitable corridor connections will satisfy habitat requirements for the GGBF by providing dispersal avenues. Therefore, it is not considered likely that the proposed works will have a significant impact on the local population of GGBF.

# 2.0 Endangered Ecological Communities

## 2.1 Coastal Saltmarsh in the NSW North Coast, Sydney Basin and South East Corner Bioregions.

Small fragmented patches of Coastal Saltmarsh were observed along Salty Creek between Old Port Road and the foreshore railway line adjacent to the shoreline. Saltmarsh is present on both sides of the creek as narrow linear bands approximately 0.5 metres in width and varies in patch size and condition, with the majority of patches showing a high level of weed encroachment. The overall extent of the fragmented Saltmarsh is estimated to be approximately 30 square metres.

A few square metres of this vegetation will be removed during Stage 1 of the Concept Plan and habitat for the remaining areas is likely to be modified during the remaining stages of the Concept Plan which may reduce the long-term viability of this patch.

The community primarily consists of *Sarcocornia quinqueflora*, *Paspalum vaginatum*, *Juncus kraussii*, *Suaeda australis* and *Cyperus laevigatus*. There are a number of species that are encroaching into the saltmarsh community including couch (*Cynodon dactylon)* and *Acacia longifolia subsp. sophorae*. Lantana (*Lantana camara*) and Bitou bush (*Chrysanthemoides monilifera*), both noxious weeds, are scattered along the edge of the Coastal Saltmarsh.

### 2.1.1 Lifecycle

The community is highly fragmented and isolated from other areas of Coastal Saltmarsh in the wider Port Kembla area. No further fragmentation or isolation of habitat is likely to occur as a result of the proposed action due to the impact being located at the mouth of Salty Creek on the periphery of the local habitat for the community.

The proposed activity may adversely affect the potential for pollination, seed dispersal and germination of the species which comprise the community due to changes to the hydrology and salinity of salty creek and through changes to average water levels. These changes may favour the proliferation of exotic species which in turn may compete with and displace saltmarsh.

### 2.1.2 Importance of Habitat

The patch of Coastal Saltmarsh community to be affected is considered to be of relatively low quality and conservation significance due to its small size, weed invasion and low species diversity. The small size, linear shape and low species diversity of this patch is considered to limit its potential habitat value for fauna such as wading birds.

Coastal Saltmarsh is found throughout the whole NSW coast in the following bioregions, NSW North Coast, Sydney Basin and South East Corner bioregions and is not at the known limit of its distribution.

The limited in-channel bench width, vertical bank shape and surrounding land-use, limits possible landward migration of the Saltmarsh. Therefore, the medium to long-term viability of this community within this particular location is limited.

### 2.1.3 Threat Abatement

Potential impacts on the coastal saltmarsh can be managed by continued enhancement of larger more viable occurrences in the Port Kembla area. PKPC currently supports Coastal Saltmarsh community groups in more viable patches of saltmarsh north of the proposed Outer Harbour development area and should continue to do so. PKPC has committed to various measures to compensate for the loss of habitat associated with the Port Kembla Outer Harbour development (refer Section 16.4.1).

## 2.2 Conclusion

Due to the limited conservation value of the saltmarsh of the site, potential impacts on Coastal Saltmarsh are unlikely to significantly affect the long-term conservation of this community in wider the Port Kembla locality. The proposed works are not considered to have an adverse affect on any other areas of Coastal Saltmarsh within the locality.

## 2.3 References

Department of Environment and Conservation (NSW) 2007, *Management Plan for the Green and Golden Bell Frog Key Population at Port Kembla.* Department of Environment and Conservation (NSW), Sydney.

Department of Environment and Climate Change NSW (2005) Draft Recovery Plan for the Green and Golden Bell Frog (*Litoria aurea*). DECC NSW, Hurstville, NSW.

Department of Environment and Climate Change–National Parks and Wildlife (2008) website http://www.nationalparks.nsw.gov.au/.

Department of Environment and Climate Change NSW (2008) *Threatened species, communities & ecological communities of NSW*. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile

Gaia Research (2008). Assessment of habitat, dispersal, corridors and management actions to conserve the key population of Green and Golden Bell Frog. Department of Environment and Climate Change (NSW) Sydney.

Pyke, G.H and White, A.W. (1996). Habitat requirements for the Green and Golden Bell Frog *Litoria aurea* (anura:Hylidae). In: Biosphere (2006) Plan of Management Green and Golden Bell Frog North Avoca and Davistown.

Pyke, G.H and White, A.W (2001). A Review of the Biology of Green and Golden Bell Frog (*Litoria aurea*) in Australia and New Zealand. *Australian Zoologist*. **32:** 563-598.

# 1.0 Draft Green and Golden Bell Frog Management Plan

This Draft Green and Golden Bell Frog (GGBF) Management Plan has been prepared to outline actions that could be implemented by PKPC and other stakeholders for the protection of GGBF populations within and around the proposed works areas. This plan is for guidance only and a *Final GGBF Management Plan* would be prepared by the proponent prior to works commencing on the site.

The *GGBF Management Plan* contains 23 actions in four time frames (prior to construction, during construction, after construction, and ongoing). Where action items are not the sole responsibility of PKPC (e.g. during operation), the appropriate stakeholder for implementing the actions will be identified during preparation of the *Final GGBF Management Plan*.

**Table 1: Port Kembla Outer Harbour Development Green and Golden Bell Frog Management Plan**

| Number | Action | Details | Performance indicators | Indicative Costs |
|---|---|---|---|---|
| 1. Actions Prior To Construction | | | | |
| 1.1 | Classify and map PKPC land according to GGBF habitat | Map subject site into the following classes of habitat:<br>GGBF dedicated / preferred habitat<br>GGBF friendly habitat (non-dedicated open space areas and movement corridors)<br>GGBF unfriendly areas<br>GGBF exclusion areas<br>Temporary GGBF exclusion areas (during construction) | | |
| 1.2 | Delineate and (where appropriate) fence known and potential GGBF habitats where there is the potential to be impacted by construction works. | Mark and delineate habitats on the ground to prevent inadvertent construction impacts. | | |
| 1.3 | Install temporary frog exclusion fencing around potential GGBF active areas | Where feasible, install temporary erect fencing (min 600 mm high) around drainage areas and potential foraging habitat areas at the location of the new rail siding and old rail corridor. | | |
| 2. Actions During Construction | | | | |
| 2.1 | Erect erosion and sediment control devices around constructions sites | Provide adequate resources to prevent sediment and pollutants leaving construction sites and entering waterways, including stormwater drains. | | |
| 2.2 | Monitor water quality | Monitor the water quality in the pond at Port Kembla Heritage Park, and in the stormwater drains running through the site to ensure that construction activities do not impact adversely on water quality. Baseline monitoring prior to construction is required. | | |

| Number | Action | Details | Performance indicators | Indicative Costs |
|---|---|---|---|---|
| 2.3 | Undertake active searches (site walkovers) ahead of earthworks that will be undertaken in close proximity to known or potential GGBF habitats | *Prior to and during* construction activities involving disturbance to the ground (e.g. digging, compaction, road construction, removals of concrete slabs, railway sleepers, railway ballast, etc.) active searches (site walkovers) should be undertaken to assess and locate GGBFs and remove them from danger. This will require approval and licensing from DECCW. | | |
| 2.4 | Provide connectivity under new roads | Where feasible, provide culverts or similar under new roads to minimise fragmentation of habitat. | | |
| 2.5 | Minimise incidence of artificial lighting around breeding habitat | Whilst the frogs can tolerate artificial lighting, additional lighting from construction activities may benefit predators such as cats and foxes. A Lighting Management Plan may be implemented to address potential impacts from lighting during construction. | | |
| 2.6 | Incorporate GGBF management into construction site inductions and tool box agendas | Address the purpose, requirements, restrictions and benefits of the management of GGBF to instil pride and sense of ownership and duty in construction workers and contractors. | | |
| 3. Actions After Construction | | | | |
| 3.1 | Provide / augment a mosaic of foraging and sheltering habitat around existing breeding habitat | Planting tufted grasses and sedges (e.g. *Lomandra longifolia*) in clumps in the vicinity of Port Kembla Heritage Park. Placing swales in grassy areas to retain stormwater and provide ephemeral damp foraging habitat. Providing occasional boulder piles for frogs to shelter under, not just around ponds but in wider foraging range. | | |
| 3.2 | Provide habitat features in potential movement corridors | Provide logs or boulder piles, swales and tufted grasses along movement corridors such as railway easements and stormwater drains. | | |
| 4. Actions That Are Ongoing | | | | |
| 4.1 | Implement frog-friendly landscape maintenance techniques in habitat zones | Develop and implement techniques for slashing, weeding and general vegetation management that are frog-friendly. Use of herbicides to be minimised. | | |
| 4.2 | Liaise with DECCW to encourage monitoring projects of GGBF populations | Liaise with DECCW to effectively monitor existing populations. | | |
| 4.4 | Observe Chytrid Fungus hygiene protocols | DECCW has guidelines for minimising the spread of Chytrid Fungus disease between water bodies and frog populations. All land mangers and researchers working with frogs, ponds, or other habitat areas on site must demonstrate and document their compliance with the hygiene protocols. | | |
| 4.5 | Monitor water quality | Monitor the water quality in the pond at Port Kembla Heritage Park, and in the stormwater drains running through the site to ensure that operation activities do not impact adversely on water quality. | | |

| Number | Action | Details | Performance indicators | Indicative Costs |
|---|---|---|---|---|
| 4.6 | Coordinate with owners and managers of adjoining land to improve habitat connectivity | Frogs do not recognise cadastral boundaries, but move across along habitat features. Fewer obstacles to movement will mean greater breeding success for frogs and improve the chances of successful management of the populations known to occur at Port Kembla and in close proximity to the proposed development. | | |
| 4.7 | Liaise with DECCW on impacts from pests on populations of GGBF. | PKPC to seek support from DECCW if implementation and control measures are required.<br>Control of predators through trapping and baiting (under licence from DECCW) will reduce pressure on the population. An initial knockdown and annual follow-up might be sufficient if required, but it would depend in part upon the extent of source populations of these predators in neighbouring lands. | | |
| 4.8 | Incorporate GGBF management into operations site inductions and tool box agendas | Address the purpose, requirements, restrictions and benefits of the management of GGBF to instil pride and sense of ownership and duty in operation workers and contractors. | | |
| 4.9 | Manage rubbish so as not to encourage or support potential predators | Potential predators that might benefit from food scraps include ibis, gulls, rats, cats and foxes. | | |
| 4.10 | Liaise with regional Authorities including DECCW and local government | Ensure that implementation of this management plan is consistent with and recognised as contributing to other GGBF management plans and initiatives applicable to the wider area. | | |
| 4.11 | Encourage and facilitate research | Allow researchers and dedicated community groups reasonable access to land areas for research and monitoring purposes | | |

* Costs and performance indicators will be subject to available funding and resources

**Table 1: EPBC terrestrial species identified as potentially occurring in the area of development**

| Scientific name | Common name | EPBC Status | Reported within 1 km of the site | Potential habitat on site | Justification |
|---|---|---|---|---|---|
| Plants | | | | | |
| Cryptostylis hunteriana | Leafless Tongue-orchid | V | No | No | Typically occurs in woodland dominated by Scribbly Gum, Silvertop Ash, Red Bloodwood and Black Sheoak, preferring open areas of the understorey |
| Cynanchum elegans | White-flowered Wax Plant | E | Yes | No | Inhabits dry rainforest edges |
| Pimelea spicata | | E | No | No | In the coastal Illawarra area, occurs in Coast Banksia open woodland with well developed shrub and grassy understorey |
| Pultenaea aristata | | V | No | No | Inhabits dry sclerophyll woodland or wet heath on sandstone |
| Zieria granulate | Hill Zieria | E | No | No | Inhabits dry ridge tops and rocky outcrops on shallow volcanic soils |
| Amphibians | | | | | |
| Heleioporus australiacus | Giant Burrowing Frog | V | Yes | No | Requires forest on sandstone escarpments and sandy soils |
| Litoria aurea | Green and Golden Bell Frog | V | Yes | Yes | A population exists adjacent to the site |
| Litoria littlejohni | Littlejohn's Tree Frog | V | Yes | No | Requires heath and forest |
| Reptiles | | | | | |
| Chelonia mydas | Green Turtle | V | Yes | No | Pelagic and vagrant south of Sydney |
| Dermochelys coriacea | Leatherback Turtle | E | Yes | No | Pelagic in NSW |
| Hoplocephalus bungaroides | Broad-headed Snake | V | No | No | Requires forest on sandstone escarpments |
| Birds | | | | | |
| Diomedea exulans | Wandering Albatross | V | No | No | Pelagic in NSW |
| Diomedea e. exulans | Tristan Albatross | E | No | No | Pelagic in NSW |
| Diomedea e. antipodensis | Antipodean Albatross | V | Yes | No | Pelagic in NSW |
| Diomedea e. gibsoni | Gibson's Albatross | V | Yes | No | Pelagic in NSW |
| Diomedea e amsterdamensis | Amsterdam Albatross | E | No | No | Pelagic and vagrant in NSW |
| Thalassarche bulleri | Buller's Albatross | V | Yes | No | Pelagic and vagrant in NSW |
| Thalassarche cauta cauta | Shy Albatross | V | Yes | No | Pelagic in NSW |
| Thalassarche c. salvini | Salvin's Albatross | V | Yes | No | Pelagic in NSW |

| Scientific name | Common name | EPBC Status | Reported within 1 km of the site | Potential habitat on site | Justification |
|---|---|---|---|---|---|
| Thalassarche c. steadi | White-capped Albatross | V | Yes | No | Pelagic in NSW |
| Thalassarche m. melanophris | Black-browed Albatross | V | No | No | Pelagic in NSW |
| Thalassarche m. impavida | Campbell Albatross | V | Yes | No | Pelagic in NSW |
| Macronectes giganteus | Southern Giant Petrel | E | Yes | No | Pelagic in NSW |
| Macronectes halli | Northern Giant-Petrel | V | Yes | No | Pelagic in NSW |
| Pterodroma l. leucoptera | Gould's Petrel | E | No | No | Pelagic in NSW |
| Pterodroma n. neglecta | Kermadec Petrel | V | Yes | No | Pelagic in NSW |
| Rostratula australis | Australian Painted Snipe | V | Yes | No | Shallow inland wetlands, either freshwater or brackish, often temporary or infrequently filled, usually with some timber |
| Lathamus discolor | Swift Parrot | E | Yes | No | Requires forests and woodlands with winter-flowering eucalypts |
| Neophema chrysogaster | Orange-bellied Parrot | CE | Yes | No | Requires coastal saltmarshes; vagrant in NSW |
| Xanthomyza phrygia | Regent Honeyeater | E | Yes | No | Requires winter flowering woodlands, such as box-ironbark or swamp mahogany |
| Mammals | | | | | |
| Dasyurus m. maculatus | Spot-tailed Quoll, | E | Yes | No | Requires sclerophyll woodlands and forest, coastal heathlands and rainforest with suitable den sites (hollow logs, caves), and extensive connectivity |
| Isoodon obesulus obesulus | Southern Brown Bandicoot | E | Yes | No | Lives in areas of thick vegetation and constructs nests underground |
| Potorous tridactylus tridactylus | Long-nosed Potoroo | V | Yes | No | Inhabits coastal heaths and dry and wet sclerophyll forests. Dense understorey is essential |
| Pteropus poliocephalus | Grey-headed Flying-fox | V | Yes | No | Occurs in subtropical and temperate rainforests, sclerophyll forests, woodlands, heaths, urban gardens and orchards |
| Chalinolobus dwyeri | Large-eared Pied Bat | V | Yes | No | Requires rainforest or eucalypt forest with extensive connectivity |

V = vulnerable, E = endangered, EC = Critically Endangered

**Table 2: TSC species identified as potentially occurring in the area of development**

| Scientific name | Common name | TSC Status | Recorded since 1980 | Potential habitat on site | Justification |
|---|---|---|---|---|---|
| Plants | | | | | |
| Acacia baueri subsp. aspera | | V | No | No | Inhabits damp heathlands often on exposed rocky outcrops |
| Acacia bynoeana | Bynoe's Wattle | E | Yes | No | Inhabits heath or dry sclerophyll forests on sandy soils |
| Arthropteris palisotii | Lesser Creeping Fern | E | Yes | No | Requires rainforest |
| Cynanchum elegans | White-flowered Wax Plant | E | Yes | No | Inhabits dry rainforest edges |
| Haloragis exalata subsp. exalata var. exalata | | V | Yes | No | Requires protected and damp riparian habitats |
| Pimelea spicata | Spiked Rice-flower | E | Yes | No | In the coastal Illawarra, occurs in Coast Banksia open woodland with well developed shrub and grassy understorey |
| Pultenaea aristata | Prickly Bush-pea | V | Yes | No | Inhabits dry sclerophyll woodland or wet heath on sandstone |
| Solanum celatum | | E | No | No | Inhabits rainforest clearings or wet sclerophyll forests |
| Zieria granulata | Illawarra Zieria | E | Yes | No | Inhabits dry ridge tops and rocky outcrops on shallow volcanic soils |
| Amphibians | | | | | |
| Litoria aurea | Green and Golden Bell Frog | E | Yes | Yes | A population exists adjacent to the site |
| Pseudophryne australis | Red-crowned Toadlet | V | Yes | No | Requires sandstone escarpments |
| Reptiles | | | | | |
| Chelonia mydas | Green Turtle | V | No | No | Pelagic and vagrant in south of Sydney. |
| Birds | | | | | |
| Diomedea antipodensis | Antipodean Albatross | V | Yes | No | Pelagic species |
| Diomedea exulans | Wandering Albatross | E | Yes | No | Pelagic species |
| Diomedea gibsoni | Gibson's Albatross | V | Yes | No | Pelagic species |
| Thalassarche cauta | Shy Albatross | V | Yes | No | Pelagic species |
| Thalassarche melanophris | Black-browed Albatross | V | Yes | No | Pelagic species |
| Thalassarche m. impavida | Campbell Albatross | V | Yes | No | Pelagic species |
| Macronectes giganteus | Southern Giant Petrel | E | Yes | No | Pelagic species |
| Macronectes halli | Northern Giant-Petrel | V | Yes | No | Pelagic species |
| Pterodroma l. leucoptera | Gould's Petrel | V | Yes | No | Pelagic species |
| Pterodroma solandri | Providence Petrel | V | Yes | No | Pelagic species |
| Puffinus assimilis | Little Shearwater | V | Yes | No | Pelagic species |
| Puffinus carneipes | Flesh-footed Shearwater | V | Yes | No | Pelagic species |

| Scientific name | Common name | TSC Status | Recorded since 1980 | Potential habitat on site | Justification |
|---|---|---|---|---|---|
| Stictonetta naevosa | Freckled Duck | V | Yes | No | Requires deep open wetlands, usually with some timber |
| Oxyura australis | Blue-billed Duck | V | Yes | No | Requires deep open wetlands, usually with some timber |
| Botaurus poiciloptilus | Australasian Bittern | V | Yes | No | Requires expansive freshwater wetlands with well-developed emergent vegetation |
| Ixobrychus flavicollis | Black Bittern | V | Yes | No | Requires forested wetlands |
| Pandion haliaetus | Osprey | V | Yes | No | Vagrant in southern NSW |
| Lophoictinia isura | Square-tailed Kite | V | Yes | No | Prefers timbered country and forested ranges |
| Ephippiorhynchus asiaticus | Black-necked Stork | E | Yes | No | Vagrant in southern NSW |
| Rostratula benghalensis australis | Painted Snipe | E | No | No | Shallow inland wetlands, either freshwater or brackish, often temporary or infrequently filled, usually with some timber |
| Haematopus fuliginosus | Sooty Oystercatcher | V | Yes | Marginal | Predominantly inhabits rocky intertidal areas |
| Haematopus longirostris | Pied Oystercatcher | V | Yes | Marginal | Prefers sand-spits and tidal mudflats |
| Charadrius leschenaultii | Greater Sand-Plover | V | Yes | Marginal | Estuaries, tidal mudflats, occasionally coastal wetlands |
| Thinornis rubricollis | Hooded Plover | CE | Yes | No | Requires remote sandy beaches with low disturbance levels |
| Charadrius mongolus | Lesser Sand-Plover | V | Yes | Marginal | Estuaries , tidal mudflats, occasionally coastal wetlands |
| Limosa limosa | Black-tailed Godwit | V | Yes | Marginal | Estuaries, tidal mudflats, occasionally coastal wetlands |
| Xenus cinereus | Terek Sandpiper | V | Yes | Marginal | Estuaries, tidal mudflats |
| Calidris alba | Sanderling | V | Yes | Marginal | Estuaries, tidal mudflats |
| Calidris tenuirostris | Great Knot | V | Yes | Marginal | Estuaries, tidal mudflats |
| Limicola falcinellus | Broad-billed Sandpiper | V | No | Marginal | Estuaries, tidal mudflats |
| Sterna albifrons | Little Tern | E | Yes | Marginal | Breeds on undisturbed sandy beaches; sometimes roosts on beaches and rocky platforms |
| Sterna fuscata | Sooty Tern | V | Yes | No | Pelagic species and vagrant in NSW |
| Gygis alba | White Tern | V | No | No | Pelagic species and vagrant in NSW |
| Ptilinopus magnificus | Wompoo Fruit-Dove | V | No | No | Rainforest species |
| Ptilinopus regina | Rose-crowned Fruit-Dove | V | Yes | No | Rainforest species |
| Ptilinopus superbus | Superb Fruit-Dove | V | Yes | No | Rainforest species |
| Calyptorhynchus lathami | Glossy Black-Cockatoo | V | Yes | No | Requires extensive groves of Casuarina in sclerophyll forests |
| Callocephalon fimbriatum | Gang-gang Cockatoo | V | Yes | No | Requires montane forests in summer, and lowlands forests in winter |

| Scientific name | Common name | TSC Status | Recorded since 1980 | Potential habitat on site | Justification |
|---|---|---|---|---|---|
| Lathamus discolour | Swift Parrot | E | Yes | No | Requires forests and woodlands with winter-flowering trees |
| Polytelis anthopeplus | Regent Parrot | E | Yes | No | Confined to mallee and similar semi-arid habitats in Western Districts. |
| Polytelis swainsonii | Superb Parrot | V | Yes | No | Confined to west of Great Divide |
| Neophema pulchella | Turquoise Parrot | V | No | No | Requires grassy plains or woodlands |
| Ninox connivens | Barking Owl | V | Yes | No | Requires woodlands or similar timbered country |
| Ninox strenua | Powerful Owl | V | Yes | No | Requires forest or similar timbered country |
| Tyto novaehollandiae | Masked Owl | V | No | No | Requires forested or timbered country |
| Tyto tenebricosa | Sooty Owl | V | Yes | No | Requires tall, moist forest |
| Pachycephala olivacea | Olive Whistler | V | Yes | No | Requires montane forests |
| Coracina lineata | Barred Cuckoo-shrike | V | Yes | No | Requires rainforest or moist forest |
| Petroica rodinogaster | Pink Robin | V | Yes | No | Requires moist montane forests; vagrant in NSW |
| Grantiella picta | Painted Honeyeater | V | Yes | No | Requires semi-arid woodlands with abundant mistletoe |
| Xanthomyza phrygia | Regent Honeyeater | E | Yes | No | Requires winter flowering box-Ironbark woodlands or similar |
| Mammals | | | | | |
| Dasyurus maculatus | Spotted-tailed Quoll | V | Yes | No | Requires complex vegetated habitats with extensive connectivity |
| Dasyurus viverrinus | Eastern Quoll | E | No | No | Requires complex vegetated habitats with extensive connectivity |
| Cercartetus nanus | Eastern Pygmy-possum | V | Yes | No | Requires wet or dry eucalypt forest, woodlands or heaths with extensive connectivity |
| Phascolarctos cinereus | Koala | V | Yes | No | Requires eucalypt tree species |
| Pteropus poliocephalus | Grey-headed Flying-fox | V | Yes | No | Occurs in subtropical and temperate rainforests, sclerophyll forests, woodlands, heaths, urban gardens and orchards |
| Miniopterus schreibersii oceanensis | Eastern Bentwing-bat | V | Yes | No | Requires caves for roosting |
| Mormopterus norfolkensis | Eastern Freetail-bat | V | No | No | Requires dry or wet sclerophyll forest |
| Chalinolobus dwyeri | Large-eared Pied Bat | V | Yes | No | Requires rainforest or eucalypt forest with extensive connectivity |
| Scoteanax rueppellii | Greater Broad-nosed Bat | V | No | No | Requires tall wet forest |

V = vulnerable, E = endangered, EC = Critically Endangered